



Geospatial Analysis of Terrorist Activities:

The Identification of Spatial and Temporal Patterns of Preparatory Behavior of International and Environmental Terrorists

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SUMMARY

Geospatial Analysis of Terrorist Activities:



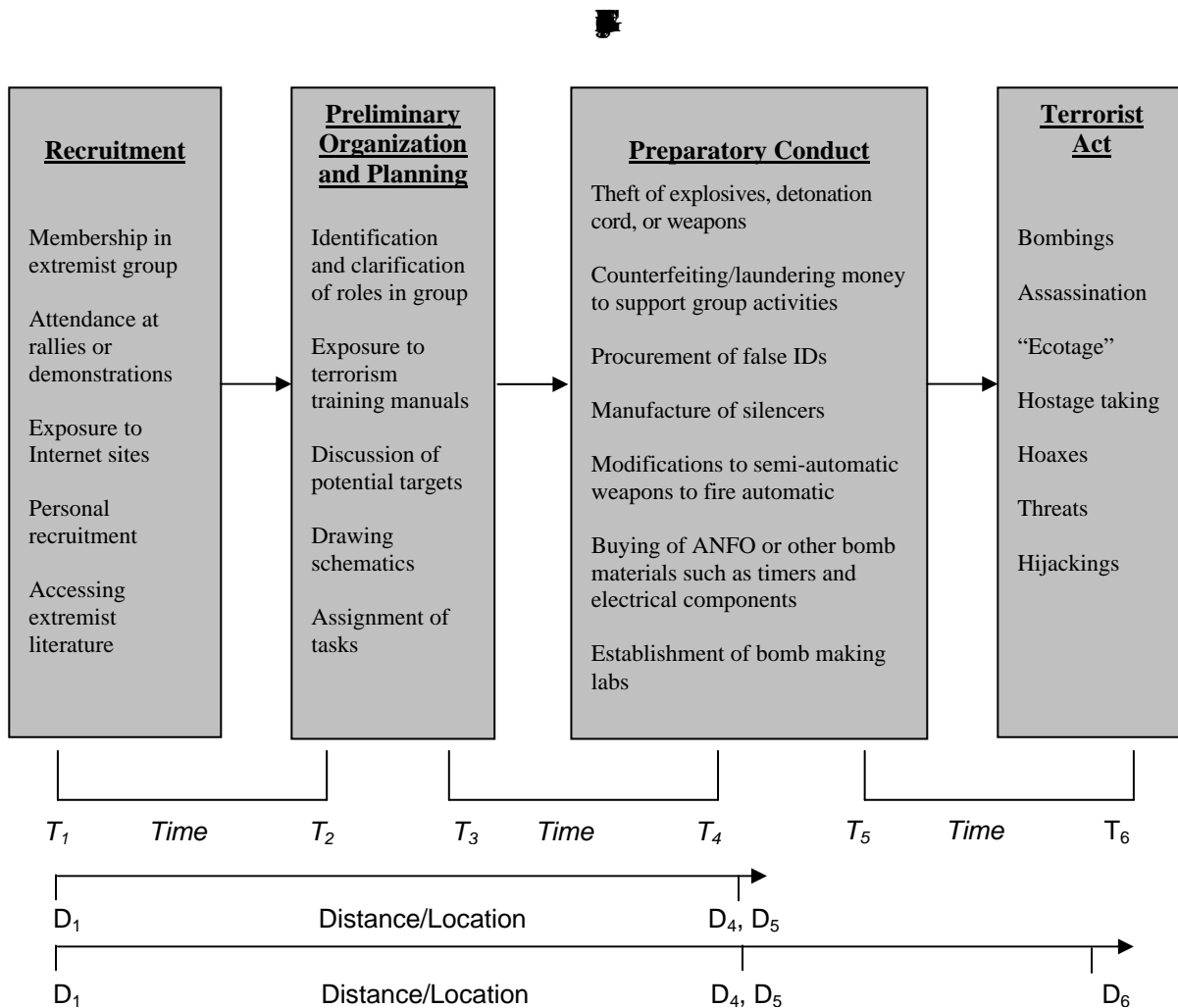
Traditional criminality is characterized by spontaneity, lack of planning, and pecuniary or personal motives. In contrast, terrorism typically involves persons or groups motivated by political or social goals, ideological justification, and considerable forethought and planning. The notion that terrorists engage in a variety of non-terrorist planning activities and criminal conduct prior to the commission of any terrorist act has been noted in previous research (Smith, 1994; Smith and Damphousse 2003; Smith, Damphousse, and Roberts 2006). These non-terrorist acts include crimes related to the creation of false identities for group members, thefts to procure funding for the group, thefts of weapons or explosive materials and, frequently, crimes related to the maintenance of internal security. These behaviors ultimately culminate in acts of terrorism. An earlier project¹ suggested that international and single-issue terrorists, particularly environmental terrorists, may engage in the most routinized temporal and spatial patterns of preparatory behavior.

This research involved an examination of selected terrorist groups/incidents (and preventions) in the United States during the period 1980-2004. The study focused upon the planning processes and behaviors, both criminal and non-criminal, that terrorists engaged in while preparing for terrorist incidents. These behaviors are referred to as “antecedent conduct.”² An examination of the antecedent conduct of terrorist group

¹ “Pre-Incident Indicators of Terrorist Incidents,” NIJ grant # 2003-DT-CX-0003.

