Tweeting Mass Shootings —The Dynamics of Issue Attention on Social Media

Abstract

Mass shootings in the United States have gained more public attention in the past decade and elicited heated debate over firearm regulations. Meanwhile, social media like Twitter have become a central platform that manifests such attention. In this paper, we propose to detect patterns of issue attention on mass shootings by tracing the volume of relevant tweets. We compiled two datasets using both traditional and computational methods. One dataset is of mass shooting events, and the other is of tweets about mass shootings on Twitter. Our focus is twofold--we conceptualize social media discourse as both an indicator and a construction of issue attention. First, we looked into the longitudinal trend of issue attention in association to mass shooting events. Second, we decomposed the issue attention into discursive themes and check the variation among those themes. We attempt to explore how mass shooting event features affect the ebbs and flows of issue attention.

CCS Concepts

• Theory of computation → Theory and algorithms for application domains → Database theory → Data modeling • Applied computing → Law, social and behavioral sciences → Sociology

Keywords

issue attention; computational method; social media; mass shooting

1. INTRODUCTION

Among the 30 deadliest mass shootings in the United States since 1949, 16 have occurred in the past decade [Willingham 2016], including the 2012 Sandy Hook shooting, the 2015 San Bernardino shooting, and a long list of other high-profile shootings in places like Aurora, Washington Navy Yard, and Charleston. These mass shootings have generated extensive media coverage and elicited voluminous talk on social media. Social media have become a central information source [Hermida et al. 2012; Pew Research Center 2015], a place for personal emotions and public sentiments after tragic events [DeGroot 2014; Jackson and Usher 2015], and a forum for policy discussion and debate [Benkler et al. 2015]. We treat social media as a barometer of issue attention to investigate the dynamics of issue attention regarding mass shootings on social media. Our analysis is guided by two research questions: 1) What is the trend of the volume of social media responses to mass shootings? 2) How do different mass shootings trigger varying social media responses?

By shedding light on dynamics of issue attention on Twitter over time, this paper will contribute to the scholarly conversation on the ways digital communication technologies influence the volume and valence of online discourse concerning mass shooting events. Our approach to answering these research question is innovative in three ways. First, we comprehensively code all mass shooting events over a three-year span so that we can untangle the effect of mass shooting events on social media responses, including the impact of various event features, over time. Second, we utilize computational methods, including topic modeling and dictionary based classification, to analyze a corpus of over 3 million tweets as a method of indexing issue attention concerning mass shooting events. Lastly, introducing social media to the measurement of issue attention, we at the same time nuance the conceptualization of social media as an arena for issue attention to restore the agency of social media users.

2. LITERATURE REVIEW

A rising amount of public attention to a certain issue can be triggered by direct or mediated exposure to relevant events, and such issue-specific attention can fade over time. Downs [1972] proposed a five-stage account of an issue cycle, which was characterized by the pre-problem stage, awareness stage, realizing the cost stage, gradual decline stage, and the post-problem stage. Based on Down's theory, Henry and Gordon [2001] delineated a three-phase model of issue attention: developing, declining, and reaching an equilibrium. They proposed that this pattern over time could be explained by a "bored public," after the public attention to a certain issue peaked following a crisis, adding that "the repetition of the crisis without immediate consequences or high-visibility attention within democratic institutions is not sufficient to maintain interest in the issue" [Henry and Gordon 2001]. Similarly, Kinnick et al. [1996] recorded empirical evidence for compassion fatigue, the phenomenon that people's compassionate feelings regarding a certain social issue declined after intense communicative exposure to the given issue. Kinnick et al. found that the exposure to media coverage and interpersonal communication about given social issues was positively associated with the level of compassion fatigue.

An alternative way to look at the fluctuation of issue attention is to view it as a result of an ecological dynamic. As illustrated in Hilgartner and Bosk's [1988] arena theory

about issue attention, "public attention is a scarce resource, allocated through competition in a system of public arenas." In each arena—an institutional, communicational, or personal environment where public discourse takes place—the carrying capacity only allows limited number of social issues and limited amount of attention to them at a given time [Hilgartner and Bosk 1988]. According to Hilgartner and Bosk, the competition is resolved by a set of selection principles including both the formative features of the issue (drama, novelty, cultural and political norm, etc.) and the communicational structure of the arena (interaction pattern, network, organization, etc.). Similarly, Webster [2011] argued that issue attention had been the product of a mutual construction involving both the external structure of information flow and the agency of individuals to utilize that structure for their own ends. According to Webster, digital media platforms like social media bear a dual nature, which "reconciles the desires of agents with structures that accommodate those desires," and hence amplifies the dynamic of issue attention.

