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How Misinformation Spreads Through Twitter

Mary Blankenship
University of Nevada, Las Vegas, blankens@unlv.nevada.edu

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ABSTRACT

While living in the age of information, an inherent drawback to such high exposure to content lends itself to the precarious rise of misinformation. Whether it is called “alternative facts,” “fake news,” or just incorrect information, because of its pervasiveness in nearly every political and policy discussion, the spread of misinformation is seen as one of the greatest challenges to overcome in the 21st century. [1] As new technologies emerge, a major piece of both content creation and the perpetuation of misinformation are social media platforms like Twitter, Facebook, and YouTube. As news events emerge, whether be a pandemic, a mass shooting, or an election campaign, it is difficult to divulge the facts from fiction when so many different “facts” appear. This study looks at 14,545,945 tweets generated in the wake of the 1 October mass shooting and its second anniversary to identify how much of the public response is fogged by information pollution, to identify what kind of misinformation is spread and how it spreads on Twitter and news coverage.

[1] Gray, R. (1 March 2017). Lies, propaganda and fake news: A challenge for our age. BBC. Retrieved from https://www.bbc.com/future/article/20170301-lies-propaganda-and-fake-news-a-grand-challenge-of-our-age

TABLE OF CONTENTS

Acknowledgements

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INTRODUCTION

People are increasingly seeing the world through the lens of social media, particularly now, with the stay-at-home measures imposed to mitigate the spread of the COVID-19 pandemic and people's contact to the outside world resorting to being mostly, if not entirely, online. More than 2.4 billion people use social media (about one third of the world's population), with roughly 330 million people using Twitter as of 2019 (Ortiz-Ospina, 2019). The constant live-updating, 280 character microblogging platform that is Twitter lets a person anywhere in the world with internet connection instantly find entertainment[2], catch the news, share their opinions, and pass information along – whether that information is correct or not. As events in this world unfold, from local to international levels, the reactions and updates from people emerge just as fast. An example of this can be seen with a recent interview of the Mayor of Las Vegas on CNN that garnered over 320,000 tweets from all over the world in the scope of just five days (Blankenship et al., 2020).

Never has the interconnectedness of the world been more apparent and while social media does have a profound positive impact, issues emerge with how the technology is utilized. After the tragedy of the 1 October massacre, the Las Vegas community was brought closer together with messages of support and the rallying cry of #vegasstrong that now defines the metropolitan area (Barrie, 2019). At the same time, more malevolent interactions of accusations, rumors, conspiracies were initiated and continue to persist, fogging the public discourse and taking over the larger policy issues at hand.

One of the greatest challenges facing the country and the world today is overcoming the information pollution that comes in a variety of forms, including mis- and dis-information. Although these disorders have been present throughout the ages, the ability to hide or fabricate your identity online while reaching millions of people is escalating the harmful ramifications possible. As Abraham Lincoln addressed in a speech, "our government rests in public opinion. Whoever can change public opinion, can change the government, practically just so much. Public opinion, on any subject, always has a 'central idea,' from which all its minor thoughts radiate." The 2016 Presidential election highlighted the vast extent of information manipulation that took place with the rise of "fake news," content meant to prey on the ignorance and emotional responses that is inherent to every human. By the end of that election cycle, false content ended up accumulating more engagement (likes, shares, comments) than mainstream, more factually reliable news (Silverman, 2017). The true extent of the impact that incorrect information has on our decision making is not well known but a study conducted by the National Bureau of Economic Research found that the continuing coverage and rapid spread of information by Twitter bots alone may have contributed about 3.23% of vote the

[2] Depends on what you consider entertainment to be

Donald Trump (Smialek, 2018). The rest of this paper is going to go through the bare bones of what misinformation is and will elaborate the pivotal role that social media outlets play in its spread.

The diffusion of (mis)information is a nuanced subject and to uncover some of its complexities, the following elements are going to be looked at in detail: what kind of misinformation about the 1 October mass shooting spread and how lasting is the impact, if the misinformation is perpetuated by bots or humans, what kind of motivation could be behind the message and its intended audience, if the message has long term ramifications, and whether the message is supported or corrected by those who engage in the conversation.

WHAT IS MISINFORMATION?

The term "information pollution" can encapsulate a wide variety of incorrect information that is perpetuated online. This paper utilizes a framework developed and published with the Council of Europe called *Information Disorder*, which outlines the different phases, elements, and players contributing to this phenomena. Three different categories of information pollution can be separated into the following categories: misinformation, disinformation, malinformation.

- Misinformation: occurs when false information is shared with no intent to harm
- Disinformation: occurs when false information is shared with the intent to harm
- Malinformation: occurs when genuine information is shared with the intent to harm, e.g. leaks

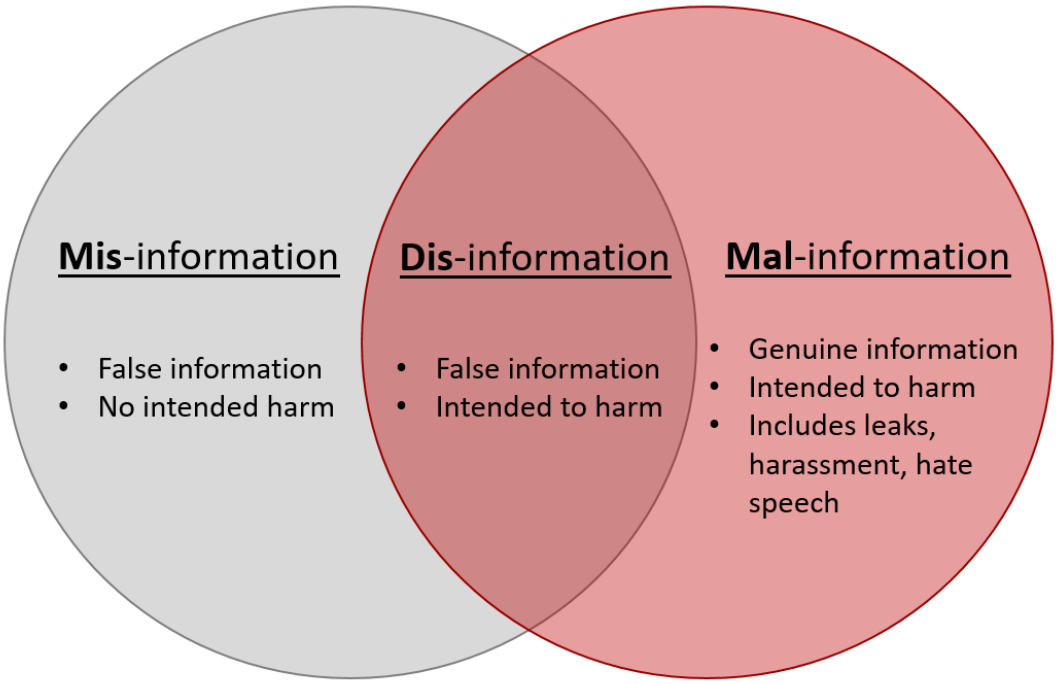


Figure 1: *Shows a Venn diagram (modified from the Information Disorder report) that categorizes the different forms of information pollution that typically occur.*