² For the purposes of this research, “preparatory conduct” is defined as the criminal and non-criminal behavior by members of a terrorist group in preparation for a terrorist incident. “Antecedent conduct” is

members places the subsequent terrorist incident in context, providing the potential to identify patterns of conduct that might lead to intervention prior to the commission of actual terrorist incidents. The analysis focused upon the temporal and geographic distribution of these behaviors.



Terrorist group conduct was envisioned as occurring along a continuum involving four major activities: (1) recruitment; (2) preliminary organization and planning; (3)

defined as the totality of measurable behaviors, both criminal and non-criminal committed by a terrorist group in advance of a terrorist incident. Antecedent behaviors may be of two types: preparatory– conduct committed to assist in the preparation of a terrorist incident; and ancillary – conduct committed for order maintenance, internal security or personal reasons.

preparatory conduct; and (4) terrorist acts. These general principles and examples of each type of behavior are presented in Figure 1. Throughout the planning process of a terrorism incident or act, meetings take place, phone calls are made, and crimes are committed. These acts take place in locations such as the terrorists' residence, that of a relative or friend, a home base or safe house, or even surveillance of the intended target. These behaviors occur in measurable dimensions of time and space.

METHOD

To accomplish these goals, subject matter experts were selected³ to identify additional international and environmental terrorist groups/incidents that operated or occurred within the United States that could be added to the original sample of cases. Because court case data provides a robust record of dates and locations of supposed criminal activity, an initial sample of approximately 54 court cases were selected from the American Terrorism Study, a database composed of information from federal indictments resulting from FBI terrorism investigations from 1980-2004. These cases were augmented by twenty-nine additional case studies identified by the subject matter experts as important terrorism cases that might render the type of information sought for the study. Sixty-three case studies were eventually selected for data collection. Of these sixty-three, 5 case studies were combined for a total of fifty-eight cases/groups.

Information on these cases was extracted from several sources: (1) federal criminal court case records (indictments, FBI affidavits, transcripts, etc.); (2) newspapers, books, and print media; and (3) other open source data to include internet searches and other

³ Including Ron Arnold (environmental extremism), Kelly Damphousse and Jackson Cothren (database management), Bill Dyson (left-wing, international groups and incidents), and Jonathan White (Islamic terrorism).

publicly available documents. Data extracted from the original 58 cases/case studies were added to a relational database composed of 280 variables that eventually included geospatial data on some 1,430 international and environmental terrorists' residences, planning locations, preparatory activities, and target locations. These "case studies" rendered information on 173 terrorist "incidents" (55 international; and 118 environmental). Data on all of these cases were included in the spatial analysis. For the temporal analysis, identification of both an incident date and dates of preparatory behaviors were required for analysis. Consequently, only 39 incidents were sufficiently fertile to provide some data for analysis. These included 10 international, and 29 environmental case studies. Temporal analysis is limited to these 39 incidents.

TERRORISM IN TIME AND SPACE

Terrorists and terrorist groups operate within the constraints and boundaries of both time and space. A common myth about terrorism incidents is that they are random and "can occur anywhere." This perception is based, to some extent, on the characteristics of major incidents here in the United States. In some of the most significant incidents over the past decade or so, the terrorists literally "came out of nowhere" to attack specific local targets. Timothy McVeigh and Eric Rudolph lived hundreds of miles from their respective targets in Oklahoma City and Atlanta and Birmingham, while the September 11 attackers literally flew to their designated targets. Local law enforcement has been left with the impression that there is little they can do to interdict such activities in advance.

While terrorism is highly indiscriminate and “can” occur anywhere, the probability of their occurrence in specific locations varies widely (Davis et al., 2004). In many ways both the indiscriminate and spontaneous nature of terrorism have been overemphasized. Terrorist incidents do not materialize out of “thin air” -- they require time to plan, meet, procure and prepare explosive devices, and travel time to and from the selected target. These events are further constrained by the distances among the residences of the terrorists, where they meet and plan, where they procure or manufacture their explosives, and the distance to the target. The temporal and spatial patterns identified in our study are presented in the following two sections with separate analyses of environmental and international cases.

