# Global Terrorism Database

# Bayesian Comparison of UK & France Bombings and

# A Discussion of Terror Related Death of US Citizens

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Global Terrorism Database:

The Global Terror Database (GTD) is a collection of data about terror attacks that have occurred anywhere in the world from 1970 through 2015. The 2016 update will come out later in 2017.

This database is very interesting to explore because they have classified the data into many categories like bombings, assassinations, kidnappings and many more. A Bayesian analysis was done on the difference in the number of terror related bombings that occurred in the UK and France. Then the focus is shifted to the number of deaths of US citizens between 1970 and 2016. Finally, some missing data from 1993 is imputed.

UK and France - Terror related bombings.

A Bayesian posterior estimation approach was used to look at the difference between the UK and France with respect to terror related bombings (TRBs) after the year 2000. Initially, I used the mean and the standard deviation of TRBs in all of Western Europe up to the year 2000 to inform my priors regarding UK and France. I assumed a normal distribution for the mean of the number of TRBs and a uniform distribution for the standard deviation of terror related bombings. Other distributions (binomial, poisson ,weible) can be used and that is one of the followups that might improve results. Pymc3 is the Bayesian modeling package used for this analysis. It uses a Markov chain method to help find the highest posterior density (HPD) of the parameters (mean and standard deviation) for the two countries. We will be looking to see if there is a statistically significant difference for the mean between UK and France. The threshold to determine if they are different will be if there is no overlap at the 5-95% level for the mean of UK and France. A simple way to see that is to subtract the mean HPD for UK from France and see if the zero point is within the 5-95% level of the resulting difference HPD. If the zero is within that threshold, then we will know that the difference is not statistically significant. If it falls outside that threshold, the difference is statistically significant.

Results.

The peak of the HPD of the mean for France came out at 18.124. It was 31.555 for UK. (See Figures 1 & 2 below) There is a difference there, but if you look at the spread of the HPD for the two countries, you will see that there is a bit of an overlap. Further, when you look at the zero point for the difference it lies within the 5-95% threshold we set out at the beginning, Figure 3. It is close to the threshold and if we had set the threshold at 10-90% it might have fallen outside that threshold, but it isn't advisable to set a threshold, do the analysis and then adjust your threshold when you want to see a result turn out a particular way.

I was actually surprised that the difference between UK and France was close to being different at a statistically significant level. I note that the level of French bombings was lower than the UK but I wouldn't be surprised that the numbers in France from 2016 are worse since I recall hearing many terrorism stories happening in France last year.

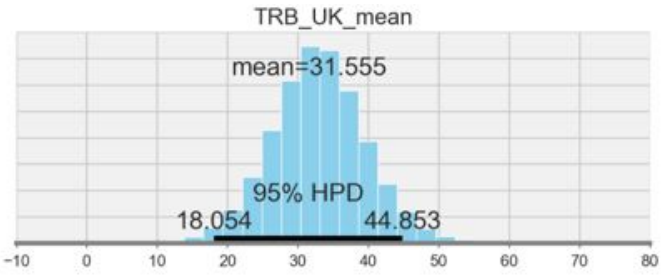


Figure 1. The Highest Posterior Distribution (HPD) for the number of Terror Related Bombings (TRB) for the United Kingdom (UK) from 1970 to 2015.

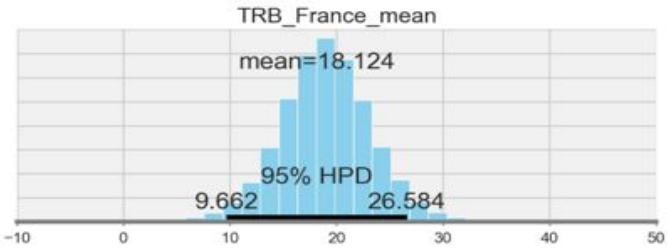


Figure 2. The Highest Posterior Distribution (HPD) for the number of Terror Related Bombings (TRB) for the France from 1970 to 2015.

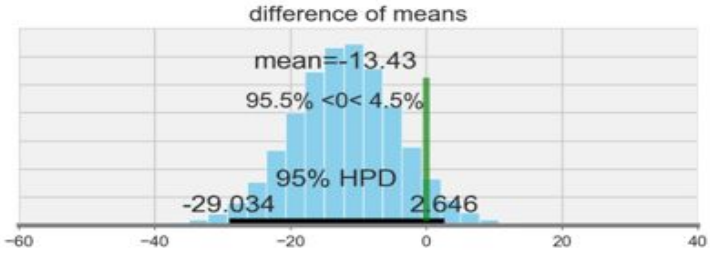


Figure 3. The difference between Fig. 1 and Fig. 2. The zero point is within 5-95% so the difference is not statistically significant.

Terrorism in the USA

Using Pandas, I looked at various forms of terror in the US over the past 45 years - kidnapping, bombings, attacks on infrastructure, armed assaults. I was surprised to find that the level of terrorism in the USA was a fairly low. Of course, there are other countries with lower levels (ex. New Zealand), but within the US borders, things are relatively safe.

