

Waves of Extremism

A data analysis and visualization project focused extremist ideological trends in the U.S.

MSDS 692
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Introduction

Why this topic?

- Three examples across five decades:
 - March 1, 1971: Left-wing extremist bombing at the U.S. Capitol
 - February 26, 1993: Religious extremist truck bomb attack on the World Trade Center
 - August 12, 2017: Right-wing extremist vehicle attack on a crowd of protestors in Virginia
- The University of Maryland has documented over 200,000 extremist attacks occurring between 1970 and 2019
- 5,000 of these occurred inside the United States causing thousands of deaths and millions of dollars in damage

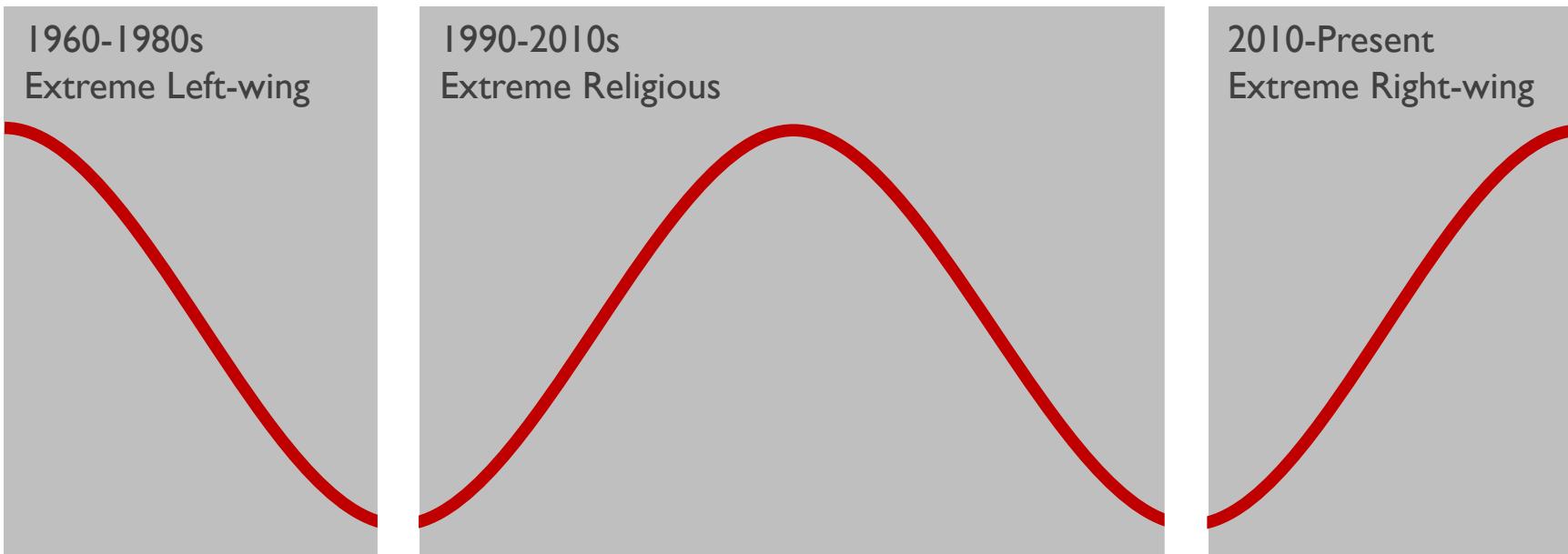


Clockwise from left: 1971 Capitol bombing, 1993 World Trade Center attack, 2017 Charlottesville car attack

Introduction

Visualizing the Problem

What we believe: Assessed Waves of Extremism



A depiction of what analysts believe the ideological waves look like based on anecdotal evidence

Introduction

What we see drives how we spend

\$61 billion

Annual amount spent on
Homeland Security
between 2002 and 2017

\$100 million

Amount allocated in 2022
for countering Domestic
Violent Extremism

Purpose of Spending	Total FY2002 – FY2017	Percent Change FY2002 – FY2017
Border and Transportation Security	\$379.1 billion	121%
Defending Against Catastrophic Threats	\$94.3 billion	958%
Domestic Counterterrorism	\$78.6 billion	59%
Emergency Preparedness and Response	\$101.5 billion	33%
Intelligence and Warning	\$9.7 billion	318%
Protecting critical Infrastructure and Key Assets	\$313.7 billion	113%

Trends in Historical Homeland Security Spending by Purpose, Fiscal Years 2002-2017 (Heeley, 2018)

- How analysts describe the problem determines where policy-makers dedicate resources
- Analytic assessments of extremist waves drive budget planning and counterterrorism policy decisions

Research Questions

What shifts, if any, have occurred in the ideology of extremists conducting attacks in the homeland?

and

Can machine learning help identify ideological motivations for attacks?

Introduction

Methodology - OSEMN

Obtain

The two datasets were openly available from the University of Maryland website. Both datasets also came with extensive codebooks defining the categories and explaining the methodology.

Scrub

Each data set was cleaned individually before combining the two. The initial effort was identifying and extracting incidents from outside the U.S. Once complete, the two sets were combined. The remaining scrub involved researching the 200 groups that did not have ideologies listed in the data.

Explore

The data was sliced and analyzed through individual features to identify unique patterns and test the pre-existing wave hypothesis.

Model

The cleaned data was run through a machine learning algorithm to see if it could provide faster identification of ideological shifts.

Interpret

Communicating findings was done by generating visualizations highlighting different aspects of the data and the results of the machine learning experiment.

Introduction

Data Sources

Original GTD Data

Original PPT Data

- The core data for this presentation came from University of Maryland's National Consortium for the Study of Terrorism and Responses to Terrorism (START) Global Terrorism Database (GTD)
 - The GTD data was combined with data from START's Profiles of Perpetrators of Terrorism in the U.S. (PPT) database
 - The GTD contained over 200,000 incidents covering the globe. The PPT had information on the motivations and ideology of 146 separate groups
 - After combining the two databases, removing the incidents outside the U.S., and cleaning the data, the resulting dataset contained over 3,000 incidents with 70 descriptive features occurring between 1970 and 2019

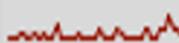
Introduction **Definitions**

Created from definitions of terrorism (Falk, 2019 and Prabha, 2000)

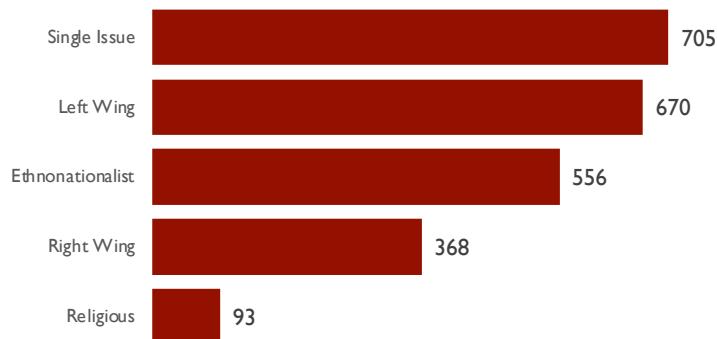
- Defining terrorism is a challenge
 - Different people define it differently
 - START defines terrorism as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation."