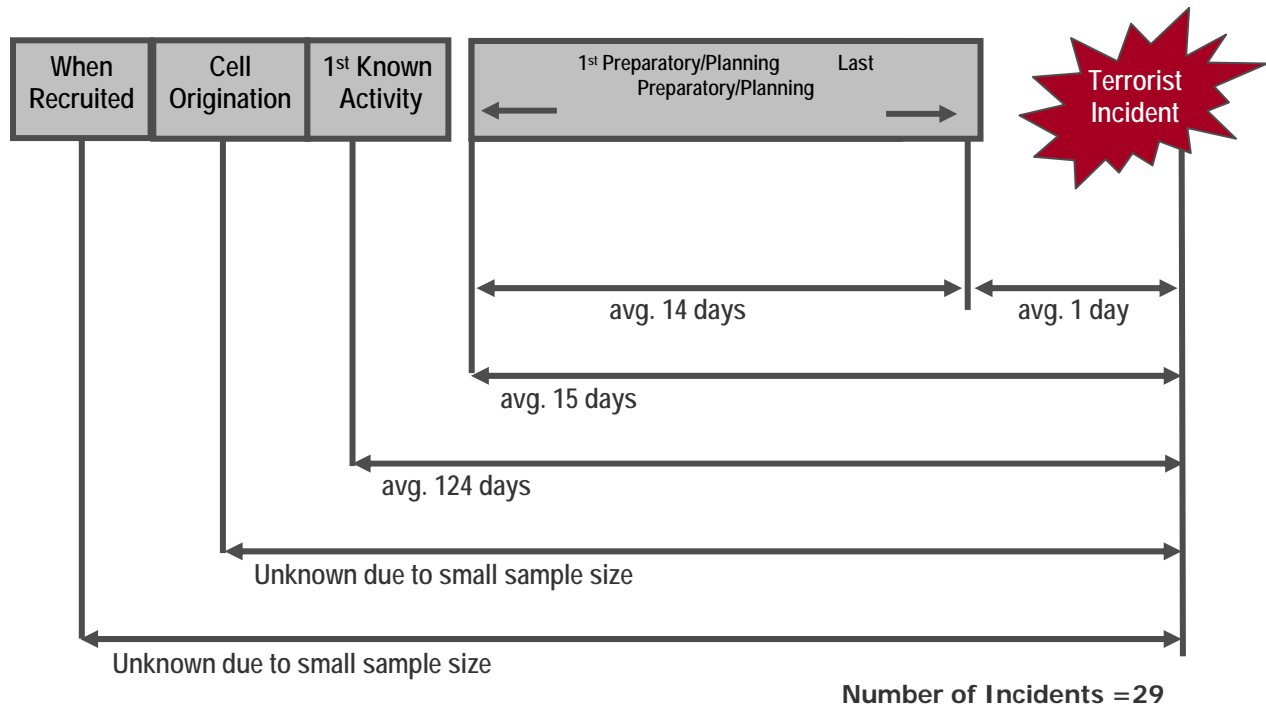
THE TERRORISTS’ TIMEPIECE

How long do terrorist groups typically plan their activities? How much time typically elapses between various phases of terrorist group planning and the eventual commission of terrorist acts? We found that the temporal planning varies for environmental and international terrorists.

Temporal Patterns of Environmental Terrorists

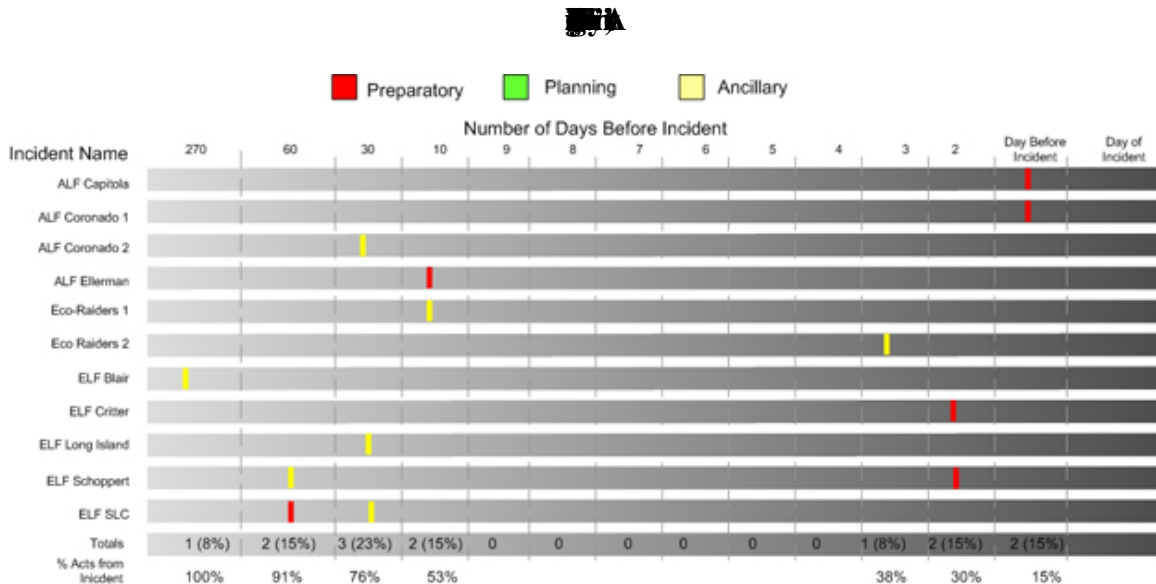
The basic averages for environmental terrorists are presented in Figure 2 below. Despite a lack of information regarding recruitment, sufficient temporal data existed to identify basic patterns of preparatory conduct. On average, the environmental terrorists studied engaged in their first planning and/or preparatory activities only 15 days prior to the date of the incident. Rather than there being a lull in activity immediately prior to the incident as was noted among some other types of groups; once begun, the activities

quickly culminated in an incident. In fact, there tended to be a flurry of activity in the day or two immediately preceding the incident. It should be noted that Figure 2 merely represents “averages” – and averages are subject to extreme variation due to outliers. These averages should not be mistaken for “patterns” of behavior.



Furthermore, our examination of environmental cases included the recently prosecuted case involving “the family” – the largest federal criminal case involving

members of the Earth Liberation Front/Animal Liberation Front in American history.⁴ While traditional environmental terrorists have adhered to an “uncoordinated violence” model involving “lone wolf” or “elf” activity, the Family case is unique in that it constituted a vast conspiracy involving at least 16 persons. Consequently, incidents involving the Family were analyzed separately from the other environmental cases for comparison. We then conducted a collective visual analysis of the cases to identify patterns by placing all of the preparatory activities of each incident in a single graph (see Figure 3).



