

LONG-TERM TRENDS IN ATTACKS ON PUBLIC SURFACE TRANSPORTATION IN EUROPE AND NORTH AMERICA

The following article was authored by the Mineta Transportation Institute's Brian Michael Jenkins, Director of the Mineta National Transportation Safety and Security Center, and Bruce R. Butterworth, a Mineta Research Associate.

January 25, 2016 – Still fresh in everyone's minds are the thwarted assault aboard the Brussels-Paris train in August 2015, the horrific November 2015 attack in Paris, and subsequent terrorist plots against transportation targets in Europe. In addition, the tenth anniversary of the deadly July 7, 2005 terrorist attack on London Transport was marked this past summer.

This is an appropriate time to ask serious questions about the long-term trends in terrorist and serious criminal attacks against public surface transportation in Europe, the United States, and Canada. Are attacks increasing or decreasing? Are attacks becoming more or less lethal? Are security measures working? What other trends are discernible? After having probed exhaustive data, the authors discuss possible answers in this article.

The focus of this article will be Europe, the United States, and Canada for the simple reason that the security environments of the regions are similar. The plots in Europe are also relatively similar to those in the United States, although both plots and attacks occur far more frequently in Europe. While there have been plots in Canada and the United States, and while there is no reason to let our guard down, so far there have been only a few actual attacks, something that may or may not continue.

Methodology for the analysis

To answer these questions, the authors analyzed trends using the Mineta Transportation Institute's (MTI) comprehensive database of attacks on public surface transportation. This carefully assembled database provides detailed information on 4,690 attacks as recent as December 31, 2015 and as far back as January 1, 1970. It enables an examination of attacks by target, country, time, method of attack and weapons used, the specific and general types of groups involved, whether the attacks were successful or not, and how many casualties they caused.

The authors have included in this analysis attacks on trains, buses, and passenger ferries. However, attacks on tracks and other railroad infrastructure were excluded. These include destruction or sabotage of signaling and communications systems, servicing equipment, construction sites, and transportation offices, except where these are clearly intended to derail passenger trains and cause casualties. Most incidents that involve blowing up, blocking, or sabotaging tracks or other equipment appear to be aimed at disrupting rail traffic rather than causing casualties. Also excluded were attacks on freight trains and highway infrastructure.

Trends evident in Europe

In Europe, two broad trends became clear:

- Although attacks in Europe are themselves few compared to South Asia and other
 regions, the volume of attacks on both train and bus targets has been increasing since
 1970. That total of 361 attacks includes three attacks against passenger ferries, only one
 of which caused fatalities. Interestingly, the increase is greater for all attacks on buses
 than on trains. Overall, however, there are more fatal attacks on trains than on buses.
- At same time, the lethality of all these attacks has decreased. Given the spectacular attacks in Madrid in 2004, in which 191 people died, and in London in 2005, in which 52 people died, that seems counterintuitive. But lethality here refers to the overall average of fatalities per attack. If the volume of attacks increases while the number of attacks with one or more fatalities declines, the average number of fatalities per attack will decline.
- However, if the failed and thwarted terrorist plots against surface transportation targets in Europe, Canada, and the United States are included, the data suggest one of two things: Either the terrorist plotters lack the capabilities to fulfill their ambitions, or those charged with security have been successfully obstructing terrorists who appear determined to achieve high body counts and who view surface transportation as the ideal venue to do so. Today's terrorists want to run up high body counts, but they rarely succeed.

How Europe compares with the rest of the world

Between January 1, 1970 and December 31, 2015, the MTI database has recorded a total of 4,690 terrorist and serious criminal assaults on all public surface transportation targets worldwide.

This database includes 95 attacks recently added by reviewing the Terrorists in Europe Targeting Railway Infrastructures (TETRIS) report, produced by the Brussels office of CEIS, a strategy and risk management consulting firm. A comparison of MTI data with the TETRIS data is included at the conclusion of this article.

If attention is confined to attacks on buses, passenger trains, and ferries, the total is 3,409. The countries of South Asia, especially India and Pakistan, account for 1,274, or 37.4% of these attacks. The Middle East follows with 810 attacks, or 23.8% of the total, and Southeast Asia with 319, or 9.4% of the total. Countries in Western Europe account for 313 of the attacks, or only about 9.2% of the total. Another 48 attacks (1.4%) occurred in the countries of Eastern Europe, bringing the European total to 361 (10.6% of the total). This figure includes the Baltic States, but not Russia or the other countries of the former Soviet Union. Spain accounts for 103 of the attacks in Europe, followed by the United Kingdom with 62 attacks, France with 39 attacks, Germany with 29, Italy with 28, and Greece with 23.