The three categories differ primarily in their intent to harm and the level of inaccuracy but the extent of information that can disseminate and its potential to impose harm can be equally as severe. In this study, since the intent to harm is difficult to discern, the incorrect information that is spread will all be placed under the blanket label of "misinformation." There are various types of information disorders that can pervade from fabricated and manipulated content to more nuanced misinterpretation and false connection of content (Warle and Derakhshan, 2017). Information disorder can also be perpetuated not only through text and stories but also though images, audio, and video. With the development of "deep-fakes" that can take authentic sources and manipulate it into fake information and because of how realistic these deep-fakes can appear, determining what is real is even a greater challenge for governments and citizens (Meserole and Polyakova, 2018).

The diffusion of information pollution can be seen through three different elements of the agent, the message, and the interpreter. As outlined in Table 1 below, the tale of misinformation begins with the "Agent" that creates the falsified information for whatever motivation and diffused by the "Message" and the "Interpreter."

Table 1: *Description of information pollution elements*

Element	Description	Characteristics of Element
The Agent	Creates misinformation	• Can be an official or unofficial actor • Can be part of group or done individually • Can have different motives (including political or financial) • Can use automated technology
The Message	What is communicated by the Agent and what is distributed	• Can be illegal • Can create long-term impact • Accuracy can be difficult to discern • Can per perpetuated through a variety of mediums (news, videos, audio, etc.)
The Interpreter	Audience of the message	• Message can be perpetuated or evolve with how different demographic groups interpret the information

The vast combination of possible misinformation and the actors that spread and interpret the message can result in a never ending cycle of information pollution. Once a false message is out, it is easy for it to diffuse and get picked up in news coverage and publications that then get referenced back in social media posts, continuing the cycle. A message that is successful at gaining traction typically contains content that perpetuates feelings of superiority, anger, or fear against another group.

Role of social media in the spread of misinformation

News companies and social media have a symbiotic relationship, as most media outlets now have a cross-platform approach to deliver their coverage that also includes social media channels. Meanwhile, the social media companies have incorporated separate tabs within their platform that only focus on the news or give "live" updates to trending events. Even traditional forms of journalism like newspapers and TV coverage increasingly utilize social media posts found on these platforms as their supporting evidence or as the entire story itself. The practical reason behind this utilization is that sharing news articles on social media outlets increases the lifespan of that those articles have to mass exposure – from the media lifespan of 2.6 days without any media sharing to 3.2 days when also shared as a post (Carr, 2015). For Twitter alone, the lifespan of an article is typically 2.5 days or 10-72 hours.

Twitter is a platform that is generally most news-focused than the others with its content and is the third most popular social media outlet – behind Facebook and YouTube – to deliver news to its users (Shearer and Matsa, 2018). About two-thirds of Americans at least occasionally got their news on social media in 2018, even though more than half of social media consumers think that the news they see is inaccurate (Shearer and Matsa, 2018). The nature of information sharing and receiving has fundamentally changed in a short period of time since it has become so easy to share the information and we do not know how to correctly deal with it.

BACKGROUND ON 1 OCTOBER

As mass shootings are becoming a marker of American life, on October 1st 2017, Las Vegas joined an ever-increasing list of communities that suffered similar tragedies. Stephen Paddock opened fire from his hotel window at Mandalay Bay on a crowd of 22,000 concert-goers at the 91 Route Harvest Festival, killing 58 and injuring more than 850 people (Corcoran et al., 2019). This was the largest mass casualty shooting in the history of the United States. It began at 10:05 pm with Paddock firing with assault rifles (24 in total) he had snuck into this hotel room in the days before and ended at about 10:15pm with his suicide before the SWAT team could break into his room (Corcoran et al., 2019). The first public account of the shooting came from a tweet about ten minutes after the first shots began. Twitter remained a crucial element in the communications of the Las Vegas Metropolitan Police Department (LVMPD) throughout the emergency and the investigation that followed.

Chaos and confusion engulfed the scene immediately, and just as quickly people took to their social media accounts to warn others of danger or send their thoughts and prayer, fiery debate also emerged with accusations of what might have happened at the scene. The shooter left no note or manifesto behind, not that such a vile act should even be attempted to be given a logical reason, but the absence of any affiliations or motivations has resorted to insufficient guessing about the shooter and the motives behind the act. This is shown by the public discussions that prevailed on social media after the shooting, and the claims that were most popular attempted to make up for the void.

Popular claims concerning the shootings

Although there was a huge variety in the accusations, conspiracies, and falsehoods that were spread online concerning the shooting, the following section outlines some of the main misinformation topics that were spread and are compared to the conclusions found in the official LVMPD and the Federal Bureau of Investigation (FBI) report published along with other sources.

There were multiple shooters:

This is one of the earliest incorrect pieces of information that was spread. Partly because the initial alerts from the police department did not know how many active shooters there were. However, the claims did not stop even after police found Paddock to be the only shooter.

→ One of the findings of the official investigation concluded that, "Paddock acted alone. Despite early reports of multiple shooters in different locations, no evidence exists to substantiate any of those reports," (LVMPD, 2018).

ISIS was responsible for shooting:

Immediately following the shooting, ISIS claimed responsibility for it and stated that the shooter was a "soldier of the Islamic State," without providing any evidence (Smith, 2017).

→ No evidence was provided by ISIS to the shooter's connection to it, the report also states that, "there was no evidence of radicalization or ideology to support any theory that Paddock supported or followed any hate group or any domestic or foreign terrorist organization," (LVMPD, 2018).

Shooter was a Muslim or converted to Islam:

This was often coupled with the ISIS claim and that the shooter had recently converted to Islam and even traveled to the Middle East to be trained by the terrorist organization.

→ Although the shooter did travel to the Middle East on a cruise, there is no evidence of connection to Islamic State. Again, the "investigators could not link Paddock to any specific ideology," and according to his girlfriend, "Paddock was not a religious person." (LVMPD, 2018).

"Going to die" warning:

This claim suggested that the girlfriend of the shooter, Marilou Danley, was at the concert venue and announced to people by her that they were "all going to die tonight" before the shooting occurred.

→ Danley was out of the country when the shooting took place and did not get back to the United States until October 4th, 2017 (LVMPD, 2018).