Exploration and Analysis - Ideology

What motivates attackers?

50 year Trend	Ideology	Definition (START, 2019)
	Extreme Right-wing	"Extreme right-wing perpetrator groups are those that use violence to achieve their goals and believe that one's personal and/or national "way of life" is under attack and is either already lost or that the threat is imminent (for some the threat is from a specific ethnic, racial, or religious group)."
	Extreme Left-wing	"Extreme left-wing perpetrator groups want to bring about change through violent revolution rather than through established political processes. In addition, this category includes secular left-wing groups that rely heavily on terrorism to overthrow the capitalist system and either establish "a dictatorship of the proletariat" or, much more rarely, a decentralized, non-hierarchical sociopolitical system."
	Religious	"Religious perpetrator groups are those that use violence to achieve their goals and seek to smite the purported enemies of God and other evildoers, impose strict religious tenets or laws on society (fundamentalists), forcibly insert religion into the political sphere (i.e., those who seek to politicize religion, such as Christian Reconstructionists and Islamists), and/or bring about Armageddon (apocalyptic millenarian cults)."
	Ethno-nationalist/Separatist	"These are perpetrator groups that have used violence to achieve their goals and are regionally concentrated with a history of organized political autonomy with their own state, traditional ruler, or regional government, and who are committed to gaining or regaining political independence through any means and who have supported political movements for autonomy at some time since 1945."
	Single Issue	"Single issue perpetrator groups are those that rely heavily on violence motivated by very specific or narrowly-defined causes of various sorts. This category includes groups from all sides of the political spectrum."

Total Number by Ideology

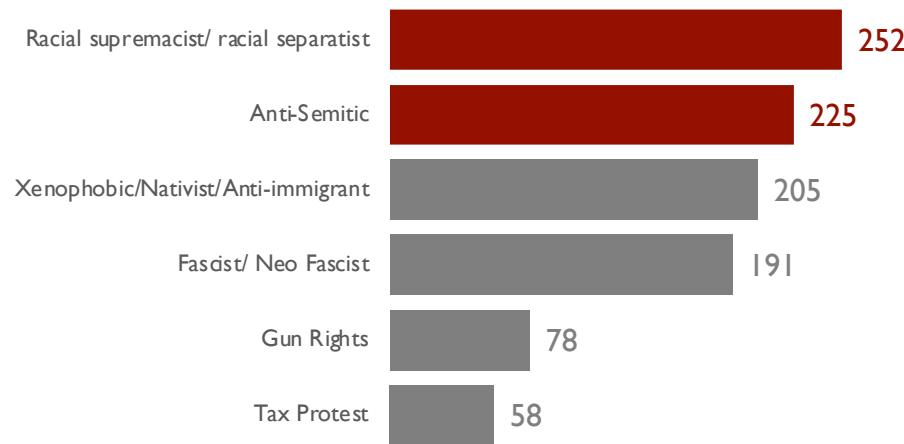


- The first three dominant ideologies are what will be used to compare waves
- Ethnonationalist ideological trends overlap with left-wing trends
- Single Issue ideologies are a catch all for incidents that did not fit in the other four

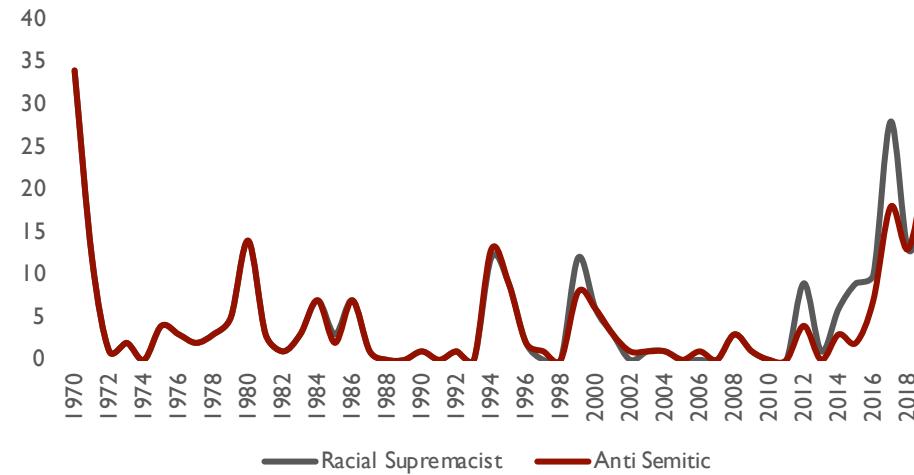
Exploration and Analysis - Ideology

Extreme Right-wing Sub-ideologies

Attacks Linked to Right Wing Sub-ideologies



Racist / Anti-Semitic Attacks Over Time

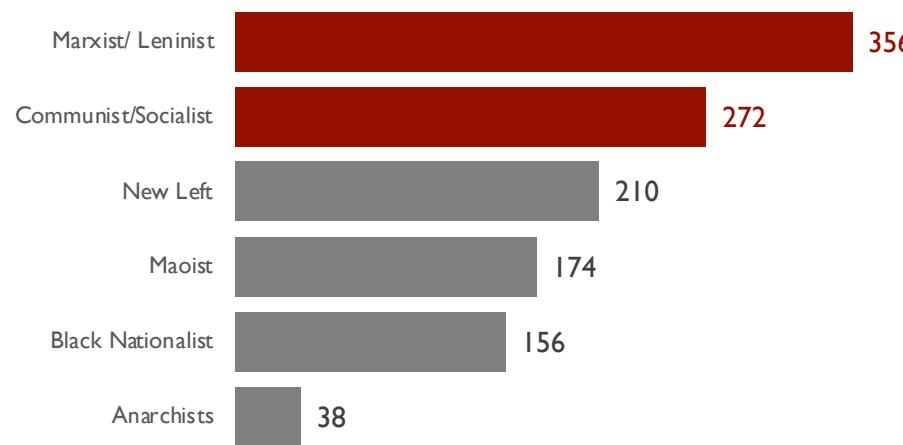


- Over half of all right-wing attacks were related to race or anti-Semitism
- The attacks for these two sub-ideologies mirror the broader trend for right-wing attacks but the increase at the end of the period is more pronounced