Clearly, although Western audiences naturally focus on threats in their own countries, Europe—with only 10.6% of all attacks—is not the main battleground for terrorists attacking public surface transportation. The developing world sees far more attacks and suffers far more from them. It is not only the sheer number of attacks that is relevant here, but also their average lethality. Attacks in South Asia, for example, killed an average of 3.6 people per attack, while in Western and Eastern Europe, the ratios were significantly less—1.4 and 0.7 respectively.

Why European attacks increased

The number of attacks trends upward from the 1970s to around the turn of the 21st century. Spain reaches a high point in 2001, with 17 attacks. The United Kingdom reaches its high point in 1992, with eight attacks, and France in 1995 and Germany in 2003, each with five attacks. Around

2001, when the total number of attacks reaches a high of 27, the peaks begin to decline but generally remain above the high points of the 1970s and 1980s.

Is the increase due solely to better reporting? This is always a worry when looking at long-term data. One way to adjust for this is by looking only at incidents with fatalities, which are less likely to have been missed in the early reporting years. Confining the data to attacks with fatalities reduces the total number of attacks from 361 to only 45. Spread over a 45-year period, the trend line actually shows volume *decreasing*. This leads to a conclusion either that the volume of low-level attacks (those with no fatalities) actually has increased significantly or that earlier reporting missed many of the low-level events that are now being recorded.

The contrast between the upward trend of all attacks (the upward-trending red line), and the downward trend of fatal attacks (the downward-trending dashed line) is shown in Figure 1.

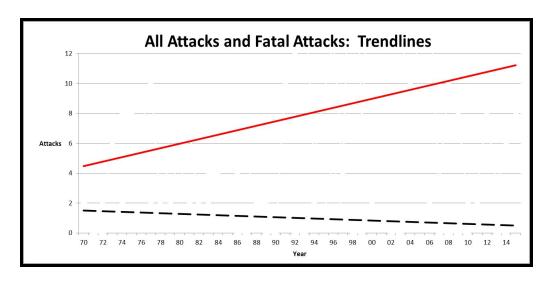


Figure 1 – All Attacks and Fatal Attacks: Trendlines

The same pattern holds true when reviewing attacks with three or more fatalities (a total of 21 events), five or more fatalities (a total of 14 events), or ten or more fatalities (a total of eight events). Spread over 45 years, all the trend lines decrease. An increasing number of incidents, combined with a declining number of incidents with fatalities, accounts for the apparent decline in lethality.

Another way of uncovering a possible bias due to better reporting is to examine the distribution over time of the incidents with fatalities or multiple fatalities. Doing so here shows incidents with one or more fatalities to be randomly spread over the 45-year period with no real trends. Attacks with at least three, five, and ten fatalities are too rare to allow easily discernible trends, except that there appear to be a larger number of them between 1970 and 1975, between 1980 and 1985, and between 2000 and 2005, than for any other five-year period. This coincides with the peak of attacks in the United Kingdom and Italy in the 1970s, in France in the 1980s and, of course, the Madrid and London attacks in 2004 and 2005, respectively.

These trends can be summed in Figure 2. This graph shows all attacks and fatal attacks and (a) an increase in the number of attacks (the upward trending solid red line) and (b) a decrease in the average lethality of those attacks (the downward trending black dashed line). A bar chart is superimposed, illustrating an interesting pattern in the number of fatalities that took place in different decades: The 1970s (57), the 1980s (131), the 1990s (23), the 2000s (261), and from 2010 to the present (13). Note that the bar chart divides actual fatalities by 10. That is, 5.7 in the chart means 57 fatalities, and so on.