Therefore, the public discourse on social media is not only a reflection of issue attention, but also an arena where the significance of such attention is constructed and qualified. Our probe into issue attention to mass shootings is based on this conceptualization of social media. Gun discourse related to mass shootings fits well in the attention-cycle perspective of issue attention, while social media users also actively define the nature of the discourse with competing frames. Studies have captured spikes in legislative activities the year after a mass shooting event [Luca et al. 2016], yet many pieces of potentially effective legislation died shortly after their introduction, or are watered down to "feel good legislation" [Schildkraut and Hernandez 2014]. In addition, studies have found rises in gun purchases and federal background checks following mass shooting events [Wallace 2015]. Focusing on the dual natures of social media discourse, this study seeks to provide more insight of the dynamic behind issue attention to mass shootings.

The complexity of issue attention on mass shootings as a discursive construction reveals in multiple facets of the gun regulation debate. On the one hand, the United States has the highest gun violence rate among countries without ongoing wars, which has prompted louder voices for more stringent gun regulations. On the other hand, the right to bear arms is enshrined in the US constitution, with Second Amendment advocates fervently blocking any legislative move towards stricter gun control. Vizzard [2015] reviewed the course of firearm policy over the past century and found only minimal change at the federal level. Vizzard further detected a flourish of concealed carry legislation and pro-Second Amendment judicial decisions at the state level in the past two decades. Collier [2014] described the inertia of US gun policy as a tragic: "The tragedy is not something awful and terrible that should never have happened. The tragedy is something awful and terrible that was and is supposed to happen." For Collier, the constitutional right to bear arms is not a self-contained legal proposition, but a discourse corresponding with the power structure and cultural configuration of the US society. Esposito and Finley [2014] identified a neoliberalism ideology, which discredited strong government administration and promoted self-dependent individualism, behind the gun control debate. All these themes need to be considered when the issue attention on mass shootings is to be deconstructed within the social media discourse.

3. METHOD

This study uses a definition of the phrase "mass shooting" that is in line with the FBI definition of a "mass murder," counting any shooting event which resulted in four or more deaths, excluding the assailant(s). Event data was collected from three databases: the Stanford Mass Shootings in America (MSA) project, the Gun Violence Archive (GVA), and the USA Today Behind the Bloodshed Project (USA Today). The MSA is collected based on online news media sources, the GVA database is based on a combination of online news sources, police media outlets, and police blotters, and the USA Today database is based on the Supplementary Homicide Reports (SHR) from the FBI. While no individual event dataset claims to be exhaustive, they represent three diverse levels of source selection (news media, local police reports, and data reported to the FBI) and each have their own form of source validation.

After compiling the event data and removing events which did not fit our timeframe or definition of mass shooting, 61 mass shooting events were identified from the beginning of 2012 to the end of 2014. While there was much overlap in terms of identified events and several coding categories across all three databases, there were also substantial differences that required standardization. In order to standardize data collection across all three event databases, three graduate student coders analyzed the final list of mass shooting events and coded each a variety of features. Each event was independently validated by coders through online news sources which referenced police reports and judicial proceedings, which were cataloged in our data files. The currently validated features are: location (city, state), date, number of victim fatalities ($\alpha = .82$), shooter race ($\alpha = .77$), and shooting type ($\alpha = .72$). The reason why the agreement level is low lies mainly in the sources of news and we will discuss to improve the agreement. The following features will be validated and also included in the final analysis: victim injuries, shooter fate (suicide, arrested, etc.), and shooter age, and specific shooting location (school, residential home, etc.).

Social media data were gathered from a running archive that collects tweets through Twitter's streaming API. Our archive consists of a random sample (10%) of Twitter's global stream of tweet data between 2012 and June 30, 2015, and 1% after that date, when Twitter changed its service to our account; therefore, timeframe of data collection was from 2012 to 2014. Two steps were taken to optimally retrieve relevant data about mass shootings from the archive. First, general search strings were defined so as to cast a wide net to capture as many tweets as possible. The search strings were "shooting," "gun," and "firearm." The second step involved noise reduction of the harvested data. Two coders were assigned to produce an exclusion list containing words and phrases that marked irrelevant tweets. Then all tweets containing one of the words or phrases were deleted. Foreign language tweets were also removed.