I decided to look closely at the number of deaths per year for US citizens within the US and deaths of US citizens worldwide. Of course the one data point of terror that sticks out in the USA is '9-11.' I found that I had to remove it from the data in order to get a look at other aspects of terror in the USA

because it skews the data so much. For example, if you want to plot the number of deaths that have occurred across the years (including 2001), 9-11 is so large, you can barely see the rest of the data since, thankfully, there are not any other data points that are so big. The plots below illustrates this. The first plot shows worldwide USA deaths from 1970 till 2015 that includes 9-11. After removing 9-11 from the data set, and rescaling, what happened in the other years become clear. This is seen in Figure 5.


Figure 4. Worldwide USA terror related deaths from 1970 to 2015 - including '9-11'.

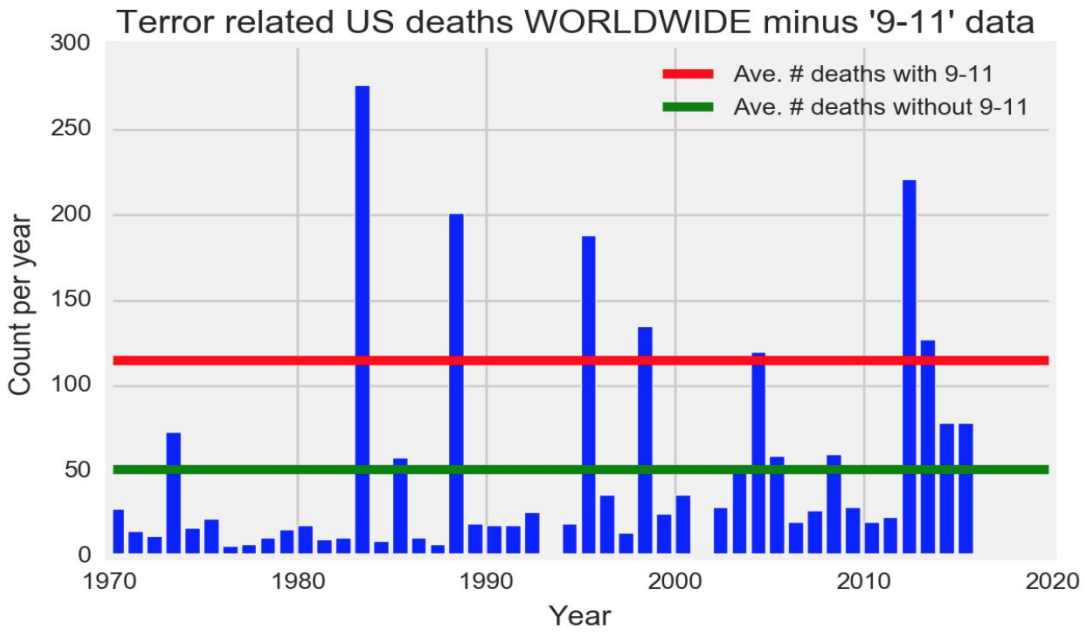


Figure 5. Worldwide USA terror related deaths from 1970 to 2015 without '9-11' data.

In the above plot, (after we have set the 9-11 data aside) we can see that there are other significant things to learn about that could not have been easily seen in a plot that included the 9-11 attack data.

Recall that this is a plot for USA deaths anywhere in the world from 1970 till 2015. The first spike in the above plot is the Beirut bombing of the US Marine barracks that killed 241 soldiers.

The red line in that plot illustrates the average number of US terror deaths over the 1970-2015 time period if you include 9-11 data. That average is about 115/year. The green line illustrates the average if you leave out the 9-11 numbers - about 51/year. In other words, 9-11 makes up more than half of all the deaths for the past 45 years. I hope that it continues to make up for more than half of US terror deaths for a very, very long time.

1993 missing data for bombings (and US deaths)

For various reasons, the data from 1993 is not included in the GTB. To estimate the number of bombings (worldwide) during that year I took the average between 1992 and 1994 and the average from 1970 to 2015. Interpolation between 1992 and 1994 gives 1445 bombings for 1993 and average over the entire time span (45 years) gives 1688 bombings/year.

The average number of US deaths (worldwide) over the 45 years is 51/yr if you don't include 9-11 and 115/yr if you do include 9-11. The average between 1992 and 1994 gives 23.5 deaths. In the appendix of the GTB, they give the number of deaths for the US in 1993 at 21.

The average number of domestic US deaths per year from 1970 to 2015 (if you don't include 9-11) was ~10/year. If you do include 9-11 that average rises to 74/yr. The average between 1992 and 1994 gives 3 deaths. Numbers from Wikipedia give the number of domestic deaths due to terror at 9 for 1993.

Conclusion:

The GTD provides an an interesting and useful database to look at when you want to learn about aspects of terror around the world. Terror events in the US get such a large amount of press coverage, it feels as though our country is a dangerous place to live. However, from the data I looked at, as long as you stay in the US, we live in a very safe country. I give credit (and thanks) for that to people at places like the NSA, the CIA and the FBI. The efforts to improve, update and maintain this database will serve the public well and should be continued.

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