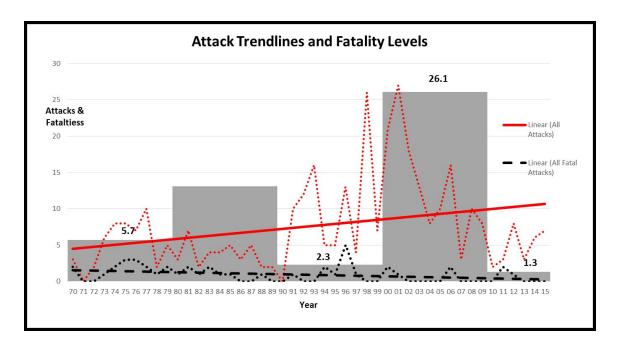


Figure 2 – Attack Trendlines and Fatality Levels

Terrorist targets, tactics, and weapons

Overall, since 1970, terrorists have attacked trains and train stations more frequently than they have attacked buses. Attacks on both target categories have increased, although at a higher rate for bus targets: 232 attacks have targeted passenger trains and subways; 126 attacks were carried out against scheduled buses; and three attacks targeted passenger ferries and terminals.

The deadliest incidents, however, occurred in enclosed environments: Subway trains and underground subway stations, and enclosed surface train stations. Although there were only 46 (13%) of the 361 attacks in these enclosed environments, they account for 345 (71%) of the 485 fatalities and 2,958 (72%) of the 4,125 injuries.

Bombings were the most frequently employed terrorist tactic; 243 (67%) of the 361 attacks involved improvised explosive devices (IEDs), vehicle-borne improvised explosive devices (VBIEDs), improvised incendiary devices (IIDs), grenades, or other explosives, and they caused 458 (or 95%) of the 485 fatalities. While this is roughly the pattern of attacks worldwide, 65% of which were bombings, the percentage of fatalities caused by bombings of surface transportation

targets worldwide is much higher—94% versus 70% for terrorist attacks against all target categories.

The changing face of the adversary

The terrorists carrying out the attacks in Europe comprise a diverse group of actors with diverse motives. The <u>Provisional Irish Republican Army</u> (PIRA) and similar groups, and Basque separatist terrorists (<u>Euskadi Ta Askatasuna</u>, or ETA) together account for 149 attacks. There were 47 PIRA attacks. The Basque campaign, focused primarily in Spain, accounted for 102 attacks, with 25 claimed by or specifically linked to Basque terrorist groups, and another 77 attacks unclaimed but assumed to be connected with this terrorist campaign.

PIRA conducted a 28-year terrorist campaign from 1973-2000, with only four attacks taking place after that year. Ten of the PIRA attacks resulted in fatalities, and one of these was aimed at a bus carrying British soldiers and their families back to camp. In all, 34 people were killed, including 12 on the bus. The PIRA certainly was willing to kill, but it worried about alienating its perceived constituents or turning off supporters in the Irish diaspora. This made it generally cautious about the level of violence.

The same is true of the ETA in Spain. Although responsible for numerous attacks, most of these were carried out against empty trains, buses, and stations. The attacks were primarily intended to demonstrate capabilities, causing fear and disruption. Only two out of 102 attacks on transportation targets by Basque separatists caused any fatalities—a total of four deaths; and only seven attacks—including these two—caused any injuries, for a total of 96

Therefore, both PIRA and ETA can be placed in the low-lethality group of adversaries. Other separatist groups active in Europe—for example, Corsican separatists—as well as leftwing extremists of the late 1960s and 1970s also operated under self-imposed constraints. Overall, attacks by armed separatists and Marxist terrorist groups in Europe have declined in recent years.

Others in the low-lethality category include anarchist groups and those motivated by specific issues such as opposition to nuclear power or protection of the environment. These almost always are intended to cause disruption and make a political point rather than to kill. Such attacks have increased in recent years.

Taken together, attacks claimed or attributed to these low-lethality groups are responsible for 216 (or 60%) of the 361 attacks but only 77 (or 16%) of all fatalities.

The second broad category comprises those whose worldviews loosen any self-imposed constraints on their violence. They appear determined to achieve high body counts. This category includes the rightwing extremists who, with just 16 attacks, were responsible for 24% of all fatalities in Europe. The 1980 attack on the Bologna train station carried out by neo-fascists in Italy caused 85 fatalities. It was the second-deadliest attack on surface transportation in Europe and the deadliest attack ever in Europe involving a single bomb.

Also in this category are the so-called jihadist groups, including al Qaeda and the Islamic State of Iraq and Syria (ISIS), which are responsible for just 11 attacks but 50% of all fatalities. These include the 2004 bombing (involving 13 devices) of a commuter train in Madrid in which 191 people died and the 2005 bombings targeting London's transport system in which 52 people (not including the four suicide bombers) were killed by four bombs. These two attacks appear to have had an inspirational effect on terrorists elsewhere and led to a number of jihadist plots to carry out bombings on trains and in train stations. Non-jihadist Islamist groups, such as those responsible

for the bombings of the Metro and commuter trains in Paris in the mid-1990s, account for another 16 deaths.