Eventually, 3,127,263 tweets were included in subsequent analysis. Although we did not exclude potential bots and non-U.S. accounts, we concluded that they do not pose a threat to validity of our data because our central concern is the longitudinal trends of relevant tweets during a three-year span. Bots might only interfere with a relative small amount of dates at most; tweets coming from outside the U.S. should be legitimate data as long as they are thematically relevant.

We treated each tweet as a document and applied Latent Dirichlet Allocation (LDA), an effective method of topic modeling, to classifying the tweets into 100 topics. With the topic terms and tweets under the corresponding topics at hand, two graduate student coders went through 50 topics each and the tweets with the goal to further reduce irrelevant tweets by adding words/phrases to the exclusion list and to detect major themes running through the tweets. With the updated exclusion list, we conducted another round of topic modeling and replicated the theme detection process, where each coder grouped together similar topics into a certain theme. Eventually, five major themes were inductively identified and agreed upon by the two coders.

The first theme is "news," encompassing matter-of-fact tweets about breaking news developments about mass shooting events. The second theme is "thoughts and prayers," including tweets that expressed condolences and sadness. The third theme is "frustration and anger," capturing tweets that contained strong and negative emotions toward mass shootings. "Second amendment" is the fourth theme, founded in tweets that mentioned the rights to bear arms. "Gun policy" is the fifth theme, under which people discussed legislative measures regarding gun regulation. In the next step, a dictionary-based approach was used for classification of tweets. With the second round of topic modeling results at hand, eight graduate student coders built five dictionaries for the five themes, each consisting of an initial set of words/phrases. For each theme, they selected the key terms of the topics grouped under the theme; they also browsed the tweets classified under the topics and picked the most frequently appearing words. Five initial dictionaries with around 100 words and phrases in each were used to classify tweets—if a tweet contained one of the words/phrases in a dictionary, it was tagged with the corresponding theme.

However, in order to reduce coder subjectivity, we conducted an optimization of the approach. Classification outcomes based on the initial dictionaries were used to generate the final ones. First, we tabulated word frequencies within each category of tweets, identified the top 600 words for each, calculated every top word's frequency in each category of tweets, and derived a discriminatory power of each word. The discriminatory power was the ratio of a given word's frequency within its category divided by its combined frequencies within all other categories. Second, we eliminated words whose discriminatory powers were lower than 1.5 as well as words that were common nouns, pronouns, verbs, and auxiliary words. Only the "news" dictionary has several words removed. The resulting five dictionaries (displayed partially in Table 1), with high discriminatory power and minimal coder subjectivity, were used for the final classification. This approach proved to be effective, evidenced in the higher ratio means for all top 600 words through final classification. Among the 3,047,713 tweets after noise reduction (using words in the exclusion list), 2,405,619 tweets, 78.93% percent, were classified. Due to the large variance of the daily counts of tweets, we plotted the log transformed counts under each theme, as shown in the appendix.

Table 1. Partial dictionaries for classification

News	shot; killed; police; dead; shooting; injured; suspect; news; officer; breaking; officers; wounded; deadly; shots; incident
Second Amendment	amendment; 2nd; protect; #2ndamendment; govchristie; constitution; #secondamendment; freedom; disarm; written; #constitution; enter; militia; sentedcruz; register
Gun Policy	#guncontrol; #nra; laws; #gunsense; bill; congress; senate; guncontrol; legislation; #guncontrolnow; safety; #gunviolence; illegal; antigun; #uniteblue
Frustration and Anger	fuck; shit; enough; mad; tired; scared; idiot; holy; #endgunviolence; sucks
Prayers and Thoughts	prayers; families; thoughts; tragedy; sad; affected; tragic; remember; prayer; praying; donate; pray; condolences; sending; deserves

4. DISCUSSION

The first part of our analysis will focus on trend in volume of total number of tweets as well as tweets under each theme. We plan to apply time-series modeling to detect whether issue attention wore off as mass shootings grew more commonplace. In the second part of analysis, we will control for time and analyze impacts of mass shooting event features on issue attention. The daily counts of total tweets as well as the respective daily counts of tweets under each theme compose the outcome variables in our analysis, while the event features constitute the independent variables. We expect to see a downward trend in issue attention on the aggregate as mass shootings occurred more often during the 2012-2014 period. However, levels of issue attention might vary with different events during the timeframe. We predict that features of mass shooting will be correlated with types of social media responses.