Shooter's identity:

Users identified the wrong people as the shooter, most notably Geary Danley, who has the same last name as the girlfriend of the gunman, Marilou Danley. Other false claims include that shooter was a 32 year-old Sam Hyde and had adopted a new name of Samir Al-Hajeed.

→ Shooter was Stephen Paddock and at no point went under any aliases.

Shooter was a left-wing extremist:

This claims was often coupled with claims of the shooter's identity and motives behind the shooting, which was perpetuated by a story written by the Gateway Pundit.

→ Danley stated, "Paddock didn't talk in length about politics and did not belong to any political organizations. Paddock did express a dislike for the Obama administration and was happy when President Trump was elected … Paddock did not comment on the topic of gun control and did not display any racial bias," (LVMPD, 2018).

Shooter was part of Antifa:

This claim was often coupled with claims of the shooter's political beliefs and the shooter's identity. The misinformation included claims that Antifa and ISIS literature was found in the hotel room of the shooter.

→ As previously established, ties to any political groups or organizations were not identified. The only document found was a handwritten note with distance/bullet drop calculations (LVMPD, 2018).

Shooter was part of an anti-Trump army:

This included reference to the shooter's alleged political affiliation and a picture of a man resembling Paddock that was shown at a Bernie Sanders rally in Reno earlier in the year.

→ As previously established, ties to any political groups or organizations were not present.

Shooter chose the venue because there would be many conservatives in the crowd:

This claim was also coupled often with the shooter's alleged political affiliation and the assumption that since the Route Harvest Festival is a country festival, many people who are conservative or Republican would be there

→ Paddock originally booked a room at The Ogden in late September that overlooked the Life Is Beautiful music festival and, "exhibited behavior which was similar to his time spent at Mandalay Bay." The shooter also booked rooms for a hotel during the Lollapalooza music festival in Chicago in August and had Internet searches that included "biggest open air concert venues in USA" and "how crowded does Santa Monica Beach get," in May of 2017 (LVMPD, 2018).

Shooting was a hoax:

People also started to claim that the shooting was made-up, "fake news," or an "insider job" as sometimes claimed the 9/11 terrorist attack (Bell, 2018).

Fake missing people:

Several accounts announced missing friends or relatives that did not exist or were not missing (Ohlheiser, 2019).

→ It was later found that these accounts lied to get more followers and online attention (Ohlheiser, 2019).

METHODOLOGY

This study utilizes data from the UNLV Libraries, collected by Thomas Padilla and Miranda Barrie that includes 14,108,104 tweets created from September 30, 2017 until October 7, 2017 at 5:00 pm PDT. The term "vegas" was used as the criteria for the collection of tweets. A response with this large number of tweets is significant, as the more typical number of tweets responding to mass shootings that occurred more recently (like the El Paso or Odessa shootings as examples) fluctuated around 1 million. This study also utilizes one of the collections conducted by the author of this paper on the second anniversary of the shooting and includes 437,841 tweets created from September 27, 2019 until October 6, 2019. Table 2 further describes the data. These tweets were collected using the open-source command line tool known as Twarc, which archived the tweets in JSONL format.

Table 2: *Summary of Twitter collections pertaining to study*

Collection	Search term	Start of collection	End of Collection	# of tweets
1-Oct 2017	vegas	Sat Sep 30 02:57:03	Tue Oct 07 17:00:00	14,108,104
1-Oct 2019	vegas	Fri Sep 27 09:48:32	Sun Oct 06 17:24:17	437,841

Because the topic of misinformation is so expansive, news stories highlighting tweets that included misinformation in them were used as the starting point to find tweets. Tweets that contained specific words, phrases, and users pertaining to information pollution were extracted. Multiple phrases or words can pertain to a topic - for example, the claim that ISIS is responsible for the shooting can have Twitter entries that include "ISIS," "ISIL," "Islamic State." Conversely, it is also possible for tweets pertaining to the topic to not include any explicit mention of said topic and unfortunately the scope of this study is unable to account for those kind of tweets.

If there were multiple search terms for a single topic, tweets corresponding to each of those terms would be extracted and grouped together in "clusters" that coincide with the topic. This also accounts for tweets that contain multiple details of misinformation and/or on different

topics, such tweets were included in multiple clusters. The list of qualifiers and their corresponding "clusters" can be seen in greater detail in Appendix A.

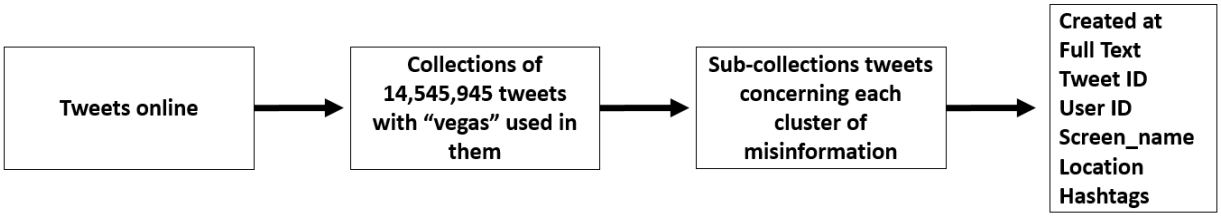
After the tweets were sorted in their clusters, any duplicate tweets were removed. A single tweet is rich in information, containing more than 150 different data variables and for the scope of this study, the variables of interest (created at, full text, tweet id, user id, username, location hashtags) were then obtained and used for the analysis. Table 3 goes over the variables of interest and describes them using the definitions found in the Twitter Developer dictionary (Twitter). Misinformation is also spread through video and pictures, however this study will focus on the written misinformation that can be detected from the full text of the recorded tweet.

***Table 3**: Description of tweet variables*

Variable	Description
Created at	*UTC* time when this Tweet was created.
Full Text	entire text of the tweet
Tweet ID	unique identifier for this Tweet
User ID	identifier for this User
Screen_name	The screen name, handle, or alias that this user identifies themselves with. screen_names are unique but subject to change
Location	user-defined location for this account's profile
Hashtags	hashtags mentioned in the Tweet or Retweet

Since the "location" variable is self-identified, it may not mean that the user is at that indicated location, but it can signify the place that the user has emotional connections with. There are other geographical variables like "coordinate" and "place" that give more accurate information, but do not have many entries within them since it is a feature that the user has to manually enable. A potential benefit to using "location" is that it allows for the opportunity to identify the presence of Twitter bots easier, as many bots often have strange entries for their locations or the same locations across multiple accounts (Barojan, 2018).