The determination to kill in quantity reflects ideological views—that the violence is sanctioned by God—with fewer concerns about earthly constituencies. Those who seek support from defined constituencies—for example, Irish Republican sympathizers, oppressed workers, proponents of specific causes, etc.—worry that indiscriminate carnage may alienate their supporters. Those on the extreme right who subscribe to notions that power is imposed on the masses from above or that they are acting on God's will are less constrained. Jihadists similarly believe they are acting on God's will, and they characteristically seek high body counts.

Attacks by jihadist groups seeking high body counts are understandably the source of greatest current concern. In addition to the attacks listed above, failed attempts or interrupted jihadist terrorist plots indicate a continuing threat. Following the July 7, 2005 bombings in London, a separate jihadist cell attempted to carry out a second round of suicide bombings on London transport on July 21, 2005. However, their devices failed to detonate. Two explosive devices planted aboard German commuter trains by homegrown jihadists in 2006 also failed to explode. And what appears to have been a planned mass shooting aboard the high-speed train from Brussels to Paris instigated by ISIS was thwarted when passengers tackled and subdued the heavily armed attacker. Acting on intelligence, police thwarted other terrorist plots in London, Barcelona, and Milan. All of these plots aimed at causing mass casualties. In December 2015, German authorities evacuated and shut down two train stations in Munich in response to intelligence indicating the possibility of suicide attacks. All of these events have occurred since 2001.

In fact, of the 11 jihadist attacks, only two have killed anyone—but spectacularly. These are the Madrid and London attacks mentioned previously. The impact of this on attack lethality in Europe can be measured only when looking at all attacks with at least 25 deaths—with the jihadist attacks included, and without them. The graph in Figure 3 shows this. The upward trending solid red line includes jihadist attacks, while the downward-trending black dashed line does not include them.

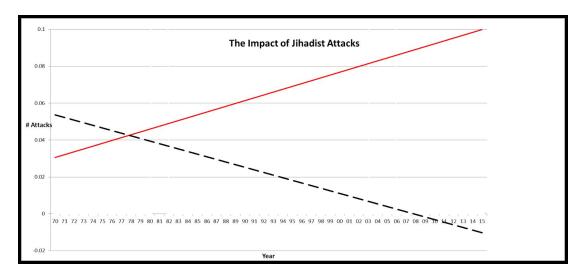


Figure 3 – The Impact of Jihadist Attacks

Critics may challenge whether every one of the plots uncovered would have resulted in actual attacks, or whether they were invented conspiracies manufactured by overzealous undercover police operations bordering on entrapment. This does not apply to the actual attempts. And while some of the terrorist plots were interrupted before they became operational, in other cases the plans were mature and preparations had begun. All cannot be dismissed.

In sum, transportation security is driven today not by what terrorists have done historically, but by what they could do. The high-casualty attacks that have occurred in the past 15 years, combined with the failed attempts and foiled plots, suggest a continuing threat that differs from that of the 1970s in its aim for high body counts. Despite the good news that lethality has statistically declined, the threat of high casualty incidents appears higher than ever. Jihadist groups in the Middle East continue to exhort their supporters in Europe to carry out attacks there, and they often have pointed to transportation as a soft target. Thousands of Europeans have traveled to join the so-called Islamic State. Some have and will return, determined to continue the campaign.

Canada and the United States

Since 1970, there have been few terrorist attacks against trains or buses, and none against passenger ferries in the United States and Canada, but there have been a growing number of terrorist plots. Only 12 attacks in the United States and only four in Canada have occurred during this time period.

Of those, only three attacks in the United States and one in Canada caused fatalities. The deadliest attack was carried out not by a terrorist, but by a mentally disturbed individual who killed six and wounded another 19 passengers aboard a Long Island commuter train in 1993. The only other fatal attack was the 1995 Amtrak derailment in Arizona, which was claimed by a neo-Nazi group, but was most likely carried out by a single individual. One person was killed and 65 were injured in the derailment. The only fatal attack in Canada was the 1984 bombing in the Montreal train station by a deranged individual who killed three people and injured 29.