Two features are noteworthy of “typical” environmental terrorist preparation. First, because they are usually conducted by single individuals rather than groups, there are few meetings or other forms of known communication between participants. Consequently,

⁴ U.S. v Dibbee et al., including CR-06-60069, CR-06-60070, CR-06-60071, CR-06-60078, CR-06-60079, CR-06-60080, CR-06-60120, CR-06-60122, CR-06-60123, CR-06-60124, CR-06-60125, CR-06-60126, U. S. District Court, District of Oregon.

these individuals, with perhaps the exception of the Unabomber, have restricted their preparatory activities to rather simple incendiary devices. Second, the planning and preparatory process is rather short. Over three-fourths of the antecedent activities occurred within 30 days of the incident and almost all (91%) took place within 60 days of the incident.

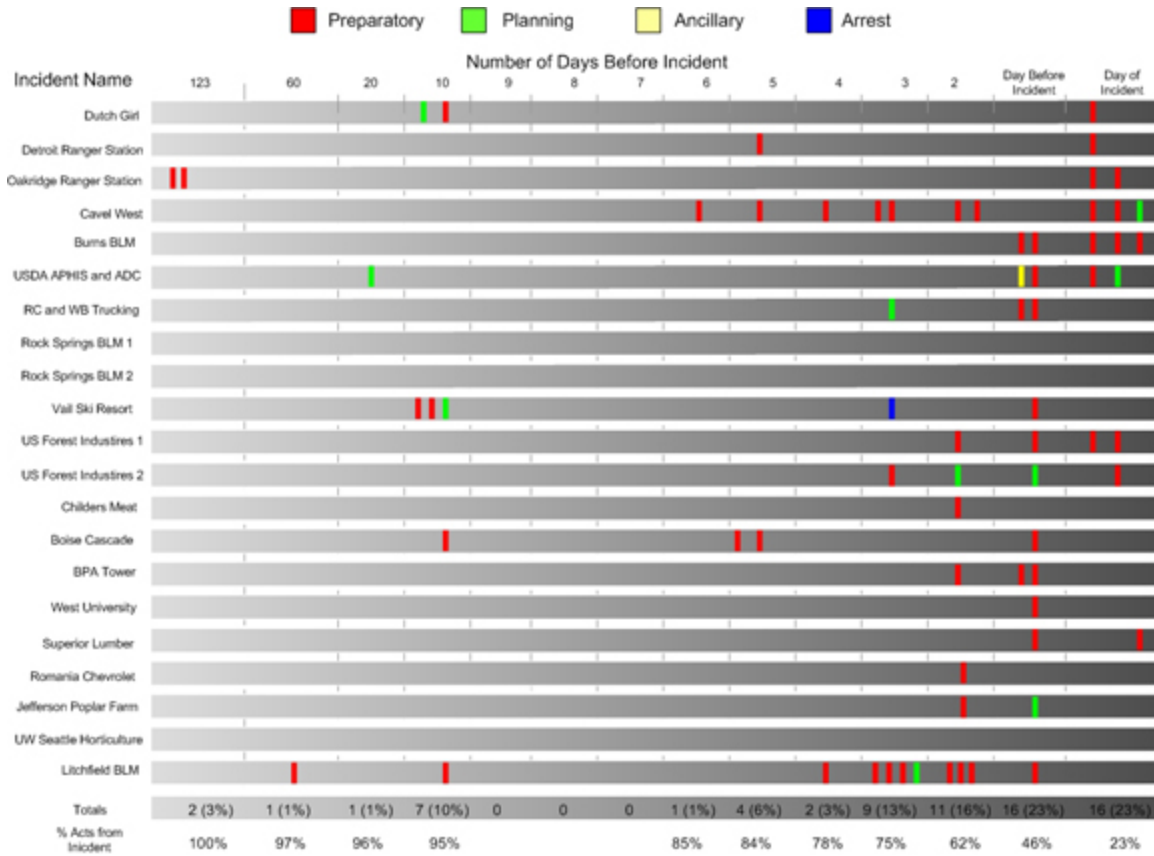
In contrast, the Family case represented a significant departure from traditional environmental terrorists' organization and structure. Since the early 1990s, environmental extremists advocating the use of terrorism have adhered to an uncoordinated violence model, very similar to the "leaderless resistance" approach adopted by the extreme right about this same time. Consequently, we expected to find substantial differences in the temporal patterns of the "Family" and "typical" environmental cases. Specifically, we expected to observe a much larger number of planning activities associated with the Family as well as a longer planning process. Such was not the case.

As Figure 4 shows, the Family was actually more spontaneous than other environmental groups. Approximately 85% of their known antecedent activities relating to specific incidents occurred within six days of the incident. 95% occurred within ten days of the incident. Most striking is that three-fourths of these activities occurred within the three day period immediately prior to, and including, the day of the incident. These activities typically included purchasing the materials for the incendiary device to be used in the arson. Rather than transport these materials over great distances, usually these were purchased from a local store, such as a Wal-Mart, in the immediate vicinity of the

target. A staging area was selected and the firebomb was usually constructed on site at the staging area the day of, or one day prior to, the bombing. Because the planning sequence was so short and many of the preparatory activities did not involve illegal acts, these tactics gave law enforcement little opportunity to intervene early. However, had early intelligence been available regarding, for example, the purchase of the particular combination of ingredients used in most of their incendiary devices, local law enforcement would have known that: (1) an attack was imminent, and (2) that it would take place in the general vicinity of the purchases.

A comparison of the Family activities and other environmental cases is compelling in that it revealed that despite differing organizational structures (one being cellular, the other emphasizing “lone wolf” *direct actions*); the length of the planning process did not vary substantially between these groups. If anything, the Family was more spontaneous than the other environmental cases studied.