***Figure 2:** General overview of data processing*



DATA AND RESULTS

The tweets for each of the topic were divided in the categories of “Claim” and “Check”. The “Claim” category which indicates that the entry supported the misinformation or introduced the Message, therefore instigating the spread information pollution. Tweets attempting to correct the false information or question the validity of pronounced accusations are sorted under the “Check” category. These categories are going to be divided and sorted by the same protocol for the rest of the paper. Note: There is an inherent bias of more entries toward the “Claim” category since even tweets that contain more neutral messages can be construed as still supporting the misinformation. Top 10 Hashtags used within each cluster is available in Appendix B, any key findings from the hashtags will also be depicted here.

There were multiple shooters

Starting with the claims that the shooting was not solely done by Paddock, the engagements amount to 66,667 of extracted tweets in total. Figure 3 shows the number of tweets per day throughout the 2017 collection, with the greatest amount of entries recorded the day after the shooting with 29,977 entries that gradually taper off. No fact checking tweets about this topic were recognized.

***Figure 3**: “Multiple shooters” tweets per day*

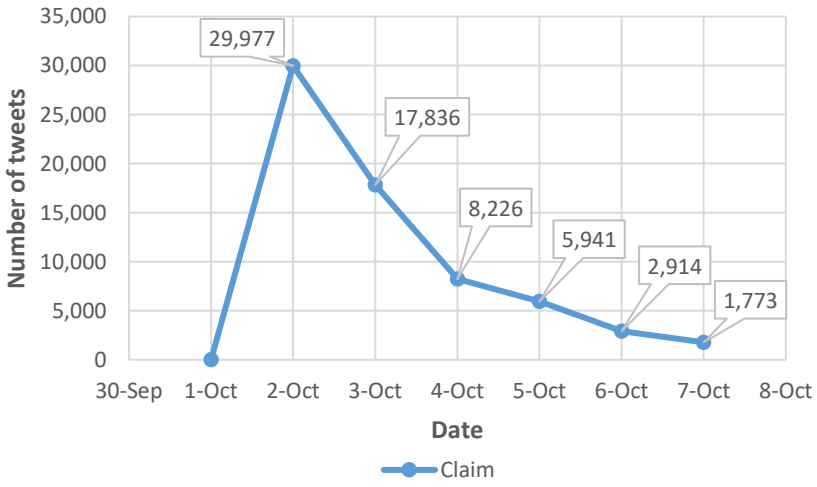
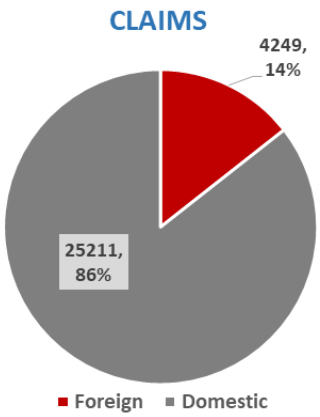


***Figure 4**: Tweets from the U.S. vs not*



The location of the tweets shown in Figure 3 were categorized between domestic vs. foreign entries to see how localized the conversation is. Foreign interference and meddling in U.S. domestic policy was another issue that came to limelight during the 2016 election and since the shooting received international attention, it would be interesting to see if any trends in “Foreign” participation emerge. Figure 4 shows a pie chart depicting the ratio of tweet entries originating in the United States vs. other counties with 89% of the entries originating in the United States. About 984 tweets concerning multiple shooters were recorded in the 2019 collection, many people were still not convinced that there was only one shooter.

ISIS was responsible for shooting

A total of 216,764 tweets concerned the discussion of this claim. This time, the discussion for this topic contained fact checking tweets. As can be seen in Figure 5, similar to the "multiple shooters" discussion, the greatest amount of generated tweets occurred on October 2nd, 2017. The number of tweets quickly decreased but had a small recovery of conversations on October 6th, 2017. The fact-checking tweets only amounted to a fourth of the tweets perpetuating the misinformation and quickly decreased in mentions.

***Figure 5**: "ISIS responsible" tweets per day*

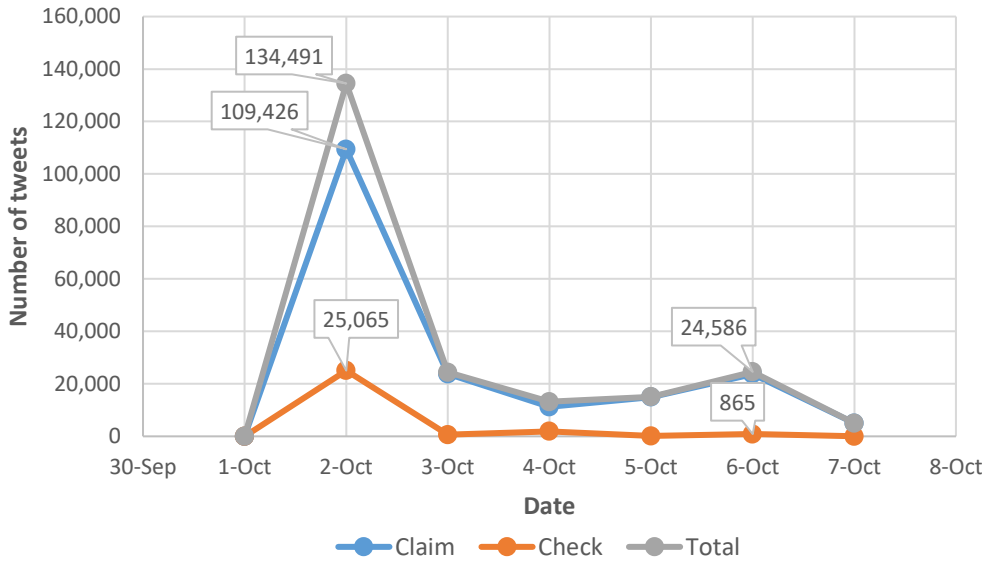
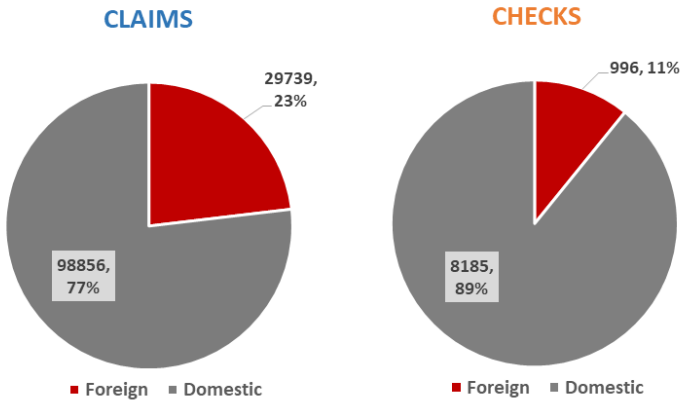


Figure 6 shows the ratio of tweets located in the U.S. vs. internationally within tweets that propagate or try to correct the misinformation. There is a greatest share of international responses that spread misinformation with 23% of the "Claim" responses. While being 11% of the "Check" responses. No entries were logged in the 2019 collection for this topic.

