HOW LONE WOLF TERRORISM IS EXPOSING LACKING COUNTER-TERRORIST MEASURES

Abstract:

This paper explores key issues concerning "lone wolves", or self-selecting terrorists and the repercussions that their actions have on the international realm. As of present day, this new form of terrorism has altered the way we view terrorism. As a result, modern counter-terrorism policies are outdated, and not adequately suited to suppress the rising accounts of lone wolves. The unpredictable and random acts are nearly untraceable. Is there a realistic response to these lone wolves? This paper explores the causes and the intentions behind such terrorists, as well as possible solutions.

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How The New Age of Domestic Terrorism Illuminates Fault in our Current Political System

Introduction

Terrorism is an issue that long predates the modern world as we know it. There is vehement discussion about the definition of terrorism. However, many scholars associate the first organized practice of collective terrorism back to the 1st century AD with the Sicarii Zealots. The Sicarii assassinated sympathizers of the Roman rulers ruthlessly, using short daggers (Zalman, 2). More importantly however, the Sicarii assassinated their victims in public, trying to trigger fear in the general public and throughout the Roman rulers.

Looking forward to present day, terrorism has evolved just as much as other aspects of society. Terrorism is now multidimensional, with platforms and weapons such as social media, television, advanced military weapons, nuclear warfare, having huge impacts on the way terrorists perform. Furthermore, the actual acts and methods of terrorism has evolved. Mass suicide attempts, hijacking, and cyberterrorism were not even possible when the Sicarii were trying to change the Roman political rule they fell under.

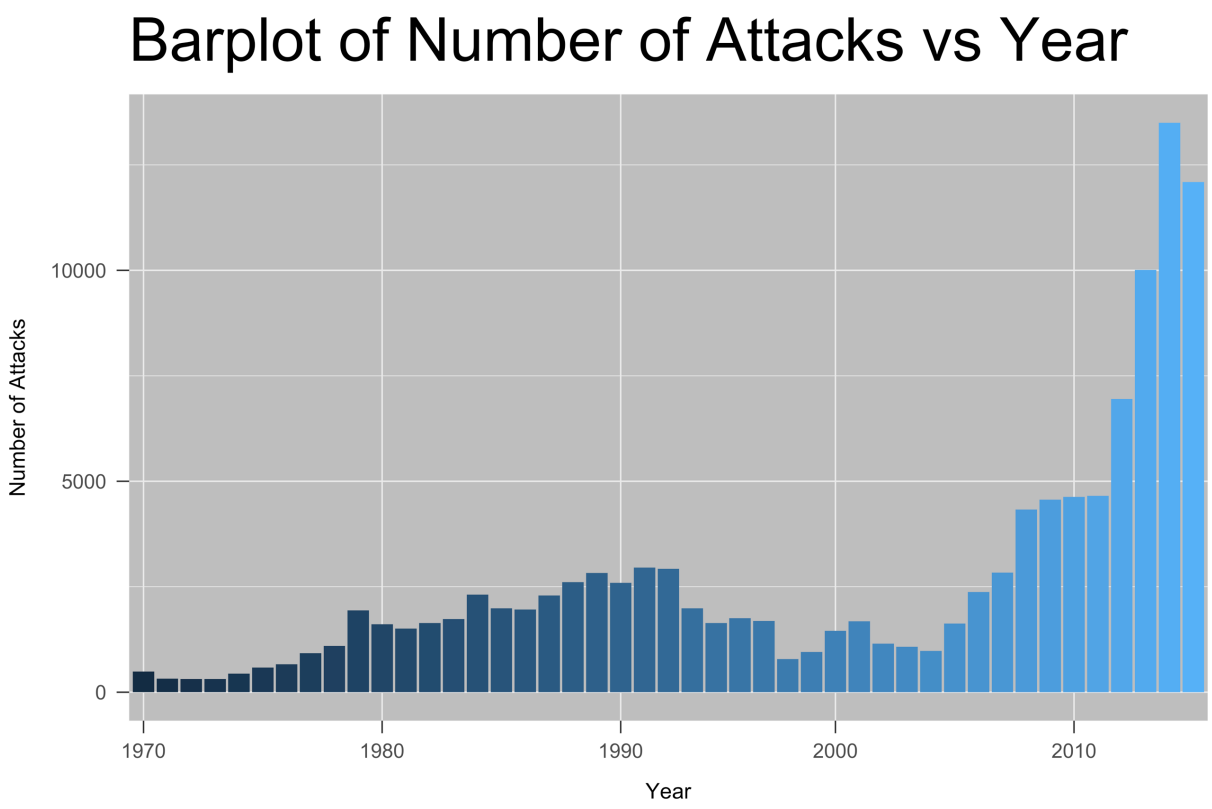

Figure 1 - Bar Plot of Number of Attacks versus Year. An increasing rise of attacks can be seen.

Terrorism has increased dramatically, although the question can be asked: are there more terrorist attacks because there are more people? Location is also relevant as some areas of the globe have been more affected by terrorism, namely the United States, the Middle East, and Europe. Regardless, terrorism is an international crisis. Repercussions from a terrorist attack echo soundly around the world and reverberates off hidden concurrent minds.