Temporal Patterns of International Terrorists

The amount of temporal data available on international cases in the United States is limited for two reasons. First, international terrorism has been relatively rare in the United States compared to other types of extremist violence. Second, the FBI has been remarkably successful in preventing terrorist plots involving international terrorists operating here in the United States. Consequently, only cases where an actual incident date or a projected date for the attack was known are included in the analysis. The basic temporal pattern is shown in Figure 5 below. The small sample size precludes us from making conclusive statements regarding these patterns. However, the differences

between the international terrorists in Figure 5 and the environmental terrorists in Figure 2 are enlightening. On average, the first known preparatory activities for the international terrorists was 92 days prior to the incident date compared to only 15 days for the environmental terrorists. Likewise, the last known preparatory behavior among international terrorists was seven days prior to the incident compared to only one day for the environmental terrorists. The data strongly suggest a more extensive planning cycle among international terrorists than among domestic environmental groups. Once again, however, these averages can be misleading. Therefore, temporal diagrams were also created for each of the international incidents and then compiled on a single timeline.

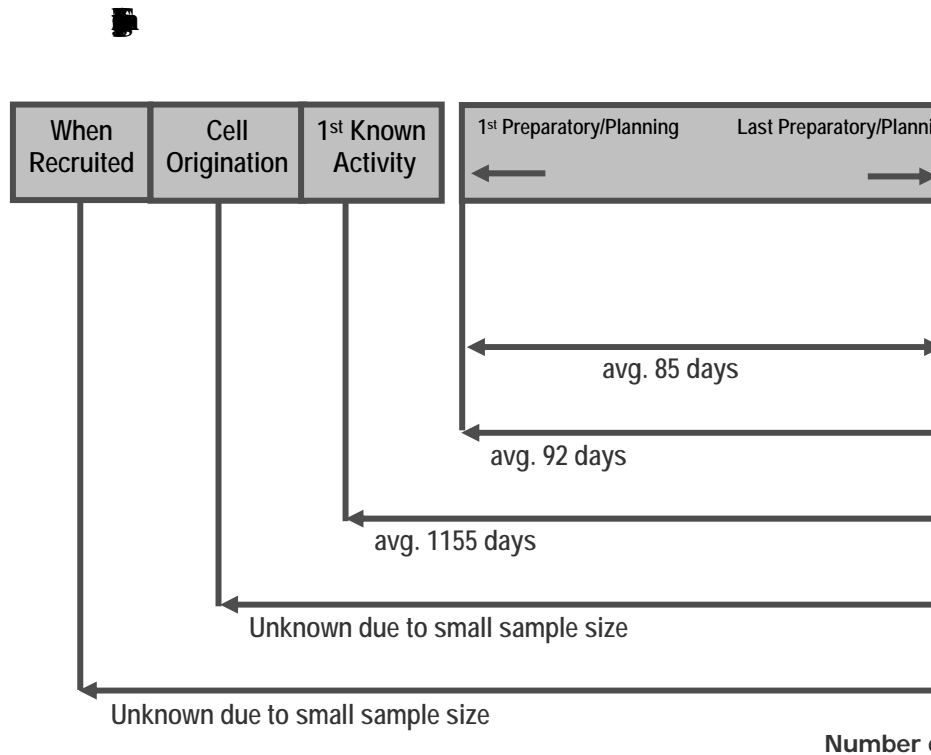
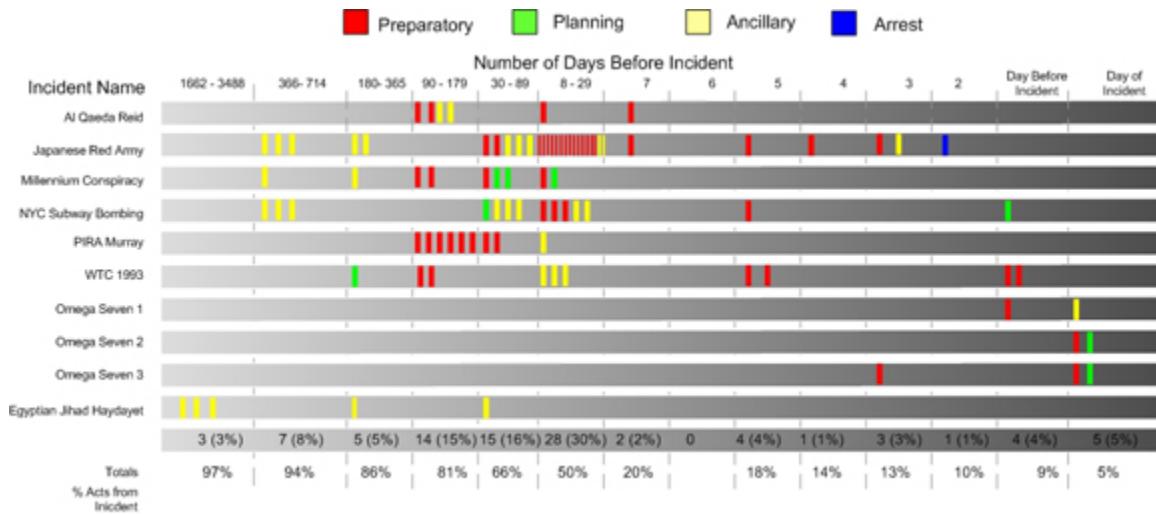


Figure 6 confirms the “patterns” suggested in Figure 5 above. While 75% of the antecedent behaviors by environmental groups occurred in the three days immediately prior to an incident, only 13% of these behaviors occurred in this same time period among international terrorists. This trend continues the further back one goes in the planning cycle. At incident minus six days (I-6), 85% of the antecedent conduct of environmental terrorists had not yet been committed compared to only 18% of the antecedent behaviors of the international terrorists. To reach the 85th percentile among international terrorists, one has to retreat to approximately six months prior to the incident. In fact, in most of the international cases studied where preparatory data could be matched with an incident date, the first known preparatory behaviors began about four to six months prior to the incident.