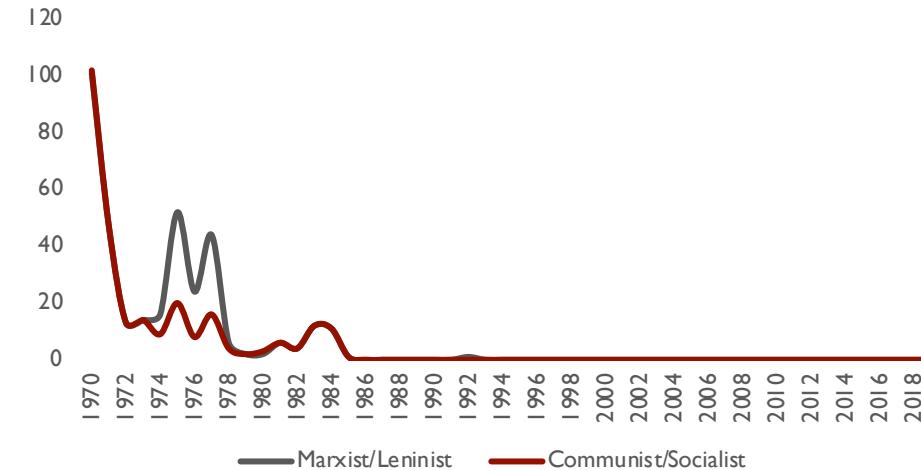
Exploration and Analysis - Ideology

Extreme Left-wing Sub-ideologies

Attacks Linked to Left Wing Sub-ideologies



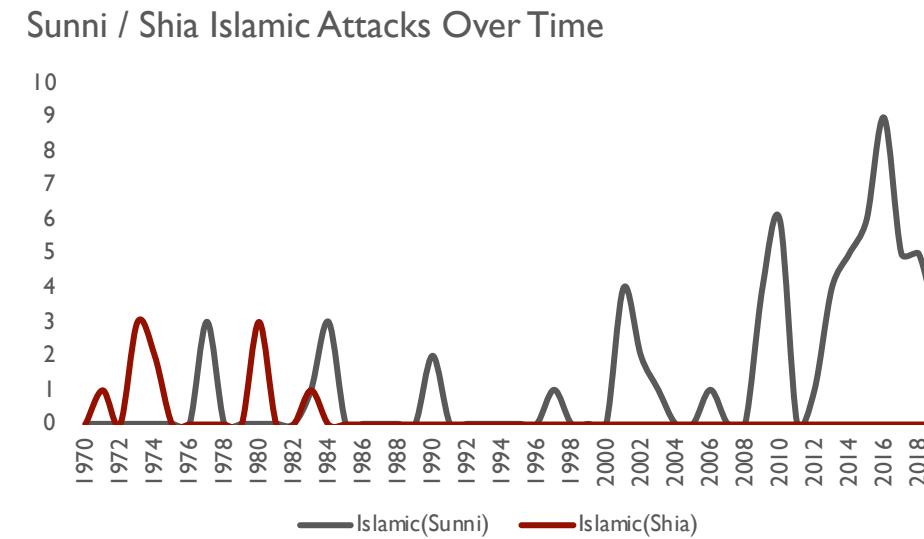
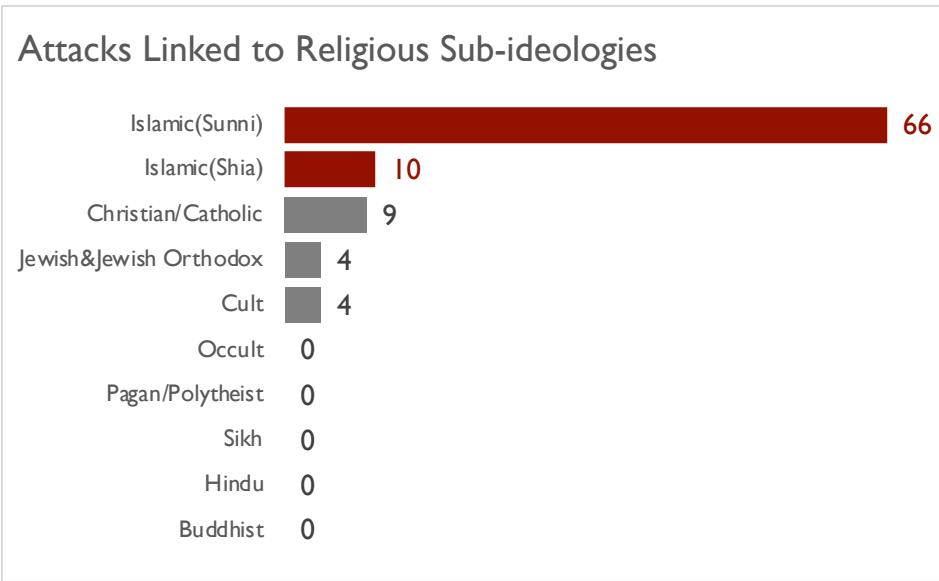
Marxist / Communist Attacks Over Time



- Marxist/ Communist ideologies were the top two left-wing sub-ideologies
- The trend for these two closely matches the trend for left-wing ideologies. Both declined with the end of the Cold War and the dissolution of the USSR

Exploration and Analysis - Ideology

Religious Sub-ideologies

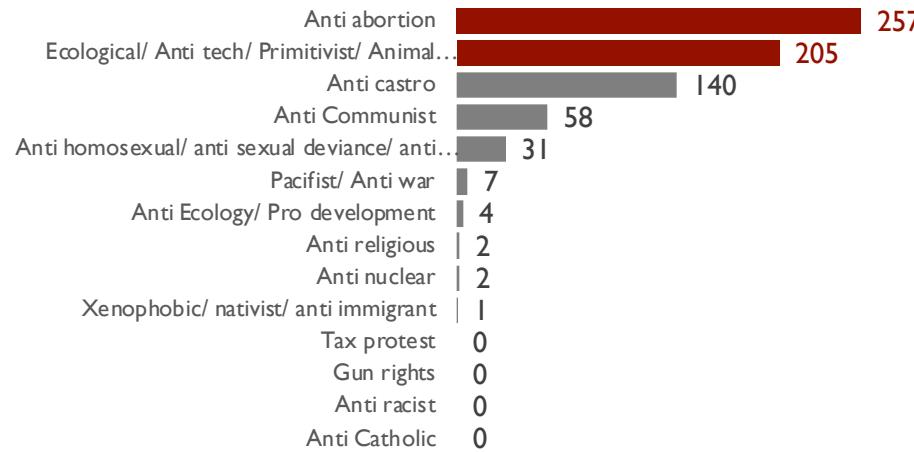


- While smaller in numbers overall, religiously motivated attacks were dominated by Islamic sub-ideologies
- Shia attacks matched up to the fallout from the Iranian Revolution. Sunni attacks spiked after 9-11 and have continued steadily