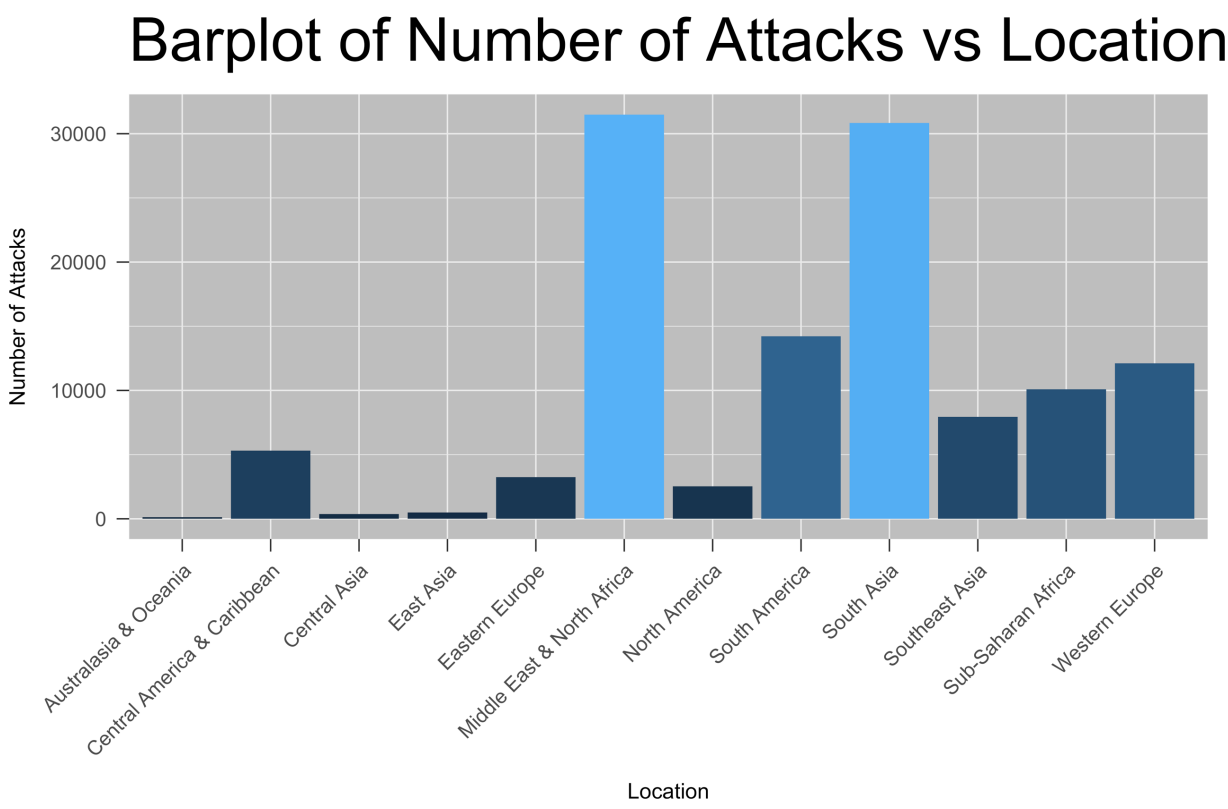

Figure 2 - Location based bar plot showing the number of attacks

A new issue has arisen in the world of terrorism – namely, the self-selecting terrorist. This type of terrorism branches out from organized and structured terrorist groups. Individuals partake in terrorist attacks for a multitude of different reasons ranging from zealous religious associations to political discontent. Regardless, the consequences of such acts from lone wolfs permeate the international realm, extending beyond borders. The problem is current and must be accounted for, not merely because of the apparent loss of life, but because of degeneration in domestic stability, as well as increased international strain. Furthermore, the increasing rise of the self-selecting terrorist is a critical issue in countries' political counter-terrorist measures. It is an issue that is new and foreign, and is not currently addressed through modern day policies. As stated prior, while this problem has severe consequences for the international realm, this paper will focus on the United States as a valid example. A more thorough and rigorous approach to the U.S. issues will help illuminate potential solutions to similarly troubled countries. It should be stated that due to the complexity and variable range of the issue, there is not a universally applicable solution to this type of terrorism. Too many factors, such as the variable nature of each act, make the problem unsolvable. However, for a vast number of the cases,

similarities between the acts can shed light on common issues and how they might arise. The rest of this paper will explore the complexities of the issue surrounding the lone terrorist and will come to the proposed solution of a healthy dose of advanced intelligence to counteract lone wolves.

Terrorism and terrorists' intentions defined

Before delving in further into the politics and potential counter-terrorist measures that are being taken against this new form of terrorism, it is important to establish a working definition of terrorism. As evidenced by the vast amount of literature debating the definition, there is still no clear unilateral definition to work with. Even in the analysis portion of this paper, the data set has to quantify which type of terrorism the act was actually reported as, breaking that down into three distinct groups.

Bruce Hoffman, a renown Georgetown political analyst cites his definition of terrorism as the following:

> *The pursuit of power, the acquisition of power, and the use of power to achieve political change. Terrorism is thus violence, — or equally important, the threat of violence — used and directed in pursuit of, or in service of, a political aim. (Hoffman, 15)*

With this relatively straightforward definition of terrorism, it seems easy to analyze the issue and draft strategic points to counterbalance such acts. However, the key aspect that makes this unattainable, as Hoffman notes, is the dynamic nature of terrorism. Because of its ever-changing nature, it is hard to hold terrorism to a constant definition. As a result, terrorism is by default a subjective definition. It inherently entails a level of sympathy with the attacked party (Hoffman, 17). If this sympathy is not there, then the individual might not consider the act an explicit act of terrorism. However, for the sake of this argument, the definition provided above will be considered the true criteria, with a more objective definition consisting of violence to others in an effort to create a movement or gain some form of power.

However, even with this baseline definition, there is still a need to refine our definition to account for the different forms that terrorism can now take. The new form of self-selecting lone terrorism is prevalent and accounts are only increasing. As Jeffrey Simon states, "lone wolves will not be concerned about a potential government and law enforcement crackdown following an incident that

could lead to the virtual elimination of a group" (12). Lone terrorism has a vast array of different desires and objectives, with abortion related attacks being the leading cause (Deloughery, King, Asal 10). The U.S. is an applicable case for this analysis, as "of the 198 LWT attacks carried out between 1968 and 2010 across the US and fourteen other predominantly western countries, 113 occurred in the United States" (Connor & Flynn, 10). The paper written by John Mueller and Mark Stewart as serves as a key example of the trends of terrorism. Shown below is an excerpt table indicating the occurrences of some of the terrorist groups. Often large acts are performed by individuals with loose ties to an organization. These terrorist attacks are unpredictable in nature and cause concern for the U.S. population, effectively doing their job and spreading fear.

Table 1. The American Cases (by number, title, *type,* year of arrest, and description)

This table contains cases of Islamist extremist terrorism that have come to light since the terrorist attacks of September 11, 2001, whether based in the United States or abroad, in which the United States was, or apparently was, targeted.