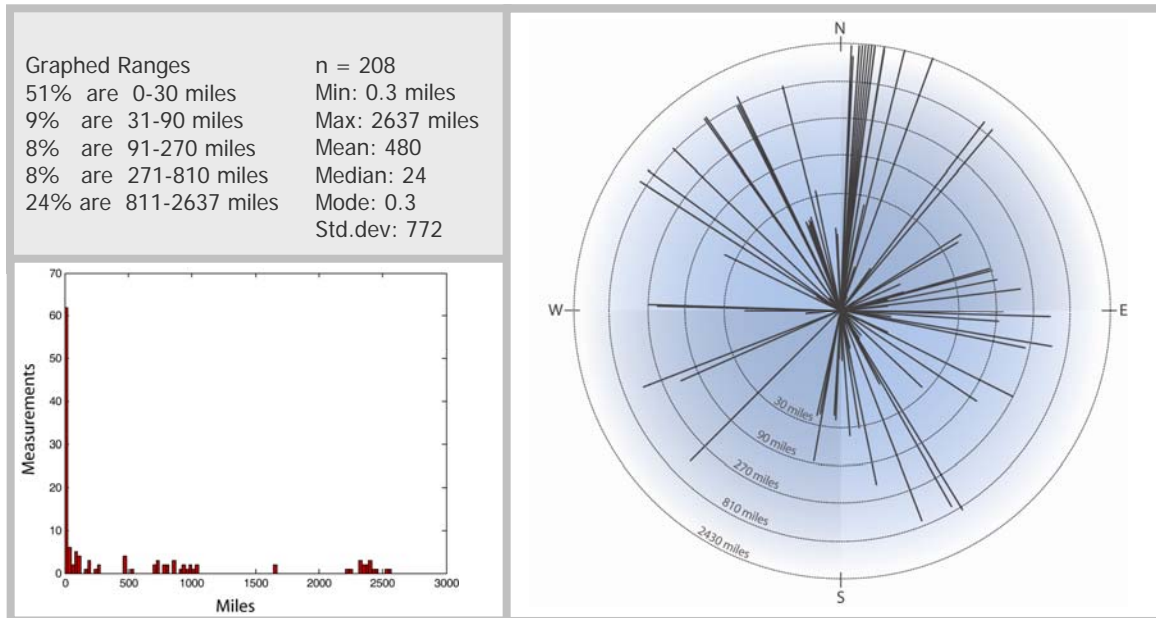
TERRORISTS MAY “THINK GLOBALLY, BUT THEY “ACT LOCALLY”

Because of incidents like the September 11, 2001 attacks, there is a tendency to think of terrorists as operating from afar and selecting targets great distances from where the terrorists reside or have been indoctrinated. While this may be true to some extent regarding the September 11 attackers, most terrorism occurring on American soil has been conducted by persons who have resided here in the United States for some time. Although terrorist groups have a “world view” or ideology that encompasses more than their local communities, results from this project suggest strongly that, in general, terrorists targeted facilities or persons relatively close to their places of residence. While we cannot determine the causal sequence from the data -- whether the terrorists selected the target and then moved their residence to be near the target or whether they lived near the target and then selected it because of its proximity, most terrorists resided for at least a short time within thirty to fifty miles of the eventual target.

Spatial Patterns of Environmental Terrorists

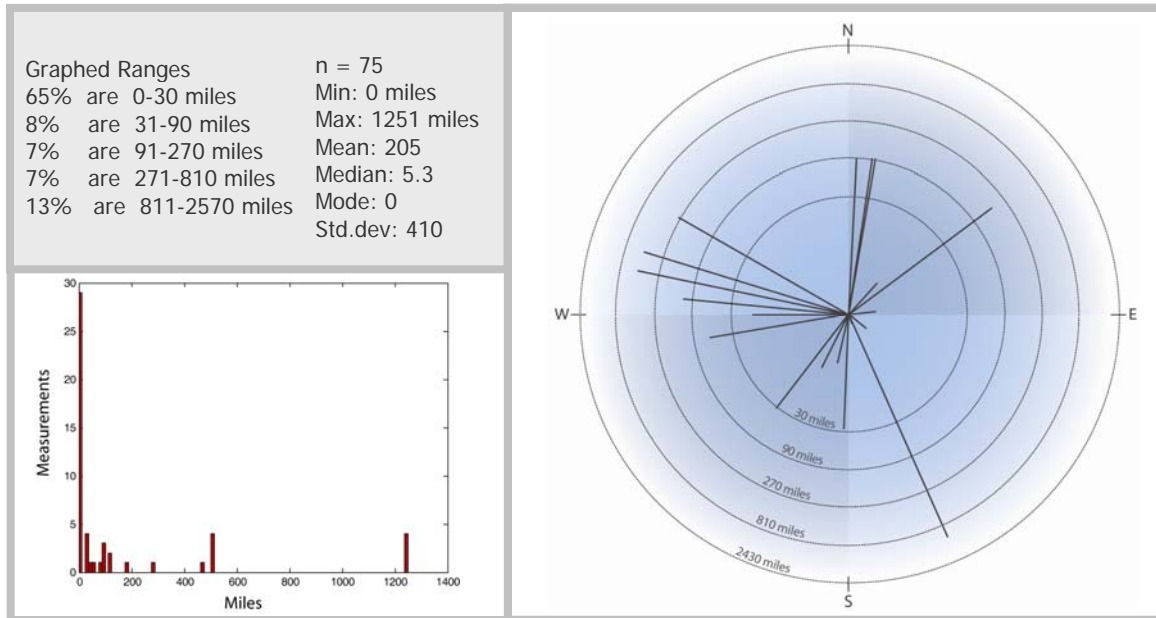
The spatial patterns of the Family and all other environmental terrorists were substantially different. Members of the Family tended to live much further from the incident than the environmental terrorists in other incidents. However, all of the environmental spatial data have been combined for this summary. Over one-half (51 percent) of the environmental terrorists lived within 30 miles of the selected target at the time the incident occurred (see Figure 7). In contrast, nearly a fourth of the incidents were committed by environmental terrorists who lived over 810 miles from the target location. These included the Unabomber, Ted Kaczynski, and members of the Family