The picture of limited fatalities and who has caused them is worth noting—they are hardly the work of conspiracies from overseas. "Lone loons" rather than "lone wolves" continue to be the threat in North America, as they have been, for example, in East Asia. There, a single deranged person attempting to commit suicide by arson failed to kill himself but managed to kill 198 other people on a subway train in Daegu, South Korea in 2003. This is the third-most-deadly attack against *any target* in the entire MTI database.

But as in Europe, what has happened in the past does not necessarily presage what will happen in the future. Recent years have seen a number of foiled terrorist plots. In 1997, Middle-Eastern terrorists planned to carry out suicide bombings on New York's subways. The attack was prevented when an individual living with the conspirators notified the police. There were five further terrorist plots against New York's subways and commuter trains between 2003-2009, all motivated by jihadist ideology. In addition to these, a homegrown terrorist was arrested in 2010 for plotting to carry out bombings on Washington DC's Metro, and another individual jihadist arrested in California in 2014 spoke about a previous plan to attack the Metro in Los Angeles. In

¹ This same report contains a chapter on PIRA's bombing campaign against British Transport.

2013, two individuals were arrested in Canada in connection with a plot to derail a passenger train between Toronto and New York.

Only one of these post-9/11 plots moved beyond the talking stage. The exception was the 2009 plot to carry out suicide bombings on New York's subways. In that case, the leader of the plot had constructed the bombs that were to be used, but he disposed of them when he realized he was under surveillance.

At the same time, continued terrorist plotting suggests that surface transportation continues to be a preferred terrorist venue. Terrorist events around the world also indicate a greater threat of high-casualty attacks. This threat cannot be dismissed as an imagined fear.

Do security measures work?

Security measures appear to work primarily as a deterrent, but deterrence is difficult to measure empirically—events that do not occur cannot be counted. Further, terrorist events are rare and statistically random, making it difficult to connect patterns of events with specific security measures. One can observe that a massive investment in airline security over the past forty years has gradually reduced the number of attempted hijackings and sabotage attempts, although terrorists continue to try to smuggle bombs aboard airliners. That would suggest that security has a long-term effect, although there are other factors that may also contribute to the decline. However, imposing the entire aviation model of security is hardly suitable for the volumes of passengers, convenience requirements, and cost constraints that drive surface transportation.

There is some evidence that increased security measures implemented on London's tube and train stations during PIRA's bombing campaign gradually drove PIRA bombers away from their preferred high-profile targets in central London. These measures included increasing television surveillance, the enlistment of the public in calling attention to abandoned parcels, and rapid response by the authorities. Indeed, looking at the 47 PIRA attacks, and leaving aside the 11 (or 23%) of PIRA attacks in which the PIRA provided a coded warning, there were another eight (or 22% of the remaining) in which the device was found. The same measures did not work against the 2005 suicide bombers in London, who did not care about being identified or escaping, and who remained attached to their explosive devices rather than leaving them unattended.

In some cases, terrorist plotters were aware of security measures—in one case, specifically of closed-circuit television coverage. But these measures did not dissuade them from continuing their plans. In another case, terrorists delayed their attempt because of heavy security in train stations owing to a major sporting event.

The decline in terrorist attacks carried out by violent separatist and Marxist groups in Europe reflects the fate of these groups, not necessarily the effectiveness of physical security measures installed at their preferred targets. Meanwhile, the increase in low-level attacks on transportation targets in Europe may reflect the emergence of new types of adversaries who are determined to call attention to their causes but who have rejected the deadlier violence of past groups. These events are difficult to prevent.

The most effective countermeasure to terrorism has been good intelligence. This has enabled authorities to uncover and thwart what may have turned out to be deadly attacks. At the same time, transportation operators are not helpless and completely reliant on intelligence

While it is nearly impossible to prove that deterrence works, it is known that in a small but significant percentage of attacks, someone has taken action to stop the attack before it could be

completed. In other words, the security system—defining security broadly to include alert transportation employees and the public—has prevented some attacks.

This can be seen when looking at worldwide patterns in attacks aimed against buses, trains, or passenger ferries. In 300 incidents—just under 9% of all attacks on buses, trains and passenger ferries—alert citizens, passengers, or officials thwarted an attack by discovering bombs before they could detonate. In 43% of these cases, who found the device is unknown. But it is known that in 17% of the 300 incidents, alert passengers or citizens found the device; in 13%, the device was discovered by security or intelligence officials; in 15%, military or police found the device; and in about 11%, alert transit drivers, crew, or employees were responsible for the discovery.