1 The shoe bomber *4* 2001 British man tries to blow up a U.S.-bound airliner with explosives in his shoes but is subdued by passengers and crew

2 Padilla *1* 2002 American connected to al-Qaida who had discussed a dirty bomb attack returns to the United States and is arrested

3 Mount Rushmore *3* 2002 Crucially aided by an informant, two men in Florida, one of them possibly connected to an al-Qaida operative, plot to bomb local targets as well as Mount Rushmore before September 11, and are arrested and tried the next year

4 El Al at LAX *4* 2002 His business and marriage failing dismally, a depressed anti-Israel Egyptian national shoots and kills two at the El Al ticket counter at Los Angeles airport before being killed himself in an act later considered to be one of terrorism

5 Lackawanna *1* 2002 Seven Americans in Lackawanna, New York, are induced to travel to an al-Qaida training camp, but six return disillusioned—all before the terrorist attacks of September 11—and are arrested the next year

6 Paracha *2* 2003 A young Pakistani seeks to help an al-Qaida operative enter the country to attack underground storage tanks and gas stations

7 Ali *2* 2003 A U.S. citizen joins a terrorist cell in Saudi Arabia and plots to hijack a plane in the United States and to assassinate President George W. Bush when he is arrested by the Saudis and extradited to the United States for trial

8 Columbus and the Brooklyn Bridge *2* 2003 American connected to al-Qaida discusses shooting up a shopping mall in Columbus, Ohio, with two friends, then scouts taking down the Brooklyn Bridge for al-Qaida but decides it is too difficult

9 Barot and the financial buildings *2* 2004 Group in London tied to al-Qaida scouts out financial buildings in the United States with an eye to bombing them, but never gets to the issue of explosives

10 Albany *3* 2004 Two men in Albany, New York, effectively help fund an informant's terror plot

11 Nettles *3* 2004 Under the nickname of "Ben Laden," an American with a long history of criminal and mental problems plots to blow up a federal courthouse in Chicago and reaches out for help to a Middle Eastern terrorist group, but gets the FBI

Figure 3 - Excerpt Mueller and Stewart's List of Compiled Lone Wolf Attacks

Throughout the figure above, there is only one occurrence of the Islamist terrorist case that has over 5 individuals involved in the terrorist acts. The table indicates a growing trend of smaller, isolated individuals acting on behalf of some group.

As former CIA director, Leon Panetta notes, "lone wolf attacks could pose 'the main threat to this country'" (Worth, 1). Other researchers note that while groups of terrorism have more clearly defined intentions and wishes, the purpose of such individual attacks is largely obfuscated. Another source says that "trying to draw a single personality profile of a lone wolf attacker is as clunky as trying to draw a profile of a generic criminal" (Worth, 2). Lone wolf terrorists differ from the stereotypical terrorist model that researchers have developed over the past. With intentions variable and profile largely unattainable, the need to understand these lone terrorists is more important than ever. Obama echoes similar notes to the former CIA director (Blitzer, 2016). He asserts that the rise of this specific form of terrorism is very much real, stating:

> *The risk that we're especially concerned over right now is the lone wolf terrorist, somebody with a single weapon being able to carry out wide-scale … when you've got one person who is deranged or driven by a hateful ideology, they can do a lot of damage, and it's a lot harder to trace those lone wolf operators. (Obama, 2011)*

Case numbers of such terrorist acts are on the rise. Current counter terrorist measures totally lack the necessary development to account for such monstrosities.

Divergence from the Norm - The Lone Terrorist

The current analysis to the issue of rising accounts of terrorism mainly lies in two lines of thinking. Namely, these two paradigms of thinking consist of the strategic model of terrorism and the organizational model of terrorism. The strategic model of terrorism assumes terrorist groups and organizations to be rational. Max Abrahms of Northeastern University has published much of his work concerning the strategic model of terrorism. In its core, the strategic model of terrorism makes three baseline assumptions that create the framework to span terrorism. We will explore the faults and shortcomings of the strategic model.

The first assumption states that terrorists are motivated by "stable and consistent political goals, which are encoded in the political platform of the terrorist organization" (Abrahms, 80-81). However, already with this first assumption, the strategic model begins to fall short of an appropriate analysis for self-selecting terrorists. As an appropriate counter example to the structural argument, the San Bernardino case can be observed (Schmidt, 1). As the F.B.I director, James B. Comey stated, "There's no indication that they are part of a network" (Schmidt, 1). This is where the definition starts to erode. Can independent parties of a terrorist organization still act on behalf of an organization which they are not legitimately a part of? I would argue that the strategic model definition starts to lack range. Furthermore, if the San Bernarndino case is not enough to break Abrahms definition, then the act committed by Major Nidal Malik Hasan, one of the deadliest lone terrorist attacks with 13 fatalities, certainly is. Hasan killed 12 soldiers and wounded 43 other people in an attack. The motive might have been related to Hasan's belief that Muslims "should not be sent to fight other Muslims" (Spaaij, 20). However, this was not a religiously motivated attack. Indeed, Hasan's attack does not to this day seem to have any political or religious motivation. The reasoning behind such an attack seems to be completely unapparent. Hasan's attack is just one more example of the issues that lie in defining the strategic model of terrorism that Abrahms presents.

Abrahms expands from this assumption on a slightly more nuanced note, observing that "terrorist groups weight their options and resort to terrorism only after determining that alternative political avenues are blocked" (Abrahms, 81). This once again assumes a more logical approach than is often observed by lone-terrorists. While this may be an apparent observation that fails with lone terrorists, Abrahms's assertion does carry with it some intuitive bias. It is not valid for an outside party to determine whether the group *feels* that their political avenues are blocked. Mir Aimal Kansi was a Pakistani immigrant who killed two CIA employees in 1993. Jessica Stern, a noteworthy expert on terrorism cites in Spaaij's book doubts "as to whether he was motivated by anti-Americanism or by personal revenge" (20). On one hand, it seems that Kansi was quick to resort to terrorism and did not try any political avenues. However, is this realistic? Kansi's goals are still largely unknown, but both a mixture of American-hate and revenge are not easily achieved through political paths. Perhaps, in Kansi's eyes, he was in a similar position as the assumption that Abrahms states.

Similarly, the third and final assumption that the strategic model states is that terrorist groups "achieve their political platforms at least some of the time by attacking civilians" (Abrahms, 81). While

this may largely be true for terrorist groups, this same principle is hard to apply to individual lone wolf terrorists. Perhaps they are inspired by the political and religious message that other terrorist groups spread, but acting as a lone wolf, the probabilities of the individual being able to hide behind numbers and strength is minimalized.