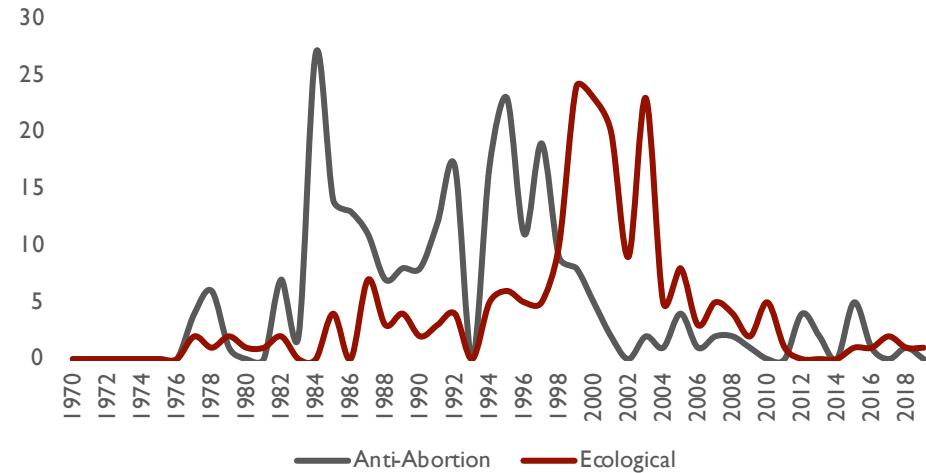
Exploration and Analysis - Ideology

Single Issue Sub-ideologies

Attacks Linked to Single Issue Sub-ideologies



Anti-Abortion/ Ecological Attacks Over Time

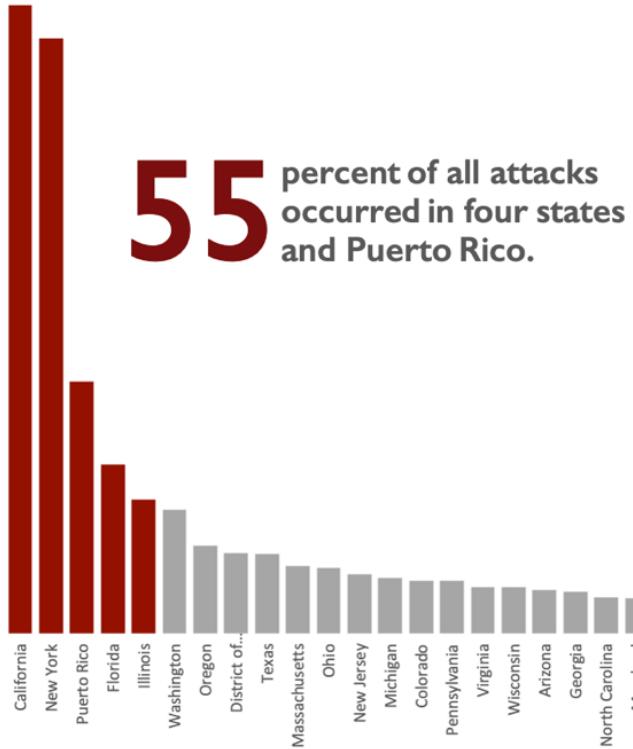


- Anti-abortion and Ecological/Animal Rights attacks were numerous in the middle of the period
- Anti-abortion attacks began to grow after the 1973 Roe v. Wade decision and Eco-terrorist attacks began a steady growth in the mid-1990's. Both motivations seemed to lose favor after 9-11

Exploration and Analysis – Attack Characterization

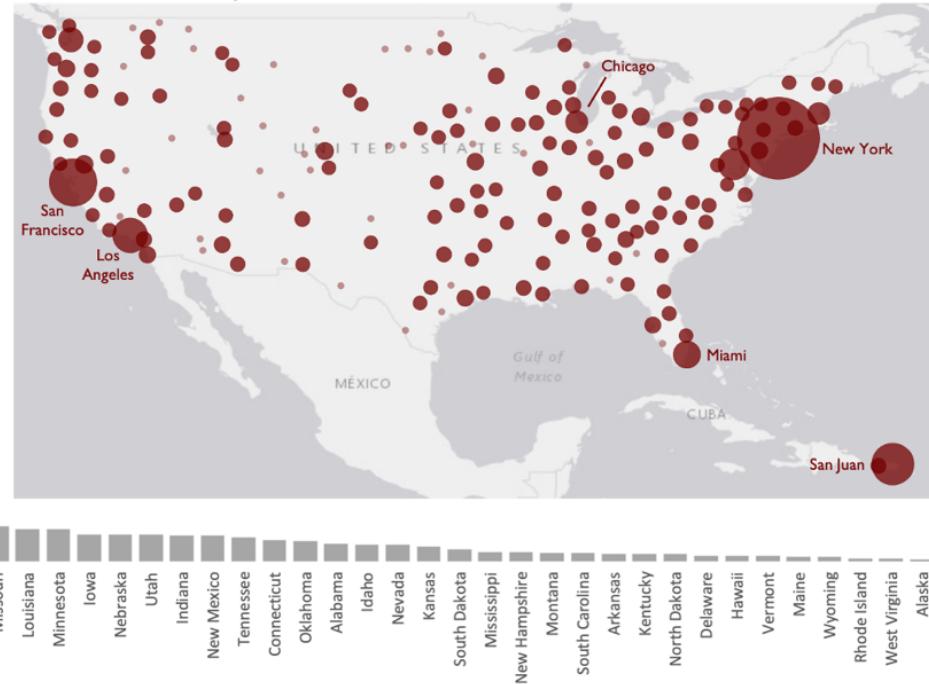
Location matters

Attack Location Overview



55 percent of all attacks occurred in four states and Puerto Rico.