***Figure 6**: Locations of "Claim" and "Check" Tweets*



Shooter was a Muslim or converted to Islam

A total of 37,913 tweets were recorded for this conversation and included a more divided discussion that feature more "fact checking" tweets than the previous conversations. AS Figure 7 shows, the greatest number of recoded tweets was again on October 2nd, 2017 where the topic was widely debated but "fact checking" quickly decreasing within a day.

***Figure 7**: "Shooter was Muslim" tweets per day*

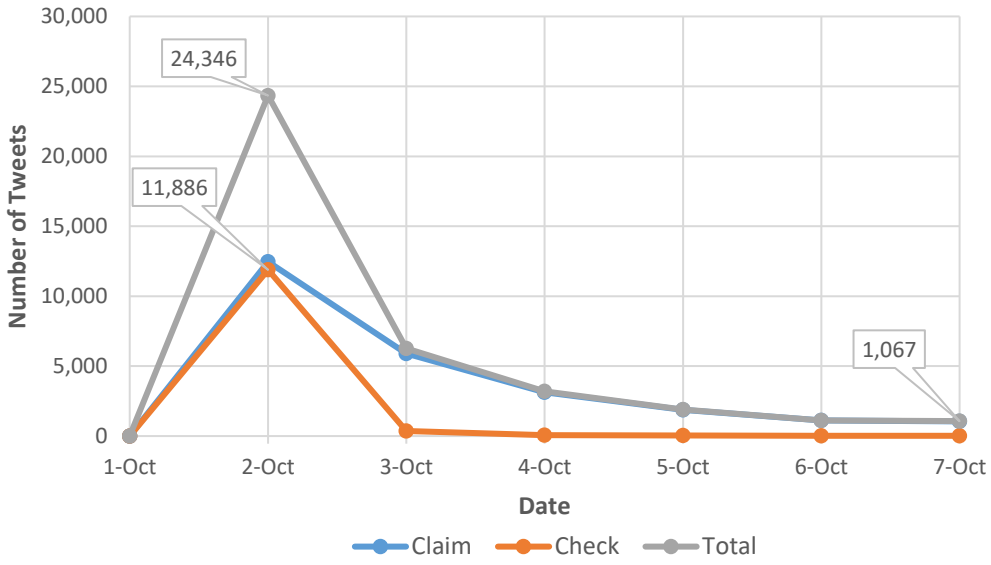
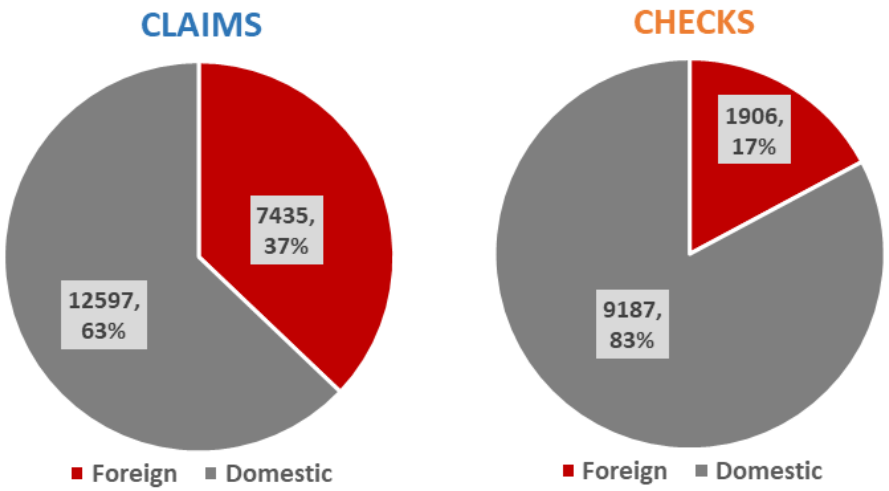


Figure 8 also shows greater participation from the international community in perpetuating tweets. While this topic garnered a great response, only 36 entries were recorded in the 2019 collection that still claimed that Paddock was Muslim.

***Figure 8**: Locations of "Claim" and "Check" Tweets*



Since this discussion was so heated, different patterns of hashtag usage also emerged that are highlighted in a generated word cloud shown in Figure 9 below, created with Jason Davies Word Cloud Generator. It shows the top 150 hashtags used by those who claim the shooter was Muslim.

***Figure 9**: Hashtags used in "Claim" Tweets*

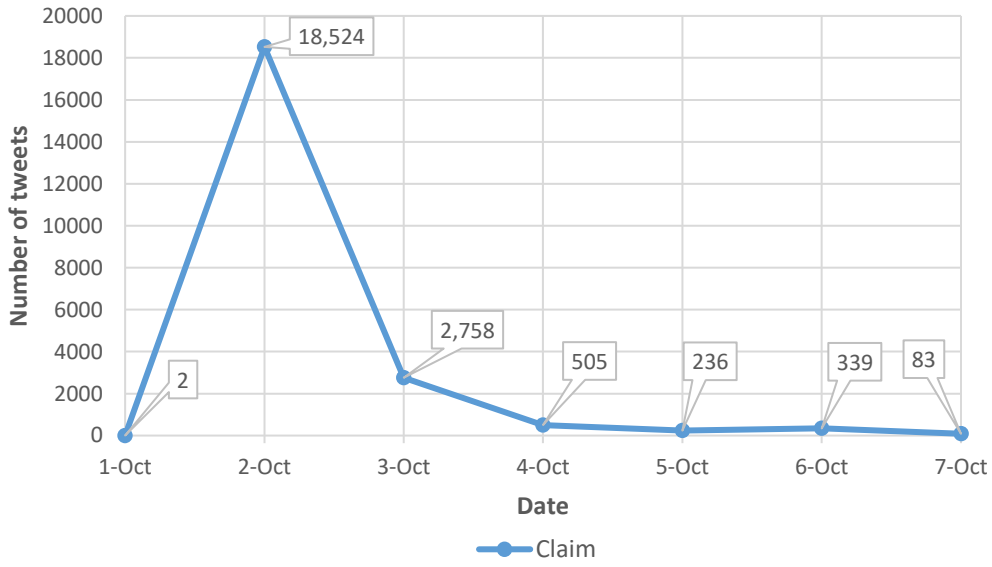
***Figure 10**: Hashtags used in "Check" Tweets*

The hashtags used highlight the different points-of-view of the two sides and what they pay attention to or value, with Figure 9 showing popular hashtags like #notallmuslims, #MAGA, #terrorist and Figure 10 showing popular hashtags from the "fact checking" tweets that include #guncontrolnow, #muslimban, #islamophobia.