The same pattern generally holds in Europe, where a slightly higher percentage of attacks—11%--were stopped because bombs were detected. In 51% of these incidents, the original source of information that prompted action is unknown. Where there is more data, transit employees and drivers found devices in 20% of the prevented attacks, passengers and citizens in 12%, security officials or intelligence in 7%, and police in 10%.

Category that Found Devices	Europe	Worldwide	
Transit Employees and Drivers	20%	11%	
Police or Military	10%	14%	
Security Officials and Intelligence	7%	15%	
Passengers or Citizens	12%	17%	
Unknown	51%	44%	
Total	100%	100%	

Table 1 – Categories that Found Devices

Turning finally to the 12 attacks in Canada and the United States, three (25% of all incidents—the highest percentage so far) involved devices that had been found before detonation. These include one each in a passenger train, a subway station, and a train station. In the last case, it was a maintenance worker who found a grenade in 1992.

Comparing the MTI study with the TETRIS study

The Brussels office of CEIS, a strategy and risk management consulting firm, has conducted a similar analysis of attacks on trains in Europe. Referred to as TETRIS, the study addresses attacks on passenger rail targets in Europe between 1970-2014.²

The authors analyzed the TETRIS data to determine where it is similar or different from the MTI data and, where it is different, what questions it raises.

The first task was to ensure that equivalent data is being compared.

² Briefing charts describing the TETRIS project, and its findings are available online: http://ceis.eu/en/european-office/news/report-better-addressing-threat-posed-terrorism-against-railway-infrastructures

MTI's analysis, as discussed in the previous sections, includes 172 attacks on passenger train targets in Europe between 1970 and 2014. The TETRIS analysis includes 257 attacks, a significant difference. However, as mentioned at the outset, the MTI analysis excludes attacks in which the intent appears only to have been disruption, not casualties. These are attacks against freight trains, against tracks (in which derailment is not the intended consequence), and against other railroad infrastructure such as signaling and communications systems, servicing equipment, construction sites, and transportation offices. It is clear that TETRIS includes these types of attacks. The authors therefore added back all the 97 freight train, track, and other infrastructure-only attacks that are contained in the MTI database.

Next, to ensure that the MTI data included all known attacks against these targets, the authors reviewed all the TETRIS attacks. It was found that 120 (or 47%) of the attacks were already in the MTI database; another 137 (or 53%) were not. Therefore, attention was turned to these 137 attacks.

First, the authors excluded 26 TETRIS cases that are thwarted plots. MTI includes failed attempts but does not include uncovered plots in its database, as reliable information is lacking about the number and detail of plots uncovered outside of the United States. Plots in which information is available are examined separately.³

Second, the authors excluded another 18 attacks in the TETRIS data because the written information was insufficient to justify or code them accurately. (Clarification has been requested from CEIS about these attacks.) The authors also excluded a few other cases because the targets (such as an airline ticket office in a train station) did not fit MTI's definition of a public surface transportation target.

In the end, the authors added 93 of the TETRIS attacks to the MTI database, 4 most of them from the earlier decades in which available reports are scarce: 42 in the 1970s, 24 in the 1980s, 15 in the 1990s, 7 in the 2000s, and 5 between 2000 and 2014.

This brings the MTI total to 364, significantly more than the 257 attacks (including the 26 plots) or 231 (excluding the plots) covered in the TETRIS report. Now the MTI and TETRIS data can be compared to see where the results are similar and where they differ.

First the authors examined the single and most important instance in which the data differ—the rate at which all attacks, regardless of their lethality, are increasing or decreasing.

Looking at all 364 attacks in MTI's database, which include track and infrastructure targets (Figure 4), the rate increases when only attacks against trains and train stations are considered (the upward trending dashed red line), but increases significantly (the upward trending solid red line) when track and infrastructure attacks are included. TETRIS, by contrast, shows a decline in the total number of attacks (the downward trending solid black line). As the graph shows, the trend lines differ fairly dramatically.

³ Jenkins, Trella, <u>Carnage Interrupted: An Analysis of Fifteen Terrorist Plots against Public Surface</u> <u>Transportation</u>

⁴ Because of MTI's database rules, the authors added 95 new attacks, as mentioned earlier.