While all three of the core assumptions of the strategic model can be countered by solely looking at lone terrorists, there is an appropriate alternative which Abrahms helps to highlight. This model is based on solidarity. This type of explanation is called the natural systems model. The model stressed that the most important motivator behind any action is the "sense of solidarity from participating in a social collectivity" (Abrahms, 95). This model of terrorism is more appropriate and can be aptly applied to the lone terrorist. In fact, as Abrahms notes, "the vast majority of terrorist organizations are composed of unmarried young men or widowed women who were not gainfully employed prior to joining them" (Abrahms, 95). People who are detached from the rest of society and struggling to make connections, often turn to terrorism out of desperation and lack of control. There is a strong psychological element of this analysis. Jeff Victoroff has an excellent analysis of the mind of a terrorist – analyzing several psychological theories. He claims that research shows that terrorists are logical, and normally not actually psychotic (12). With this in mind, the natural systems model is a more appropriate model to help define terrorism.

Current Counter-Terrorism Measures

The analysis and understanding of the individuals that are committing such acts is imperative in formulating appropriate counter-terrorist measures. After September 11th, the backlash to counter terrorism was swift and apparent to the general public. The measures to counteract lone terrorist have been more gradual and less apparent. However, recently under the Obama administration and even slightly before, lone wolf terrorism has obtained more attention. One of the largest advances forward in the measure of counter-terrorism was the Intelligence Reform and Terrorism Prevention Act in 2004. A specific section in the document was added to address the lone wolf terrorists. Specifically, this section allows authorities to track non-US nationals suspected of being lone wolf terrorists *without* confirmed ties to terrorist groups. This is a pivotal movement in terms of the range of security from a governmental decree. The everyday meaning of such an order being passed is that it would now be

possible for the Foreign Intelligence Surveillance Court (FISC) to "issue a court order authorizing electronic surveillance and physical search orders without having to demonstrate a connection between the target of the electronic surveillance or the physical search and a foreign government or terrorist group" (Spaaij, 78). The concern with such a powerful act is the jeopardy of human liberties. As to be expected, the American Civil Liberties Union criticized the new power of the FISC, citing an abuse into democratic civil liberties.

There are two main strategies in counter-terrorist measures - the criminal justice model and the war model. Both models assign responsibilities and groups to designate with replies to terrorist acts. As Ramon Spaaij of Victoria University notes, in the criminal justice model, the police are assigned the responsibility to respond, whereas with the war model, special forces and more advanced militaristic measures are taken in response. Typically, since the post 9/11 era, the war model has been preferred (Spaaij, 79). This makes sense as an aggressive, more heightened response is validated by the catastrophic results of 9/11. Although this response might be justified on the larger scale, as Spaaij notes, because lone terrorists are more widely affected by the larger terrorist communities, repressive actions should be taken against those communities. The scale of the response should be proportional to the size and strength of the attacker. While one individual may be able to cause a vast amount of damage, they are structurally and organizationally weaker than a well formed terrorist group.

Future Counter-Terrorism Measures and a further Solution

So how do we walk this line? What's the balance between jeopardizing individual liberties and potentially transforming into a police state versus maintaining a steadily increasing count of lone wolf terrorist attacks that incur a strong loss of life on the domestic population? The implication for the international community should be reiterated. Applications of this more modern approach can not only apply to lone terrorists, but can also have applications to larger political structures.

Spaaij cites four key elements to interrupting and perturbing the methods of the lone terrorists. Primarily, he cites enhanced security, intelligence, internet surveillance, and emergency preparedness and resilience. Out of the four of these measures, the trending theme is security and control. Intelligence interplays with what do we know and how can we protect our citizens. Internet surveillance is simply an extension of the same idea. The final point of preparedness and resilience takes a slightly more macabre approach issue, looking at the situation like it will inevitably occur. However, the most

important *and most realistic* aspect out of these four is the increased intelligence. While increasing physical security is the optimal solution, it is not a practical solution. Is there going to be a point where an American with a home-made bomb will not be able to leave their house and walk freely? Actions like these are almost impossible to control. However, if enough information was available to accurately track the specific components of a homemade bomb and any suspicious behavior, then perhaps with some confidence level, the terrorist could be stopped before the act was committed.

The notion of predictive analytics being applied to criminal and terrorist information is not a new idea, and there are unmistakably issues that need to be sorted out before this is a reality. However, this poses the most promising stable path – one that compromises between domestic civil liberties and still an aggressive approach to identifying trends among lone wolfs. Note, that this would still require some tightening of civil liberties. Things like networks and cybersecurity would have to be monitored rigorously by an overarching body like the NSA. The Patriot Act might have to be expanded – but, the motive would be to save physical lives and prevent the next Kansi or Hasan from dominating the news on the tragic day after.

Conclusion

Terrorism itself is a multidimensional problem with no obvious solution in sight. A subsection of this overarching issue more specifically is the rising accounts of lone terrorist. Terrorism is a hard issue to define and to wrap solutions around – so in the very best, modifications and policy reforms will have to suffice. This paper has served to show that the instance of a lone terrorist destroys the strategic model, and applauds an organization model that pulls on a psychoanalysis of lone wolves. Finally, looking forward to the future, policy proposals and politicians must turn towards heightened intelligence over heightened security, in order to maintain a realistic and physical level of freedom, while stabilizing the threat of the lone terrorist.