"Going to die" warning

This did not have any tweets that qualified as fact checking or questioning the allegations that the shooter's girlfriend told concert goers they were going to die. Figure 11 shows a total of 22,449 were extracted with the greatest response being on October 2nd, 2017 again. This discussion follows closely with the trends seen with the discussion of multiple shooters.

***Figure 11**: "Warning" tweets per day*



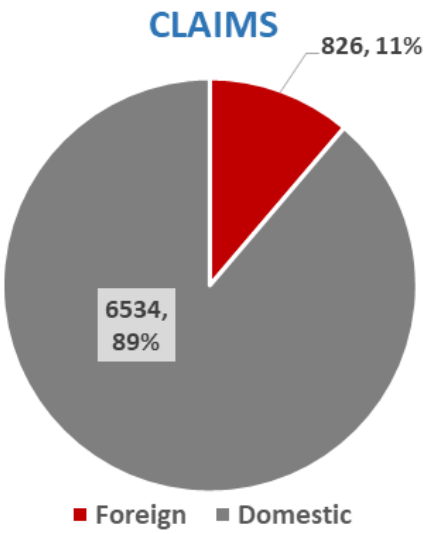


***Figure 12**: Locations of "Claim" and "Check" Tweets*

Figure 12 depicts the share of misinformation tweets with 89% of them originating from the United States. Low numbers of tweets concerning this topic were identified in the 2019 collection, with 201 entries.

Shooter's identity

The false allegations concerning the identity of the shooter amount to 1036 entries, Figure 13 shows that number of tweets that pertained to the topic per day. The greatest number of tweets were recorded on October 2nd, 2017 and in a rare instance, more "fact checking" tweets were present however the amount of tweets again quickly decreased the following days while the allegations increased on October 4th, 2017.

***Figure 13**: "Shooter's identity" tweets per day*

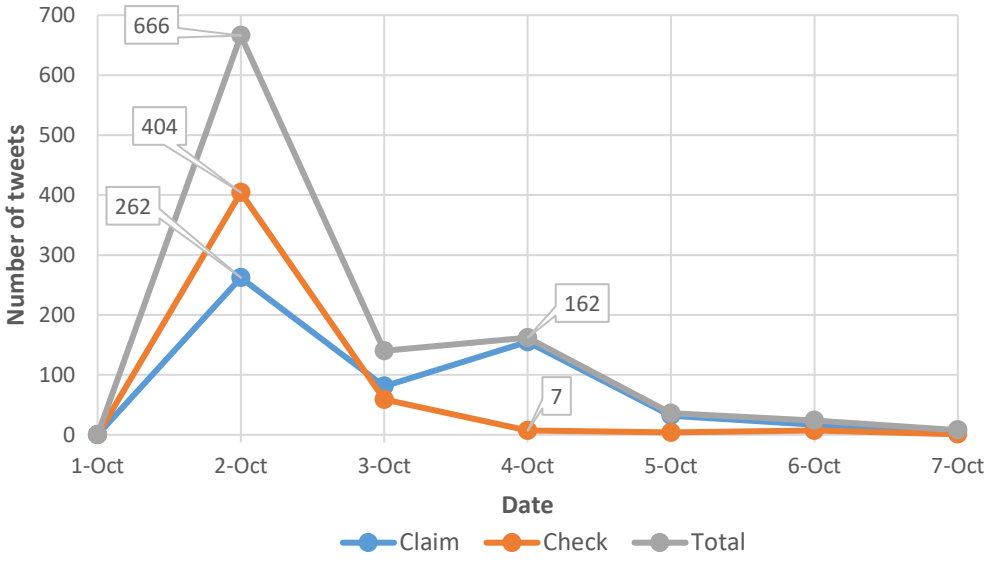
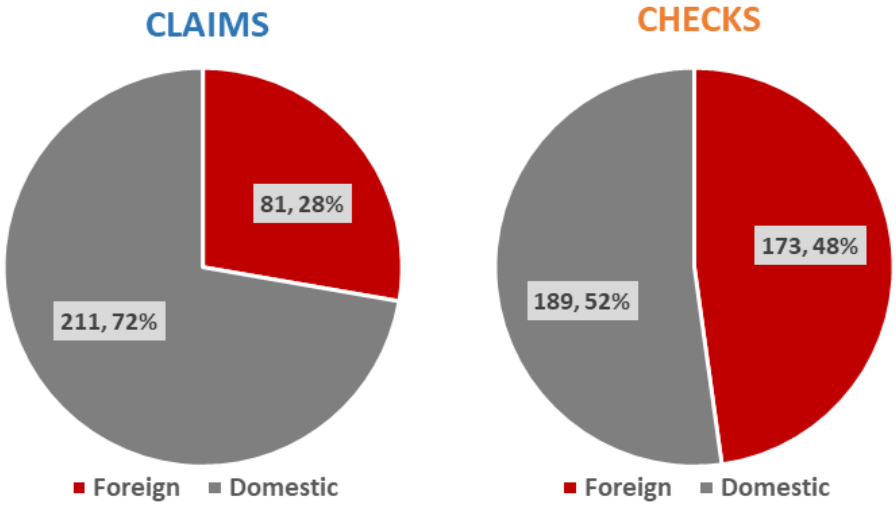


Figure 14 shows that there is also a greater participation from other countries on both sides of the discussion, with 28% of the "Claim" tweets and 48% of the "Check" tweets not originating in the United States.

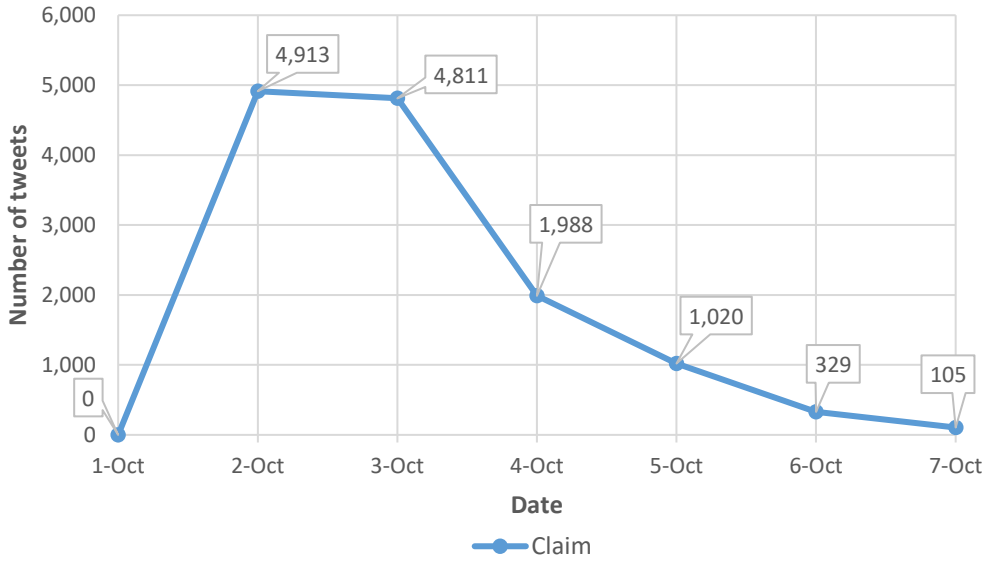
***Figure 14**: Locations of "Claim" and "Check" Tweets*