who flew in from other states to participate in locally selected targets by other members of the group. With the exception of the Family conspiracy, environmental terrorism has been, by and large, committed by local extremists.



If preparatory behaviors can serve as pre-incident indicators to local law enforcement agencies, it is important to know the relationship between where these acts occur and the location of the residence of the terrorist and the target location. Once again, nearly two-thirds (65 per cent) of the antecedent or preparatory behavior of the environmental terrorists occurred within 30 miles of the target (see Figure 8). Rather than commit these acts near their places of residence, environmental terrorists, particularly members of the

Family had a tendency to travel closer to the target before engaging in preparatory behaviors (figures not shown, see Final Report).⁵

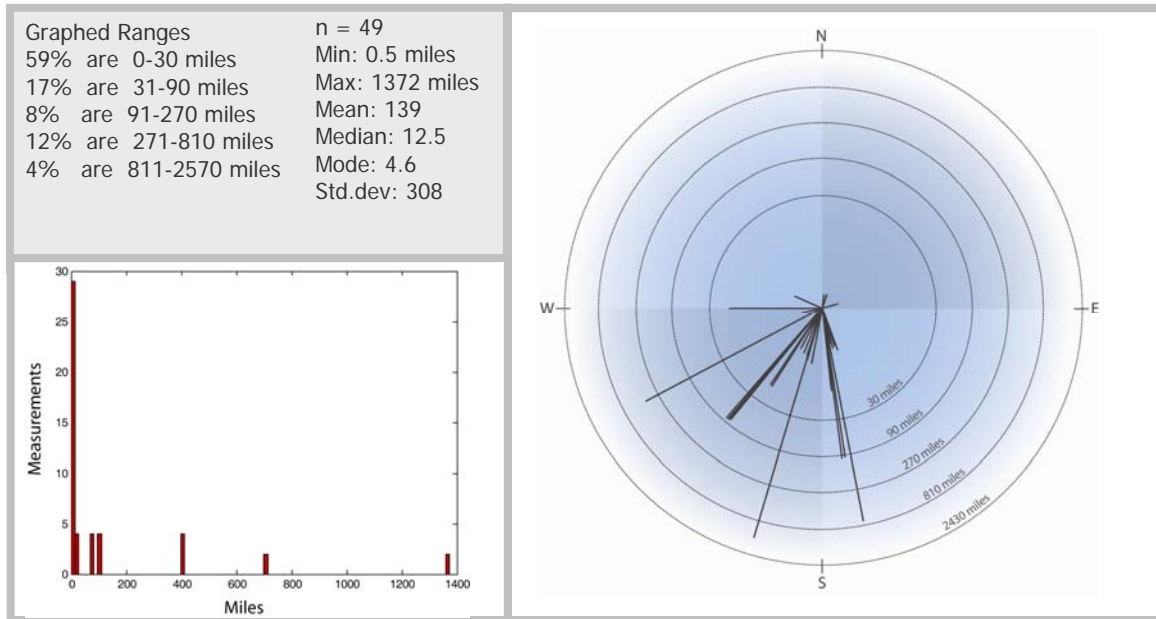


Spatial Patterns of International Terrorists

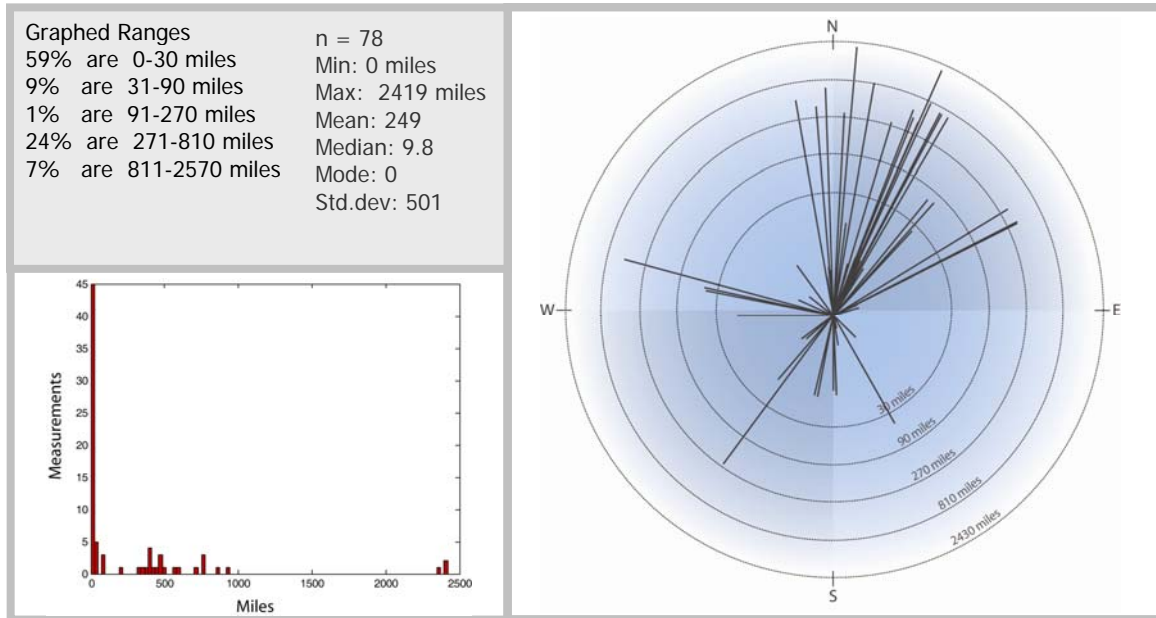
Although the *temporal* patterns of environmental and international terrorists differed substantially, their *spatial* patterns were fairly similar. Of 49 measures from the international terrorists' residences to the target location, three-fifths (59 per cent) were within thirty miles of the target (Figure 9). However, unlike their environmental counterparts, international terrorists did not reflect a bimodal distribution regarding the

⁵ This pattern may be skewed due to the inability to identify residential locations for all members of the Family and due to their tendency to congregate at a protest site where environmental activists were residing. Use of that address would have reduced these distances considerably.

relation between residences to target. Instead, a general linear relationship between residence and target location emerged – the farther the distance from the incident, the lower the percentage of international terrorists’ residences.



International terrorists also committed a majority of their antecedent and preparatory behaviors close to the incident location (Figure 10). Like the environmentalists, about three-fifths (59%) of the known, measurable antecedent activities occurred within a 30 mile radius of the selected target. Although these spatial patterns are similar for both groups, the implications for local law enforcement are different. Observation of environmental extremists’ antecedent behaviors by local law enforcement probably signals that a terrorist attack is eminent. In contrast, the antecedent activities of international terrorists in a local community may occur over several months in advance of the incident.



Types of Antecedent Activities

Antecedent activities by terrorists may include ancillary, planning, and preparatory behaviors. Furthermore, these behaviors may include criminal, as well as non-criminal activity. About a fourth of these activities measured (121 of 472), involved some form of communications in the form of phone calls, meetings, or letters (see final report for complete list of activities). Activities associated with bomb procurement, manufacture, and testing accounted for an additional 11 per cent (51 of 472) of the measured conduct. The third most common activity included behaviors associated with research, training, reconnaissance, and surveillance – all activities reflecting intelligence gathering. The remaining activities included the purchase of supplies and materials, banking activities --