Clustered in metropolitan areas

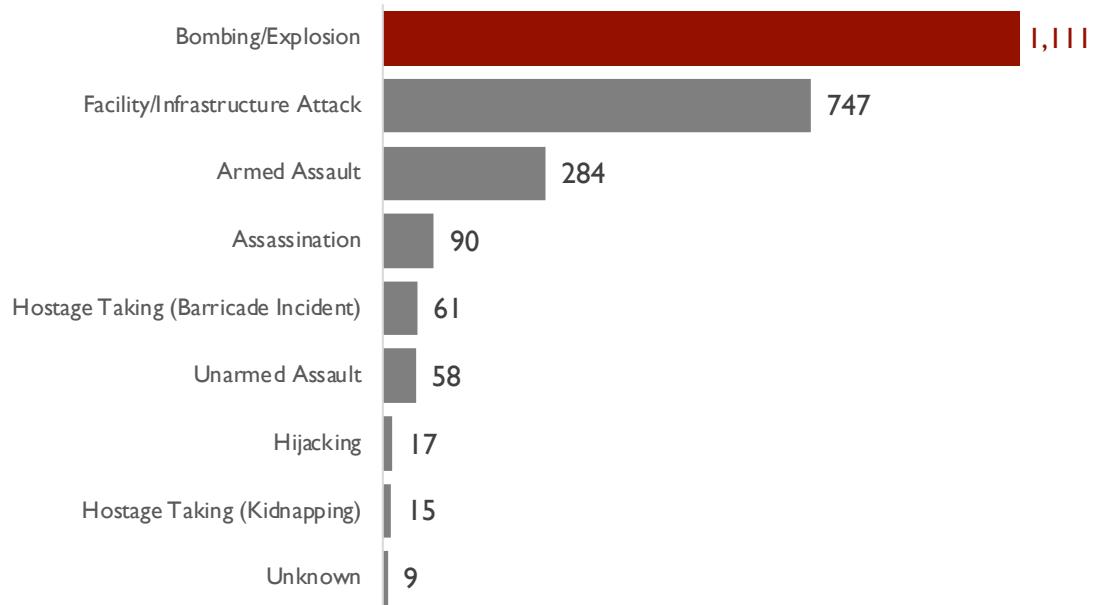


- Large metropolitan areas contribute the most to attack numbers – New York, Miami, Los Angeles, San Francisco, and San Juan were the leaders

Exploration and Analysis – Attack Characterization

Bombings most common, but not for everyone

Bombings are the most common attack type



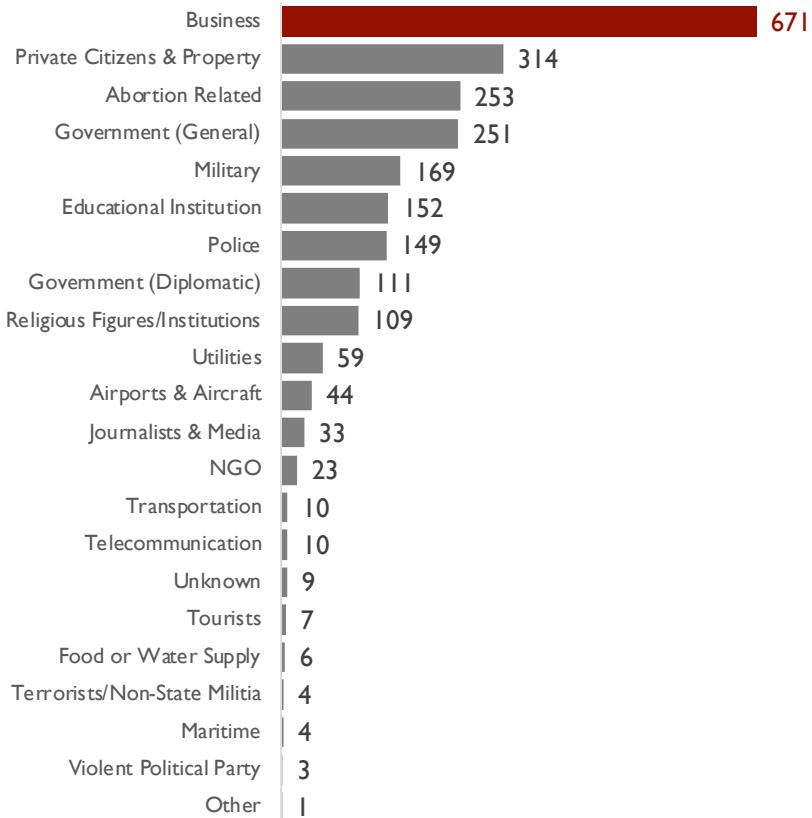
Ideology	Preferred Attack Type
Extreme Right-wing	Armed Assault
Extreme Left-wing	Bombing
Religious	Armed Assault
Ethno-nationalist/ Separatist	Bombing
Single Issue	Facility/ Infrastructure Attack

- Bombings led by a large margin but were not the preferred attack type for all ideologies

Exploration and Analysis – Attack Characterization

Businesses were a top target

Businesses targeted most often



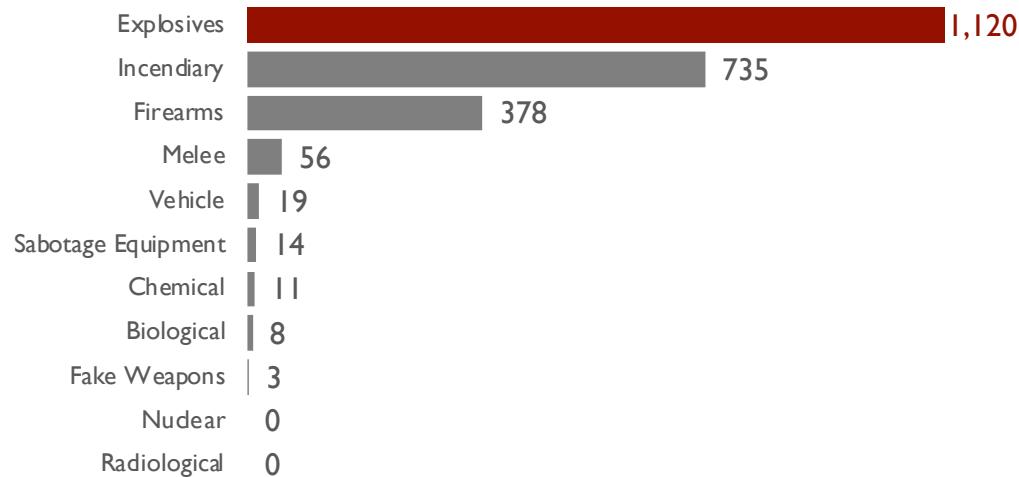
Ideology	Preferred Target
Extreme Right-wing	Private Citizens
Extreme Left-wing	Business
Religious	Private Citizens
Ethno-nationalist/ Separatist	Business
Single Issue	Abortion-related

- Businesses were targeted the most, primarily by extreme left-wing attackers and ethnonationalists

Exploration and Analysis – Attack Characterization

Explosives were a weapon of choice

Explosives lead the list for weapon types



Ideology	Preferred Weapon
Extreme Right-wing	Firearms
Extreme Left-wing	Explosives
Religious	Firearms
Ethno-nationalist/ Separatist	Explosives
Single Issue	Incendiary