Shooter was part of an anti-Trump army

13,166 tweets were recorded that pertained to the discussion of whether the shooter was "anti-Trump" and was part of the some militia plotting against Trump. This discussion was often pairing with the allegation that Paddock belonged to Antifa (that had a discussion spanning 40,933 tweets) but the two topics had a similar trend, so only the anti-Trump discussion will be highlighted. Figure 15 shows that the greatest response was still seen on October 2nd, 2017 unlike the other discussions, the claims mentioned here did not decrease as quickly after that initial surge. This topic did not have any tweets trying to fact check and question the discussion.

***Figure 15**: "Shooter was anti-Trump" tweets per day*



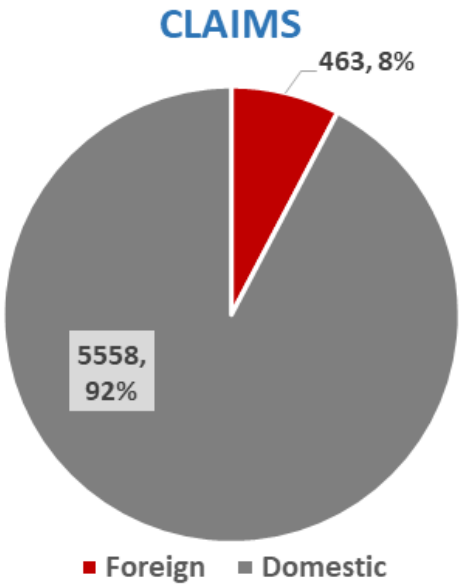


***Figure 16**: Locations of "Claim" and "Check" Tweets*

Figure 16 depicts the location of origin of the tweets within the discussion and shows that most of the misinformation is spread within the United States.

Are humans or bots behind these interactions?

To find some initial results whether the interactions that we are seeing within the discussion are real or manufactured by automated bots, a web-based program called Hoaxy is used to search tweets or articles shared on Twitter and visualize the engagement between accounts. The visualizations also utilized another web-based program called Botometer that analyzes the accounts and identifies who behaves more human- or bot-like.

The top 20 stories - with articles that include the ISIS, Antifa, fake missing people, FBI cover-up, and more – were selected and analyzed by Hoaxy. Out of the 989 accounts analyzed, 432 accounts received a Botometer score of 0, meaning that those accounts behave the most human-like while 15 accounts were given a score of 5, meaning they are most bot-like (Botometer). Table 4 depicts the entire distribution of scores classified in the search.

***Table 4**: Distribution of human- and bot-like behavior from accounts citing news articles*

Score	**1**	**2**	**3**	**4**	**5**
Number of accounts	432	241	172	86	15

About 11% of the accounts can be considered as highly suspected of being bots (if you count those with a score of 4 and 5). If you included accounts that have any degree of speculation that it may be bot, the percentage would then increase to 54%. This would still be less than the overall average for Twitter, which typically has 66% of the any shared news links come from suspected bots (Wojcik, 2018).

SUMMARY OF RESULTS

To begin to unravel the complex behavior of the spread of misinformation, tweets containing mentions of false information (both those who support and question the claims) we extracted from two Twitter collections concerning the 1 October shooting. The discussion for the most pervasive rumors were the highest on October 2nd, 2017 the day after the shooting. The conversations quickly decreased in engagement, within a few days of the shooting as national attention feigned. The amount of the identified false claims were much higher than the attempted corrections, with the exception of the discussion about the shooter's identity, and the amount of fact checking tweets decreased much steeper than the perpetuation of false claims. The majority of tweets within each topic were made by people living or having a strong emotional connection to the United States. Engagement from other countries is typically higher in conversation that spread the misinformation. Conversations concerning if ISIS was responsible for the shooting garnered the most attention and had the greatest engagement compared to the other topics.

POLICY RECOMMENDATIONS

"People can foresee the future only when it coincides with their own wishes, and the most grossly obvious facts can be ignored when they are unwelcome," this statement by George Orwell can also be applied to the past and the interpretation of any fact that is presented to an individual (Horton, 2007). Attempting to deal with information disorders is walking a fine line between having no effect in renegading the dangers of false claims and infringing on the freedoms of speech and access to information. A recent example of this can be seen with the Hungarian parliament, which passed legislation that allows for them to prosecute and imprison any journalist that they deem as spreading "fake news," (IPI, 2020). Although many Hungarian independent journalists fear these measures are rather intended to stifle any coverage that is critical to the government's handling of the crisis.

The problem is that action taken to regulate mis- and dis-information often results in declining transparency of information and the confinement of the media – while reverse should occur. Dealing with misinformation can be analogous to wearing a seatbelt or riding a bike with a helmet on. Even with regulations emplaced that people must wear their seatbelt, not everyone does but the first course of action is not to prosecute and imprison them for their disregard of safety. The following are some recommendations for actors to consider.

Government (Federal, State, and Local)

It is difficult to divulge at which specific level of government action against information pollution needs to be taken as it can be spread from anywhere in the world, but any action taken do need to be coordinated across all levels. The government could impose fines on individuals and organizations that start false information meant to be malicious and harmful. The identification of such information can be done by an independent agency on a national level that would be responsible for warning the nation of the false information and providing evidence of intended harm and falsehood of the content.

The federal government can also create cybersecurity trainings and courses that which would be publicly available and would teach their citizens how to identify information disorders. Doing this on a national level is important as state and local governments may not provide the autonomy needed to effectively instruct individuals. All levels of government can sponsor programs that aim to continue developing detection programs that can more effectively and reliably identify false information and fake accounts of social media.

Twitter

The social media platform recently released an update to their site that included labels for tweets containing potentially manufactured and/or harmful information. Figure 17 shows a screenshot taken of Twitter's categorization of how they will treat claims found with different degrees of severity (Roth and Pickles, 2020).