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Appendix

Appendix A: R Code for Analysis and Generation of Graphs

```
# Author: John Larkin
# Date: 11/30/2016
# Institution: Swarthmore College
# Class: International Politics
#
# ************************************
#   Program:
#       terrorism_analysis.R
#
#   Purpose:
#       The purpose of this project is multidisciplinary Primarily, this script and analysis
#       will be done to support my final research paper on self-selecting and lone
#       terrorists in the United States. The intent was to create visualizations and analytics
#       that offer another perspective outside of the theoretical. This project will also
serve
#       to rehash and refresh R skills previously developed.
#   http://127.0.0.1:26372/graphics/plot_zoom_png?width=748&height=823
#   Helpful Links:
#       This blog post from a Stanford phd student helped to identify useful columns:
#       http://www.shorttails.io/a-timeline-of-terrorism/#fn:1
#
# ************************************

# Wipe everything
rm(list = ls())

library(readxl)
library(ggplot2)
library(plyr)
library(dplyr)
library(reshape2)
library(scales)

# ************************************** #
# **********  Getting the Data!  ********** #
# ************************************** #

# Do you want to use the CSV file or the XLSX file? Not sure of optimizations yet.
use_csv <- TRUE
# NOTE: the csv version seems to load without any warnings which is a def + :)

# Let's load in the data
directory = "~/Desktop/College/Academics/Senior/Fall/POLS4_IntPolitics/Final_Essay/Analysis/"
if(use_csv) {
    filename = "globalterrorismdb_0616dist.csv"
    file_location = paste(directory,filename, sep = "")
    dat <- read.csv(file_location)
} else {
    filename = "globalterrorismdb_0616dist.xlsx"
    file_location = paste(directory,filename, sep = "")
    dat <- read_excel(file_location)
```

```
}

# Let's pick off the data that we think is relevant
# This data is really diverse. Let's interpret what it all means.
#
# GTD ID AND DATE
# ---------------
#   GTD ID - this is the unique ID (string)
#   iyear - year of incident (int)
#   imonth - month of incident (int)
#   iday - day of incident (int)
#   approxdate - this is when the exact date isn't determined
#       if an element is not determined then a 0 is placed in the date, year or month
#   extendedevent - 1 if lasted longer than 24 hrs; 0 otherwise (boolean)
#   resolution - only exists if lasted longer than 24 hours. this tells when the event
actually ended (R date variable)
#
# INCIDENT INFORMATION
# --------------------
#   summary - explanation of what's going on (text variable)
#
#   Note: the next few variables are 1 if the criterion is met. 0 if not.
#   crit1 - POLITICAL, ECONOMIC, RELIGIOUS, OR SOCIAL GOAL (CRIT1)
#   crit2 - INTENTION TO COERCE, INTIMIDATE OR PUBLICIZE TO LARGER AUDIENCE(S) (CRIT2)
#   crit3 - OUTSIDE INTERNATIONAL HUMANITARIAN LAW (CRIT3)
#
#   doubtterr - 1 if there is a doubt; -9 if before this category was invented; zero if not
(bool)
#               only applies if there was a doubt
#   alternative - only there if doubtterr was 1. (can drop col)
#   alternativetxt - can drop col
#   multiple - can drop col
#   related incidents
# .... this is going to be easier if we keep only the columns that we like
#
#
#   want to keep eventid, iyear, imonth, iday, country, country_txt, region, region_txt,
provstate, city, summary, crit1,crit2,crit3
#   want to keep success, suicide, attack type, attacktype1_txt, weaptype1, targtype1,
targtype1_txt,targsubtype1, targsubtype1_txt,
#   want to keep gname, gsubname, CLAIMED - this is if a group or person claimed
responsibility
#
#   see corresponding appendix

# NOTE: Environment view does not show the entire dataframe

# let's get rid of bad rows

terrordata_polish1 <- dat[dat$doubtterr == 0,] # let's just make sure we have terrorist events
(i.e. removing 1's and 9's)
terrordata_polish2 <- terrordata_polish1[!is.na(terrordata_polish1$iyear),]

# let's just keep the best columns
valid_col1 <- c("eventid", "iyear", "imonth", "iday", "country", "country_txt", "region",
"region_txt", "provstate", "city")
valid_col2 <- c("summary", "crit1", "crit2", "crit3", "success", "suicide", "attacktype1",
"attacktype1_txt", "weaptype1", "targtype1")
```

```
valid_col3 <- c("targtype1_txt", "targsubtype1", "targsubtype1_txt", "gname", "gsubname",
"claimed", "nkillus", "nkillter")
valid_col4 <- c("nkill", "nwound", "weaptype1_txt")
total_valid_col <- c(valid_col1, valid_col2, valid_col3, valid_col4)
terrordata_clean <- terrordata_polish2[,total_valid_col]

# Yay dimensionality reduction!
dimension <- dim(terrordata_clean)
print(paste('The dimension of our new simplified data set is:', dimension[1], dimension[2]))

total_deaths_and_inj <- terrordata_clean$nkill + terrordata_clean$nwound
exact_date_if_av <- ISOdate(terrordata_clean$iyear, terrordata_clean$imonth,
terrordata_clean$iday)
ter_clean_adv <- data.frame(terrordata_clean, total_dth_and_inj = total_deaths_and_inj,
exact_date = exact_date_if_av)

# ************************************** #
# **********  Plotting the Data!  ********** #
# ************************************** #


######## Graph 1 - Barplot of Attacks

uniqueyears <- unique(ter_clean_adv$iyear)
uniqueyears <- uniqueyears[(uniqueyears %% 10 == 0)]
uniqueyears <- as.character(uniqueyears)

attacksbarplot <- ggplot(data=ter_clean_adv,aes(x=as.factor(iyear)),fill=variable) +
geom_bar(aes(fill = ter_clean_adv$iyear)) + theme_bw(base_size=35) + xlab("Year") +
ylab("Number of Attacks")
attacksbarplot <- attacksbarplot + ggtitle("Barplot of Number of Attacks vs Year")
attacksbarplot <- attacksbarplot + theme(
                        axis.title = element_text(size = 15),
                        legend.position="none",
                        axis.text.y = element_text(size=14),
                        axis.text.x = element_text(size=14),
                        #axis.ticks=element_blank(),
                        #panel.grid.major = element_blank(),
                        panel.grid=element_line(colour="white", size=0.5),
                        panel.border=element_blank(),
                        panel.background = element_rect(fill = "grey")
                        )
attacksbarplot <- attacksbarplot + scale_x_discrete(breaks = uniqueyears)
attacksbarplot
extension <- "plots/"
location <- paste(directory,extension, "attacksbarplot", sep="")
png(location,width=1000,height=700)
attacksbarplot
dev.off()


######## Graph 2 - Locations