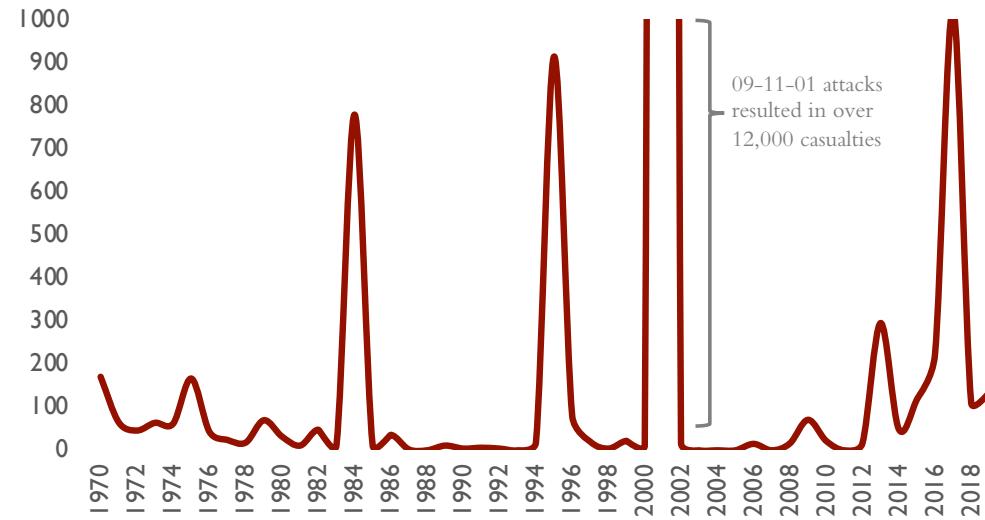
- Explosives remained a primary weapon
- Coupled with the number of attackers using incendiary devices, this made up nearly 80% of all attacks

Exploration and Analysis – Attack Characterization

Casualties provide unique insights

Ideology	How likely is an attack to generate casualties?	How many casualties could they cause per attack?
Extreme Right-wing	38.32%	6.50
Extreme Left-wing	15.52%	0.45
Religious	54.84%	3.76
Ethno-nationalist/ Separatist	16.01%	0.76
Single Issue	12.91%	0.45
All Ideologies	19.9%	1.58

Casualties vary but trend is increasing

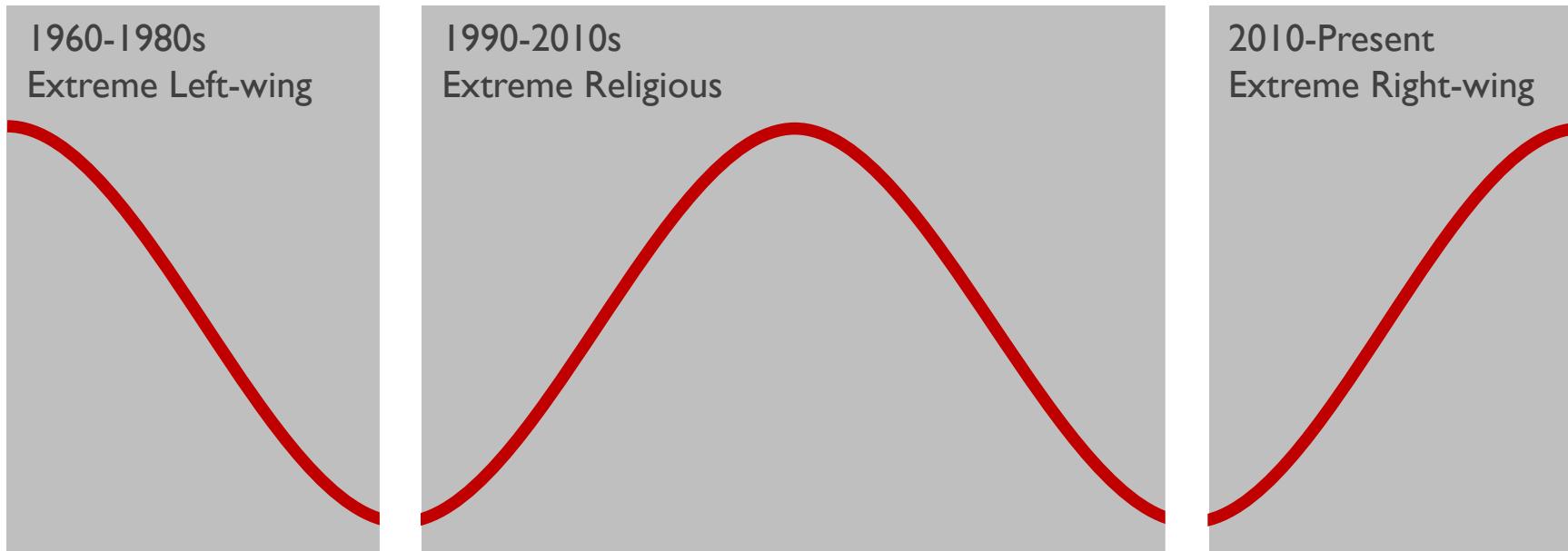


- Despite larger attack numbers overall, left-wing, ethnonational, and single issue attacks cause less casualties
- Right-wing and religiously motivated attacks are far more likely to cause casualties and cause more when they do happen. This trend occurs even if we remove the large numbers from 9-11

Results – What do the waves of extremism look like?

Revisiting the original assessment

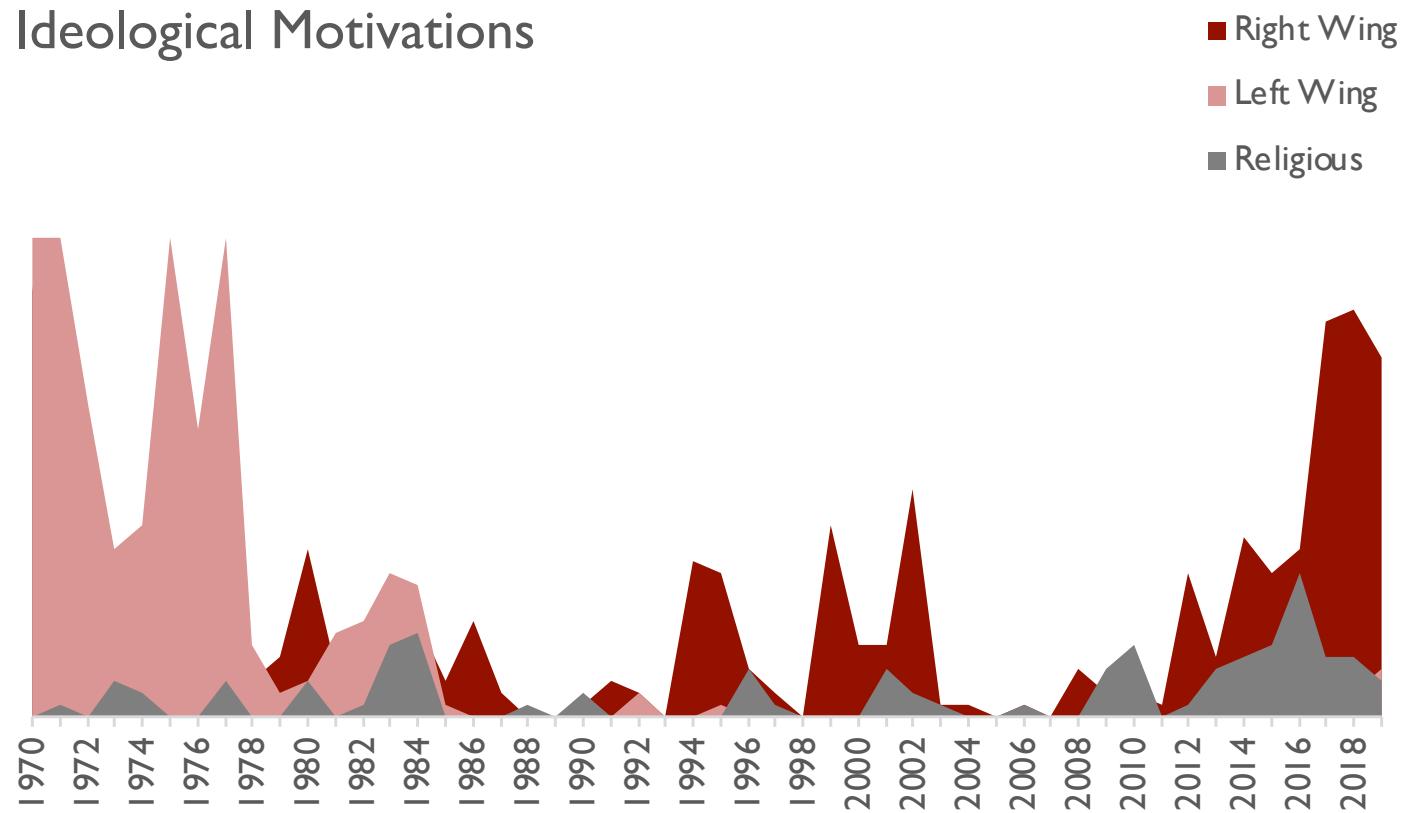
What we believe: Assessed Waves of Extremism