***Figure 17**: Action to be taken by Twitter based by severity of identified claims.*

Misleading Information	Label	Removal
Disputed Claim	Label	Warning
Unverified Claim	No action	No action*
	Moderate	Severe
Propensity for Harm		

It is also essential to continue to target content that is amplified by automation and develop tools that are more effective at identifying bot activity. While warnings and labels are considerable steps forward, it is important to make fact-checking tools more readily available and popular with users – perhaps even having a tab or button that users that could press on a tweet or account that then uses open-source programs to identity whether a tweets contains false claims or a user displays bot-like activity. This also produces engagement with the user and may even help to stimulate the users into doing more thorough fact-checking and research into an issue.

Media

Given the partnership that media corporations have with social media outlets, they are a crucial piece to mitigating misinformation. News organizations often make the mistake of legitimizing misinformation while reporting on it or giving the warning that information is false (West, 2017). Such was evident within the 1 October collections, with instances where individuals posted neutral tweets that tried to highlight the false information and unfortunately could easily be interpreted as supporting the claims. News organizations can also provide outlines and publicly available access to news literacy curriculum that would teach how to differentiate between fact and fiction.

Individuals

A revolutionary step that each individual can take is to rethink how they choose to deal with misinformation that they come across. False information is frequently most successful in acquiring attention when it targets emotions of fear and anger against another group. Keeping this in mind and being skeptical of the intentions behind such a post can keep an individual from impulsively retweeting and legitimizing the message (Kaplan, 2019). The attitudes taken towards users that perpetuate the claims can also be counter-productive. As a claim is

introduced and becomes fiercely contested, those who recognize that a claim is false can treat those who spread the claim with contempt and ridicule. This becomes problematic when you consider the human propensity for confirmation bias, or a 'myside bias' that a person will defend (even believe in more strongly) if conflicting information and attitudes are introduced (Kolbert, 2017). What starts as a disagreement escalates into an emotional debate divided across political ideologies.

Every person can also take matters into their own hands and use open-source programs like Botometer, Hoaxy, StopFake to check content they find suspicious themselves. While there is a tendency to go to national coverage of events, individuals can also support local news outlets and public service media to use their coverage as a check to networks and posts that are geared to be more political.

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APPENDIX A: Identifiers for clusters

There were multiple shooters: "shooters"

ISIS responsible for shooting: "ISIS," "Islamic"

Shooter was a Muslim or converted to Islam: "Muslim," "Islamic"

"Going to die" warning: "going to die," "Marilou"

Shooter's identity: "geary," "sam hyde," "Al-hajeed"

Shooter was part of Antifa: "Antifa"

Shooter was part of an anti-Trump army: "anti-trump," "anti trump"

Other Clusters:

Shooters political affiliation and activities: "democrat," "Bernie Bro," "liberal," "leftist," "left-wing," "progressive," "Rachel Maddow," "October Revolution"

Platforms spreading misinformation: "4chan," "gateway pundit"

Discussions of misinformation: "fake news," "rumor," "without evidence," "propaganda," "troll," "bot," "hoax," "censor," "algorithm," "conservative," "right-wing," "disinformation," "misinformation"

APPENDIX B: Top 10 Hashtags used from each discussion

There were multiple shooters

Rank	Claims	
	Hashtags	Uses
1	#TrueMAGA	2753
2	#LasVegasShooting	1987
3	#TellTheTruth	1584
4	#LasVegas	780
5	#ma4t	598
6	#VegasShooting	556
7	#Vegas	513
8	#MandalayBay	379
9	#FLASH	377
10	#BlueLivesMatter\nPolice	300

ISIS takes responsibility for shooting

Rank	Claims			Checks	
	Hashtags	Uses		Hashtags	Uses
1	#ISIS	15,716		#BREAKING	264
2	#FBI	12,931		#ISIS	147
3	#LasVegas	6,466		#LasVegas	65
4	#WarRoom	4,675		#FLASH	62
5	#StephenPaddock	4,446		#Vegas	55
6	#Veg	3,389		#UPDATE	33
7	#LasVegasShooting	2,968		#LasVegasShooting	18
8	#BREAKING	2,923		#tcot	13
9	#Vegas	2,565		#RT	11
10	#AlexJonesShow	1,787		#shooting	10

Shooter was Muslim

Rank	Claims			Checks	
	Hashtags	Uses		Hashtags	Uses
1	#lasvegas	1105		#shooting	5963
2	#thursdaythoughts	652		#guncontrolnow	1013
3	#vegasif	638		#muslimban	93
4	#notallmuslims	599		#lasvegas	22
5	#vegas	405		#vegas	17
6	#guncontrol	376		#stephenpaddock	16
7	#ma4t	294		#vegasshooting	14
8	#lasvegasshooting	216		#islamophobia	13

9	#muslim	197		#lasvegasshooting	12
10	#lasvegasattack	146		#isis	11

"Going to die" warning

Rank	Claims	
	Hashtags	Uses
1	#lasvegasshooting	1423
2	#truemaga	1153
3	#mariloudanley	513
4	#vegas	320
5	#lasvegas	149
6	#tucker	121
7	#hanni	118
8	#teamkj	61
9	#lasvegasshooter	53
10	#tcot	40

Shooter's Identity

Rank	Claims			Checks	
	Hashtags	Uses		Hashtags	Uses
1	#MarilouDonley's	11		#LasVegasShootings	12
2	#GunControlNow	10		#FakeNews	8
3	#NeverTrump	8		#LasVegasShooting	7
4	#Vegas	8		#Geary	5
5	#vegasshooting	8		#Trump	5
6	#LasVegas	7		#LasVegas	4
7	#mandalaybay	7		#fake	4
8	#MandalayBay	6		#Danley	3
9	#BREAKING	5		#UniteBlue	3
10	#LasVegasShooting	5		#altright	3

Shooter was part of Antifa

Rank	Claims			Checks	
	Hashtags	Uses		Hashtags	Uses
1	#vegas	5533		#Antifa	11
2	#antifa	5029		#LasVegasShooting	10
3	#warroom	4452		#39	8
4	#vegasshoot	2188		#Conspiracy	5
5	#lasvegasshooting	1709		#LasVegas	4
6	#isis	1127		#antifa	4
7	#breaking	1036		#DomesticTerrorism	3
8	#lasvegas	1036		#ISIS	3

9	#maga	635		#MSM	3
10	#resistance	563		#StephenPaddock	3

Shooter was anti-Trump

Rank	Claims	
	Hashtags	Uses
1	#StephenPaddock	1382
2	#LasVagasShooting	351
3	#LawAndOrder	203
4	#Vegas	179
5	#PrayForLasVegas	148
6	#ANTIFA	107
7	#resistance	94
8	#antifa	90
9	#LasVegas	60
10	#shooting	60