outlier_removed1 <- ter_clean_adv[ter_clean_adv$total_dth_and_inj < 2000,]
outlier_removed <- outlier_removed1[!is.na(outlier_removed1$total_dth_and_inj),]
location_attack <- ggplot(data = outlier_removed, aes(x = iyear, y = total_dth_and_inj, color
= as.factor(region_txt))) + geom_point() + theme_grey()
extension <- "plots/"
location <- paste(directory,extension, "location_attack", sep="")
```

```
png(location,width=1000,height=700)
location_attack
dev.off()

######## Graph 3 - Guns in locations?
# let's get solely the acts with exact dates
exact_date_data <- outlier_removed[!is.na(outlier_removed$exact_date),]

names_of_y <- levels(exact_date_data$weaptype1_txt)
names_of_y[12] <- "Vehicle"

levels(exact_date_data$weaptype1_txt)[levels(exact_date_data$weaptype1_txt) == "Vehicle (not
to include vehicle-borne explosives, i.e., car or truck bombs)"] <- "Vehicle"

weapon_plot <- ggplot(data = exact_date_data, aes(x = exact_date, y = weaptype1_txt, color =
region_txt)) + geom_point() + theme(
    axis.title = element_text(size=15))
location <- paste(directory,extension, "weapon_plot", sep="")
png(location,width=1000,height=700)
weapon_plot
dev.off()

######## Graph 3 - Heatmap of Location and Weapon type

new_data_for_hm <- exact_date_data
new_data_for_hm <- subset(new_data_for_hm, select =-c(targtype1, targtype1_txt,
targsubtype1_txt, gname, gsubname))
new_data_for_hm <- subset(new_data_for_hm, select =-c(targsubtype1, crit1, crit2, crit3,
nkillter, nkillus))
new_data_for_hm <- subset(new_data_for_hm, select =-c(summary, city, provstate, imonth, iday))
new_data_for_hm <- subset(new_data_for_hm, select =-c(iyear, exact_date, eventid,
country_txt))
new_data_for_hm <- subset(new_data_for_hm, select =-c(region_txt, attacktype1_txt,
weaptype1_txt))

collap_hm_data <- aggregate(new_data_for_hm, by=list(countryID = new_data_for_hm$country), FUN
= sum, na.rm = TRUE)

# let's essentially build a dictionary that just has the country code and the country text
key_val_country <- data.frame(countryID =exact_date_data$country, country_txt =
exact_date_data$country_txt)
dups <- duplicated(key_val_country)
key_val_country <- key_val_country[!dups, ]

# let's see if we can combine back our data
merged_country_hm_data <- merge(collap_hm_data, key_val_country, by='countryID')

rownames(merged_country_hm_data) <- merged_country_hm_data$country_txt
dat_matrix <- data.matrix(merged_country_hm_data)

heatmp <- heatmap(dat_matrix, Rowv=NA, Colv=NA, col = cm.colors(256), scale="column",
margins=c(5,10))
location <- paste(directory,extension, "heatmp", sep="")
png(location,width=1000,height=700)
heatmp
dev.off()

######## Graph 4 - Heatmap of Region and Weapon type
```

```
new_data_for_hm <- exact_date_data
new_data_for_hm <- subset(new_data_for_hm, select =-c(targtype1, targtype1_txt,
targsubtype1_txt, gname, gsubname))
new_data_for_hm <- subset(new_data_for_hm, select =-c(targsubtype1, crit1, crit2, crit3,
nkillter, nkillus))
new_data_for_hm <- subset(new_data_for_hm, select =-c(summary, city, provstate, imonth, iday))
new_data_for_hm <- subset(new_data_for_hm, select =-c(iyear, exact_date, eventid,
country_txt))
new_data_for_hm <- subset(new_data_for_hm, select =-c(region_txt, attacktype1_txt,
weaptype1_txt))
collap_hm_data <- aggregate(new_data_for_hm, by=list(regionID = new_data_for_hm$region), FUN =
sum, na.rm = TRUE)

# let's essentially build a dictionary that just has the country code and the country text
key_val_region <- data.frame(regionID =exact_date_data$country, region_txt =
exact_date_data$region_txt)
dups <- duplicated(key_val_region)
key_val_region <- key_val_region[!dups, ]

# let's see if we can combine back our data
merged_region_hm_data <- merge(collap_hm_data, key_val_region, by='regionID')

rownames(merged_region_hm_data) <- merged_region_hm_data$region_txt
dat_matrix <- data.matrix(merged_region_hm_data)

heatmp <- heatmap(dat_matrix, Rowv=NA, Colv=NA, col = cm.colors(256), scale="column",
margins=c(5,10))
location <- paste(directory,extension, "heatmp2", sep="")
png(location,width=1000,height=700)
heatmp
dev.off()


######## Graph 5 - Heatmap of Region and Weapon type
melt_merged_region <- subset(merged_region_hm_data, select =-c(country, region))
melt_merged_region <- melt(melt_merged_region, id.vars = "region_txt")
heat_matrix <- ggplot(melt_merged_region, aes(x=variable, y=region_txt)) +
geom_tile(aes(fill=value)) +
    scale_fill_gradient(low = "white",high = "steelblue") +
    theme(axis.ticks = element_blank(),
         axis.text.x = element_text(angle = 330, hjust = 0))
location <- paste(directory,extension, "heatmatrix", sep="")
png(location,width=1000,height=700)
heat_matrix
dev.off()

######## Graph 6 - Histogram Based on Region and Count of Attacks
# let's break our data up
regions <- as.data.frame(table(ter_clean_adv$region_txt))

locationbarplot <- ggplot(data=regions,aes(x=Var1,y=Freq,fill=variable)) + geom_bar(aes(fill =
Freq), stat="identity") + theme_bw(base_size=35) + xlab("Location") + ylab("Number of
Attacks")
locationbarplot <- locationbarplot + ggtitle("Barplot of Number of Attacks vs Location")
locationbarplot <- locationbarplot + theme(
    axis.title = element_text(size = 15),
    legend.position="none",
    axis.text.y = element_text(size=14),
```

```
    axis.text.x = element_text(size=14, angle = 45, hjust = 1),
    #axis.ticks=element_blank(),
    #panel.grid.major = element_blank(),
    panel.grid=element_line(colour="white", size=0.5),
    panel.border=element_blank(),
    panel.background = element_rect(fill = "grey")
)
locationbarplot

### Save everything

resolutionval <- 600
ggsave(
    filename = "attacksbarplot.png",
    plot = attacksbarplot,
    path = location <- paste(directory,extension, sep=""),
    width = 12,
    height = 8,
    dpi = resolutionval
)

ggsave(
    filename = "locationbarplot.png",
    plot = locationbarplot,
    path = location <- paste(directory,extension, sep=""),
    width = 12,
    height = 8,
    dpi = resolutionval
)

ggsave(
    filename = "location_attack.png",
    plot = location_attack,
    path = location <- paste(directory,extension, sep=""),
    width = 12,
    height = 8,
    dpi = resolutionval
)

ggsave(
    filename = "heat_matrix.png",
    plot = heat_matrix,
    path = location <- paste(directory,extension, sep=""),
    width = 12,
    height = 8,
    dpi = resolutionval
)

ggsave(
    filename = "weapon_plot.png",
    plot = weapon_plot,
    path = location <- paste(directory,extension, sep=""),
    width = 12,
    height = 8,
    dpi = resolutionval
)
```