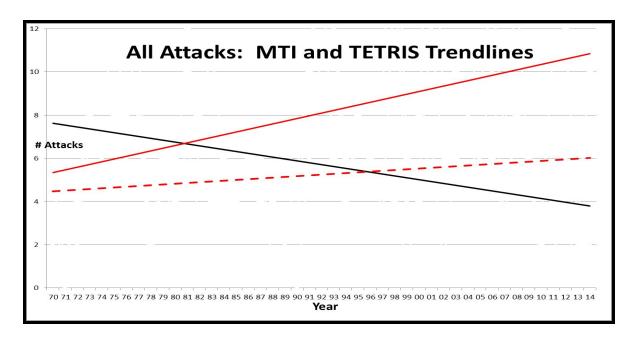


Figure 4 – All Attacks: MTI and TETRIS Trendlines

Without a side-by-side, detailed look at each attack, it is impossible to explain this difference. Different criteria for a terrorist or serious criminal attack may have been used. Different rules may have been used to define a single attack versus multiple attacks. It is also possible that as a result of this article, TETRIS may decide to include attacks previously excluded or missed. The authors of this document will continue to work with the TETRIS authors to identify the specific reasons for the difference.

Then, the authors looked at areas in which the studies agree, or at least do not dramatically disagree.

First, as shown in Figure 1, MTI shows the rate of lethal attacks declining, a rate that would be even more dramatic if jihadist attacks were excluded. TETRIS also indicates that this rate is decreasing. The TETRIS authors may agree that large-scale attacks in recent years—and the primary worry for the future—comes from jihadist groups.

The two studies also agree that five countries (United Kingdom, Spain, Italy, Germany, and France) account for over 80% of all the attacks. They are Europe's most populous countries, and since 1970, all five have confronted terrorist campaigns from domestic and operations by foreign terrorists. However, while both MTI and TETRIS place the United Kingdom in first place, TETRIS has placed France, Italy, Spain, and Germany following in that order. The MTI data has a slightly different order, with Spain in second place, and then France, Germany, and Italy following. The similarities and differences are shown in Table 2.⁵

⁵ TETRIS has three attacks where the country is unknown or is stated as one of two: "France/Germany" and "Italy/France." These attacks are not included in this list.

Table 2 – Comparing MTI and TETRIS Rankings

MTI Ranking	# Attacks	TETRIS Ranking	# Attacks
United Kingdom	90	United Kingdom	63
Spain	79	France	44
Italy	56	Italy	43
Germany	43	Spain	37
France	36	Germany	24

TETRIS breaks down targets as trains (41%), stations (27%) and infrastructure such as tracks, switches, signals, offices, and construction sites (32%). MTI's breakdown is not significantly different—off three percentage points at most (for train infrastructure). The differences are displayed in Table 3.

Table 3 – Comparing MTI and TETRIS Target Groups

Target Group	TETRIS %	MTI %
Trains	41%	39%
Train Stations	27%	26%
Train Infrastructure (tracks, etc.)	32%	35%

TETRIS breaks down attackers' capabilities according to "artisanal weaponry," meaning improvised explosive devices, which were used in 72% of the attacks; "arsenal," meaning firearms and grenades, used in 16% of the cases; and "rudimentary means," meaning barriers placed on tracks, mechanical sabotage, etc., which were used in 13% of the cases. Breaking down capabilities a different way, TETRIS shows that explosives were used in 75% of the cases, incendiary devices in 16%, and sabotage tools in 4%, with the remaining 6% categorized as "other."

MTI's breakdown of "attack and weapon" shows some similarities and differences. Regarding explosives, incendiary devices, sabotage, and "other," MTI shows somewhat fewer explosive devices but more acts of sabotage. The other categories (arson has been included in the incendiary category) are fairly close. Given the small numbers and the fact that there are different definitions of weapons used, the differences are not that significant.

Table 4 – Comparing TETRIS and MTI Attack Categories

TETRIS Category	% BY TETRIS	% BY MTI
Explosives	75%	66%
Incendiary	16%	18%
Sabotage	4%	11%
Other	6%	5%

In terms of the type or nature of the attackers, the two sets of data are difficult to compare because MTI's largest category is "unknown group or persons," which includes all attacks in which the available source material does not specifically identify an individual or group, or in which responsibility was unclaimed. This accounts for 28% of the attacks. MTI also has a small set of attacks caused by "deranged persons"—few (only 1%) but potentially lethal—and a set of "Miscellaneous Groups" (only 1%).

This leaves some similarities. First, as long as the category "Ethno-Nationalist" is defined as including PIRA and similar groups, Basque separatist terrorists, and other groups, such as the Corsican National Liberation Front (FLNC), they constitute the largest percentage for both sets: 47% for TETRIS, and 36% for MTI.