A depiction of what analysts believe the ideological waves look like based on anecdotal evidence

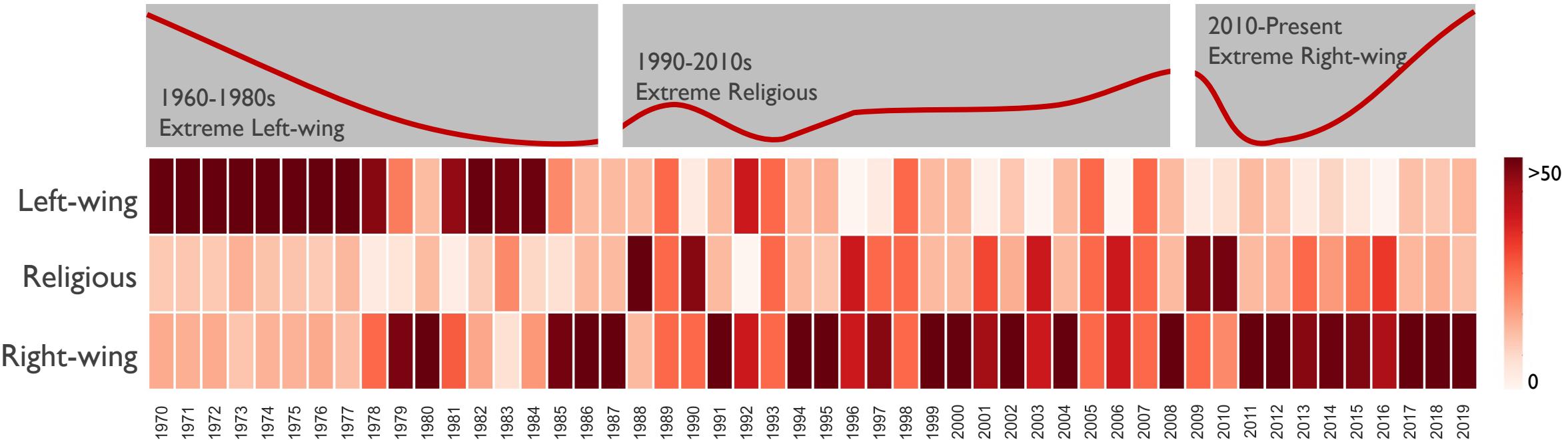
Results – What do the waves of extremism look like?

The pattern based on the data



Results – What do the waves of extremism look like?

Combining the two into a clear visual



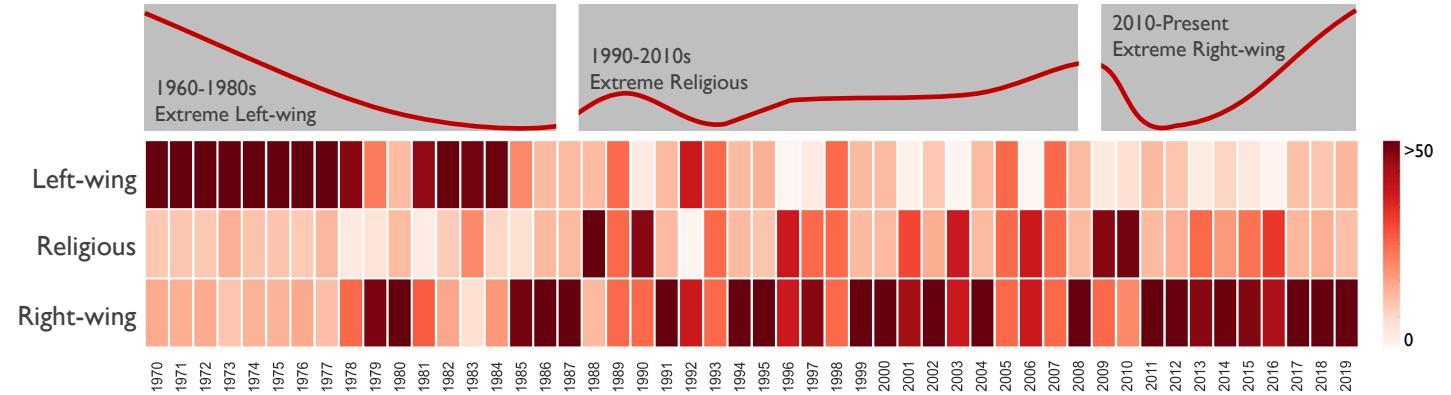
- The waves are not as clear as our anecdotal model led us to believe
- While left-wing attacks do drop off as expected, religious and right-wing motivated attacks overlap more
- Right-wing attacks are on the rise, but the slope began far earlier than our wave model showed

Results – Tying Waves and Attack Trends Together

What does this all mean for today?