Appendix B: Other Generated Interesting Graphics

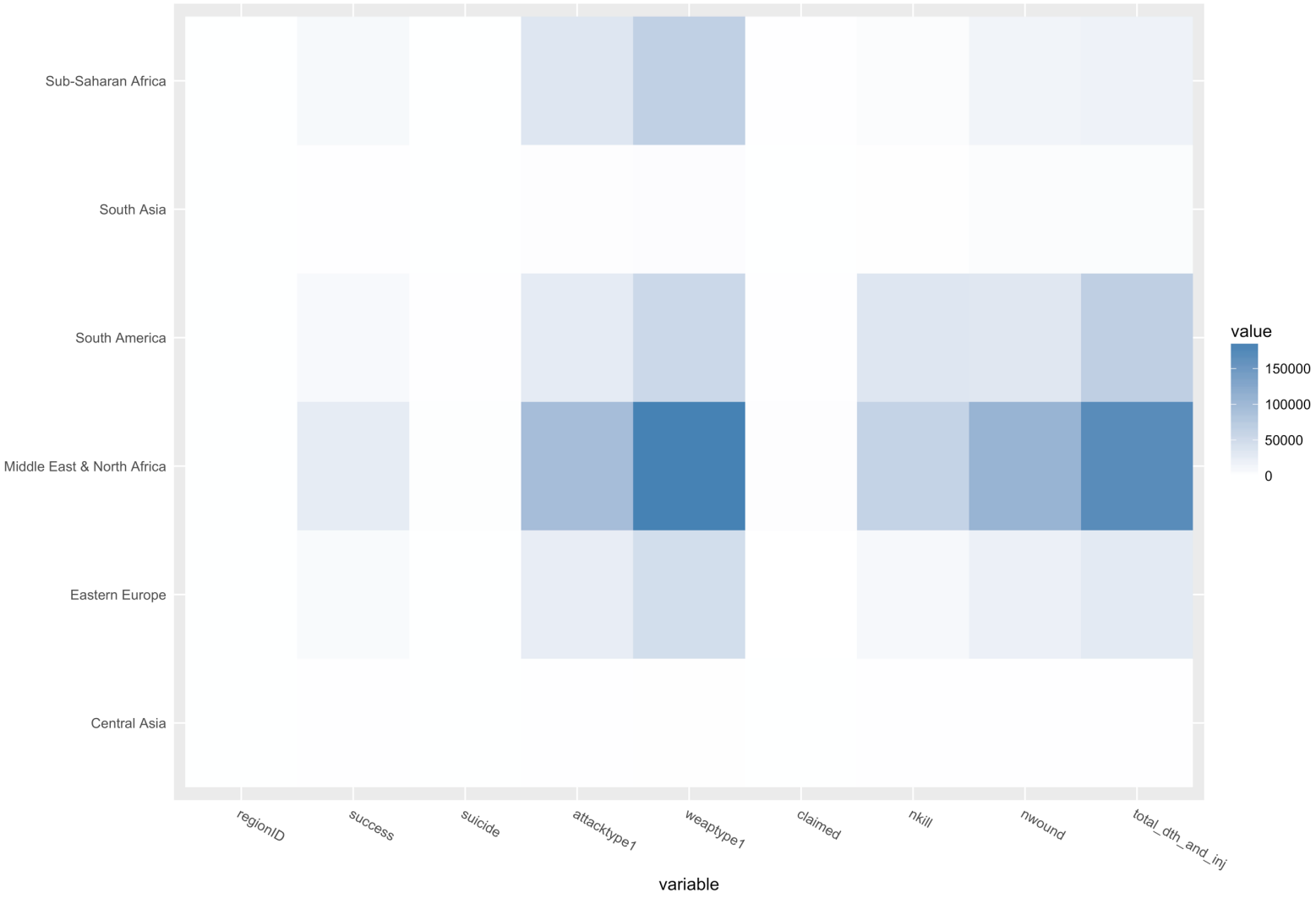

Figure 4 - Heatmap showing the correlation between locations and some external variables. It is observed that Middle East & North America has a high correlation with the total number of deaths and injuries. Also with the corresponding weapon type.