which included everything from bank robbery to fund the planned incident to legitimate withdrawals, weapons violations, and a variety of non-criminal ancillary conduct.

Further examination, however, revealed that over one-fourth (140 of 463; 30.2%) of these activities were “ancillary” – predominately criminal conduct associated with the terrorist group that could have been used as a “pre-incident indicator,” but which was not directly related to the planning of the eventual terrorist incident. The most common crimes committed by environmental terrorists involved conspiracy and the acquiring, manufacturing, or testing of bombs. In contrast, international terrorists engaged in a much broader range of criminal conduct. Their most common criminal offenses included conspiracy, bomb acquisition or manufacture, training, illegal trade, fraud, illegal entry into the United States, weapons violations, and smuggling. Unfortunately, conspiracies may not become known to law enforcement agencies until after the completion of the act or other arrests are made. Consequently, non-overt acts of conspiracies, such as meetings and phone calls, may not come to the attention of local law enforcement agencies.

To determine how many antecedent activities terrorist groups engaged in per incident, analysis was restricted to the 39 environmental and international incidents where data were fairly complete. In these cases, the international terrorists engaged in an average of 8.3 known antecedent behaviors per incident. Environmental terrorists were significantly less active, engaging in only 2.9 known antecedent activities per incident. The substantially longer planning and preparation cycle of international terrorists resulted in approximately three times as much antecedent activity as the environmental terrorists.

CONCLUSIONS

Environmental and international terrorists targeting the United States exhibited similar spatial patterns of behavior, but highly divergent patterns of temporal conduct. The study confirmed a “localized” spatial distribution of terrorist planning and targeting by both environmental and international terrorists. Slightly over one-half of both groups of terrorists in the study resided, planned, and prepared for terrorism relatively close to the eventual target. However, about one-fourth of the environmental terrorists lived and planned their acts a distance of several hundred miles from the terrorist target. These two patterns reflected operational variations among terrorist groups. Among both international and environmental terrorists, the use of “long distance terrorism” reflected one of two tactics: (1) the use of air transportation for planning and operational activities or (2) the use of postal services as a means of weapons delivery.

In contrast, the temporal patterns of environmental and international terrorists were quite different. Environmental terrorists were much more spontaneous, engaging in an extremely short planning and preparation cycle. Usually targets were selected and attacked within one week. The planning process of international terrorists was significantly longer, usually lasting several months. These differences also manifested themselves in the number and type of preparatory activities. International terrorists engaged in significantly more group interaction, planning meetings, and preparation than did the environmental terrorists. International terrorists also committed a much broader range of criminal conduct than environmental terrorists.