Second, attack groups coded by TETRIS as religious, which includes for MTI jihadist and non-jihadist Islamist groups, are responsible for 7% of attacks according to TETRIS and 5% according to MTI data.

Third, attack groups coded by TETRIS as "extreme right wing" are responsible for 5% of attacks, while MTI places the percentage at 6%.

Fourth, the TETRIS category known as Mafia is at 4%, while MTI lists 5% as criminal.

Other categories have greater differences. For example, MTI counts only 8% of the attacks as extreme left wing, while TETRIS places the count at 15%. The differences and similarities are shown in Table 5.

Table 5 – Comparing TETRIS and MTI Attacker Categories

TETRIS Category	TETRIS %	Comparable MTI Category	MTI %
Ethno-Nationalist	47%	Separatist Groups	36%
Extreme Left Wing	15%	Left Wing Groups	8%
Extreme Right Wing	5%	Right Wing Groups	6%
Religious	7%	Non-Jihadist or Jihadist	5%
Single Issue	22%	Environmental etc.	9%
Mafias	4%	Criminal	5%
Total	100%	Unnknown Group or Individuals	29%
		Miscellaneous Groups	1%
		Deranged Persons	1%

TETRIS offers judgments in several areas not addressed by MTI. It shows that 58% of the attacks were carried out by terrorist organizations, 25% by isolated cells, and 17% by individuals.

TETRIS also assesses outcomes in terms of successful attacks (60% of the cases), partially successful (19%), failed attack (11%), and plot uncovered (10%). Those involved in the TETRIS study concede that these categorizations were topics of considerable discussion. MTI made no attempt to indicate successes and partial successes.

The conclusion - so far

Obtaining and compiling accurate information for large detailed databases is not easy. Different definitions, criteria, and sources may produce different conclusions, which is why the authors are so interested in the TETRIS data and any other efforts they can identify. It is not a matter of establishing whose data is "more correct," but rather conducting and comparing analyses in ways that will be comprehensible and useful to those charged with assessing threats and implementing appropriate security measures.

The TETRIS report suggests that things are moving in the right direction. For whatever reasons—suppression of terrorist groups, effect of security measures—the total number of attacks on rail targets in Europe is declining. MTI offers a more complex picture. Lethal attacks are declining in volume. So is lethality, that is, fatalities per attack. That trend results from the fact that the total number of attacks is actually going up, not down.

Moreover, the failed attempts and uncovered plots indicate the emergence of a new type of adversary determined to kill in quantity, and the more the better. This trend also can be seen in attacks on targets other than surface transportation, such as hotels, restaurants, shopping malls, and public squares

This is clearly no time to let our guard down, either here or in Europe.

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ABOUT BRIAN MICHAEL JENKINS

Mr. Jenkins directs the Mineta Transportation Institute's National Transportation Safety and Security Center, which focuses on research into protecting surface transportation against terrorist attacks. He is an international authority on terrorism and sophisticated crime. He has authored several books, chapters, and articles on counterterrorism, including *International Terrorism: A New Mode of Conflict and Will Terrorists Go Nuclear?* and *When Armies Divide*, a discussion about nuclear arms in the hands of rebelling armies.

ABOUT BRUCE R. BUTTERWORTH

Mr. Butterworth is a research associate at the Mineta Transportation Institute. He has worked at congressional, senior policy, and operational levels, including with the House Government Operations Committee, Department of Transportation, and the Federal Aviation Administration, where he was senior-level Director of Policy, and then Director of Operations. Amongst other tasks, he helped managed the resolution of aviation security crises and launched a program of dangerous-goods regulation and cargo security after the 1995 ValuJet crash. He has published extensively on transportation security.

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The Mineta Transportation Institute (MTI) conducts research, education, and information transfer programs regarding surface transportation policy and management issues, especially related to transit. Congress established MTI in 1991 as part of the Intermodal Surface Transportation Efficiency Act. MTI won national re-designation competitions in 2002, 2006 and 2012. The Institute is funded by the US Department of Transportation, the US Department of Homeland Security, the California Department of Transportation, and public and private grants. The internationally respected members of the MTI Board of Trustees represent all major surface transportation modes. MTI, the lead institute for the nine-university Mineta National Transit Research Consortium, is affiliated with San Jose (CA) State University's College of Business. Visit transweb.sjsu.edu.