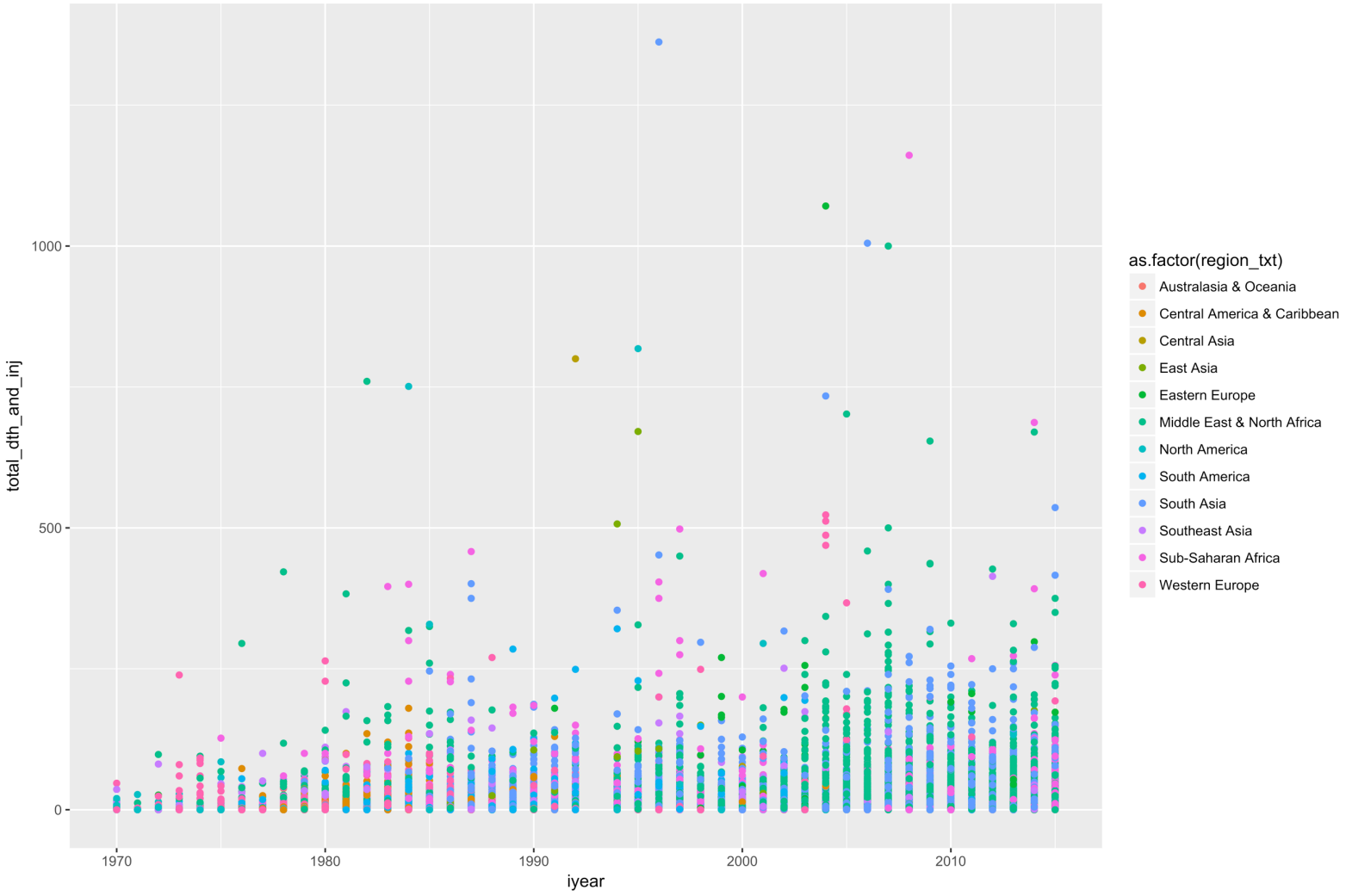

Figure 5 - Timeline of terrorist attacks, plotted by the corresponding number of killed or injured, colored by corresponding region.

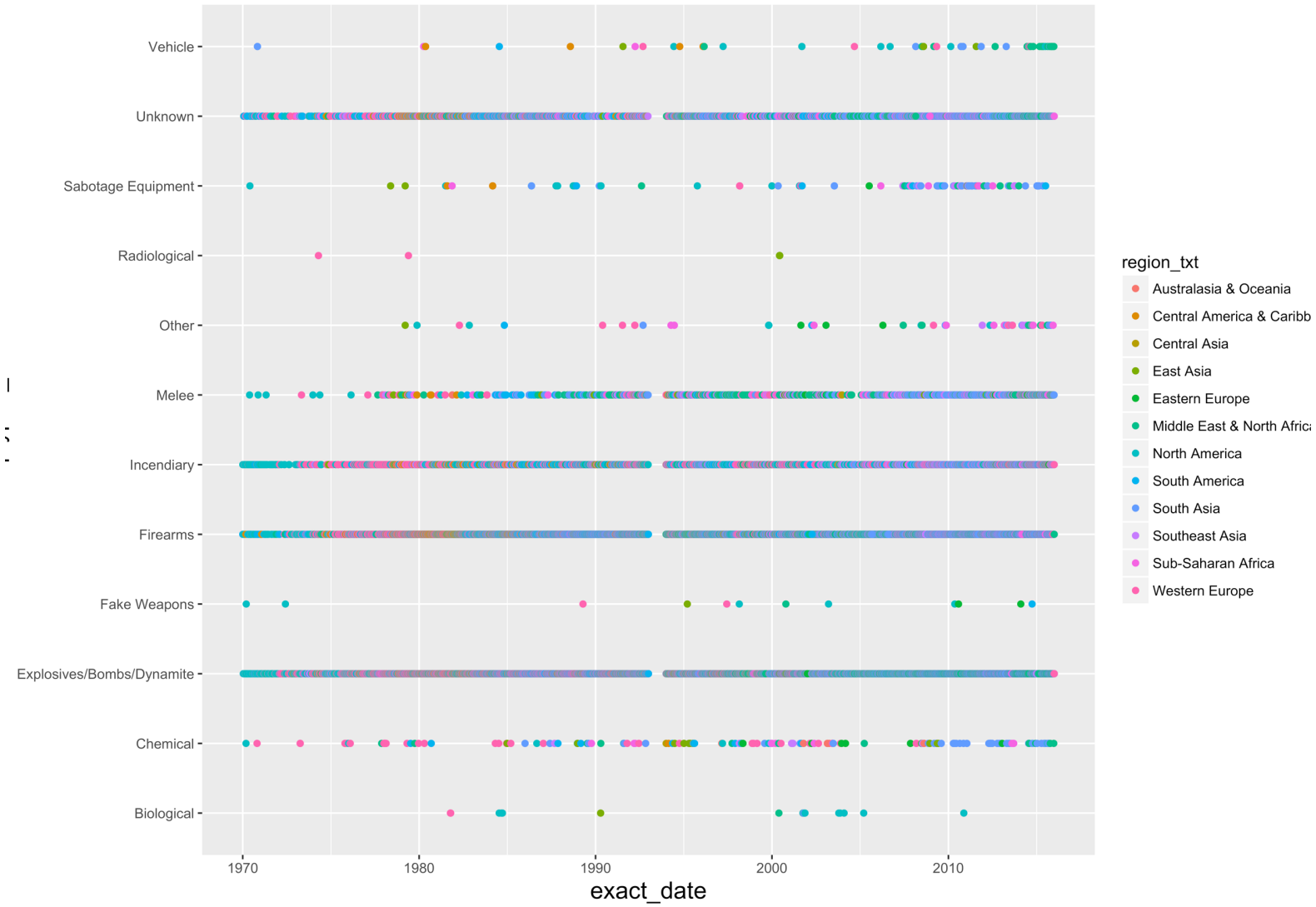

Figure 6 - Timeline charting the frequency of certain weapons, while also displaying the location of the event.

Appendix C: Further Potential Reads

Short excerpt from Soteria Intelligence about some of the advanced techniques to combat self-selecting terrorists.
http://www.soteriaintelligence.com/blog/using-artificial-intelligence-to-combat-lone-wolf-attacks/

Sydney Morning Herald article talking about the difficulty of actually predicting these lone wolf attacks analytically.
http://www.smh.com.au/comment/why-lone-wolf-attacks-are-almost-impossible-to-predict-20160613-gphykl.html