- Attacks on citizens
- Use of Firearms
- Casualties

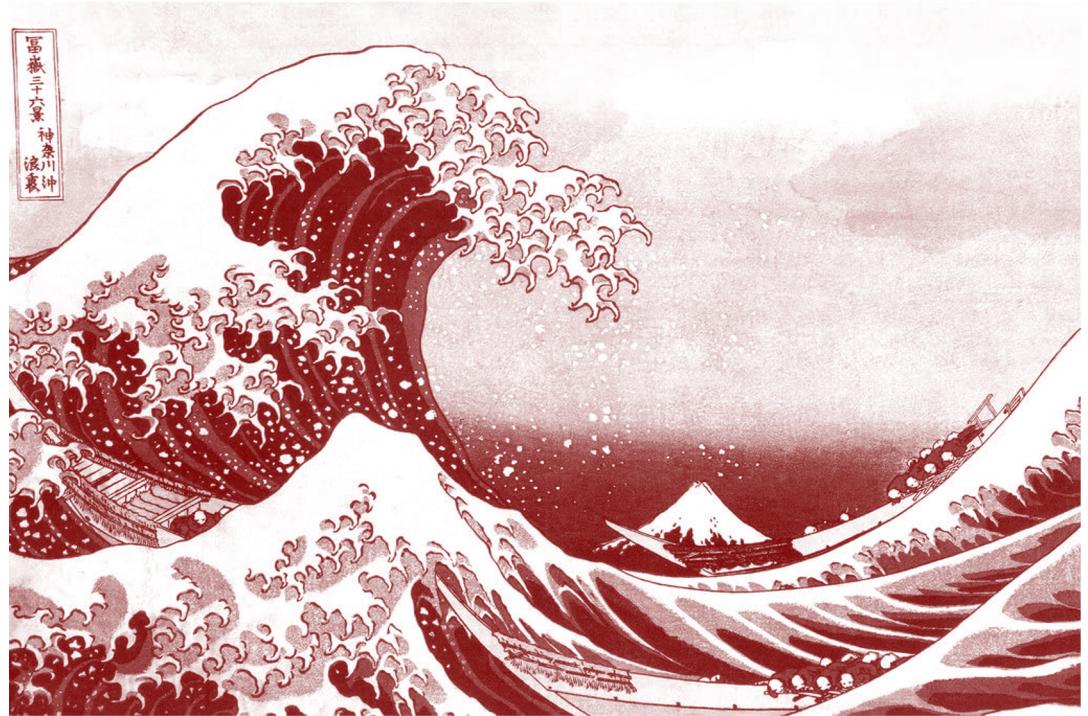


- If right-wing attacks are on the rise and the wave of religious extremism has not passed, the future threat will remain hard to counter
- Both ideologies lean towards armed assaults on private citizens using readily available firearms
- Both lead the five ideologies in the likelihood and number of casualties per attack

The way forward – Improving Wave Detection

We can see the waves...too late

- The base data for the GTD is three years behind. This is largely due to their rigorous focus on data quality and data management
- Identifying ideological motivation is very challenging. Human behavior is complex and not easily placed into neat boxes
- Analysts can tell you what they think based on their experience. They will get it right most of the time but they rarely have hard data to back up their assessment of long term trends



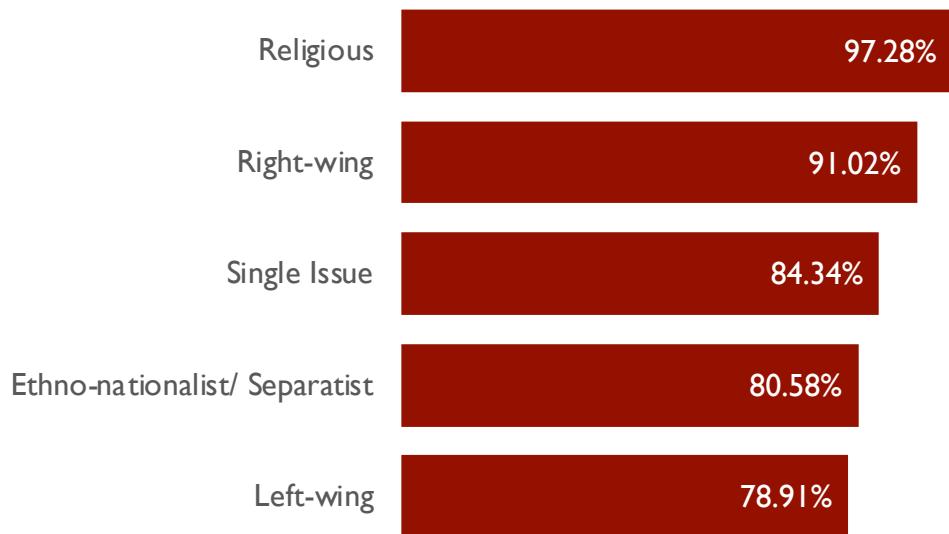
The Great Wave Off Kanagawa by Katsushika Hokusai, 1831

The way forward – Improving Wave Detection

Experimenting with Machine Learning

- Machines excel at recognizing patterns in large amounts of data.
- We can train the machine to identify patterns in attack characteristics that point to specific ideological motivations.
- After training on the data, we asked the machine to look back and identify each of the five motivations.
- Results were mixed. It does reasonably well for four out of the five ideologies. However, the high accuracy score for identifying religious motivation, while seemingly great, is worth further checking. Rarely do we see results that high.

How accurate was the machine's prediction of ideology?



The way forward – Improving Wave Detection

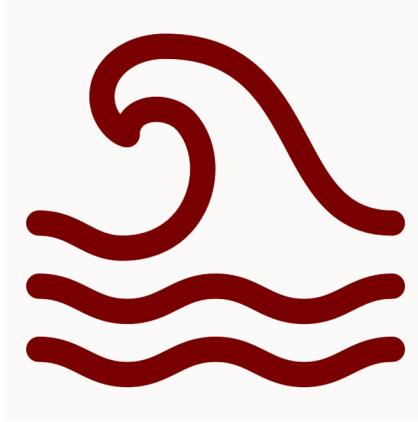
Hunting the Next Wave

- Machine learning may be a way to speed the process of identifying ideological trends in extremist attacks
- As always, more data will help refine the patterns and improve confidence in the machine's assessment
- In particular, more data on perpetrators would likely add to our ability to identify motivation

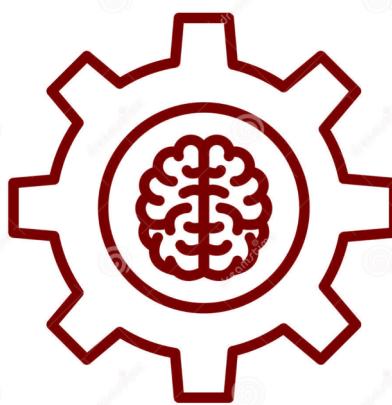


Conclusion

Waves, Machines, and Ideological Threats



Waves of extremism do exist but they may be more rogue than predictable and they may come on top of each other



Machine learning can tip and cue analysts but more detail in attack descriptions will make it more reliable



Right-wing extremism is becoming the greatest ideological threat. It is not as new of a phenomenon as we thought, but it is increasing.

Waves of Extremism