Conceptualizing issue attention in the context of social media, we not only track the ebbs and flows of issue attention over an extended period of time, but also probe into the discursive dynamics behind such a cycle. Our approach leaves us begging the question of how traditional news media might have contributed to the trend. The next step following this study should distinguish actors on social media to identify the driving force of the attention dynamic. It should also address the role of traditional media and investigate the possibility of inter-media agenda setting.

Furthermore, a better understanding of issue attention on social media may offer insight for public policy making like firearm regulations. Policy makers nowadays see social media as a valuable platform to channel public opinion. But it is still a step further to go beyond prompt response to certain issues that go viral on social media. Our study aims to provide empirical findings that guide a sustainable discussion of important public issues and a constructive transformation of issue attention to democratic deliberation.

5. REFRENCES

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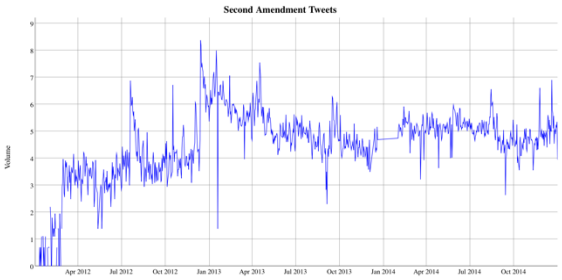
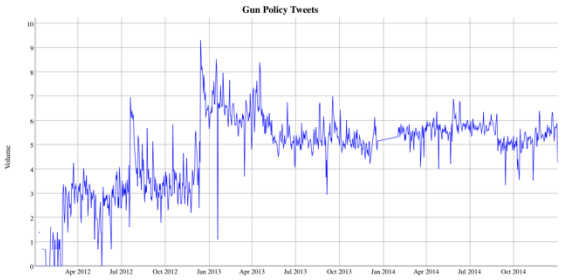
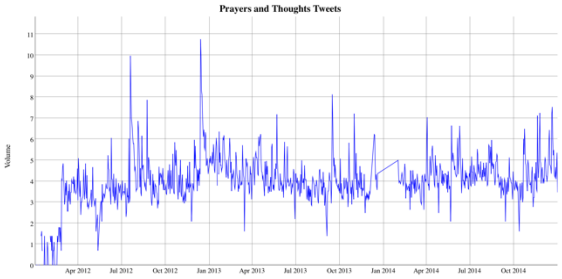
6. APPENDIX

Fluctuation in Daily Counts of Tweets of 5 Themes (News, Second Amendment, Gun Policy, Frustration and Anger, Prayers and Thoughts) Over Time




Gun Policy Tweets
Volume
0
1
2
3
4
5
6
7
8
9
10
Apr 2012
Jul 2012
Oct 2012
Jan 2013
Apr 2013
Jul 2013
Oct 2013
Jan 2014
Apr 2014
Jul 2014
Oct 2014


Prayers and Thoughts Tweets
Volume
0
1
2
3
4
5
6
7
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10
11
Apr 2012
Jul 2012
Oct 2012
Jan 2013
Apr 2013
Jul 2013
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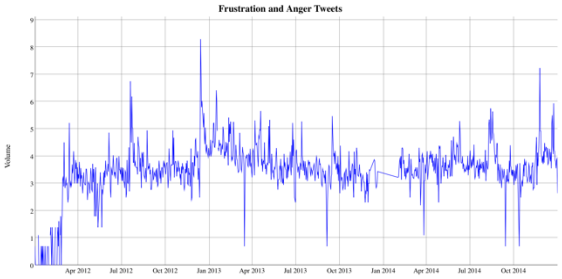
Jan 2014
Apr 2014
Jul 2014
Oct 2014


Frustration and Anger Tweets
Volume
0
1
2
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Apr 2012
Jul 2012
Oct 2012
Jan 2013
Apr 2013
Jul 2013
Oct 2013
Jan 2014
Apr 2014
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