

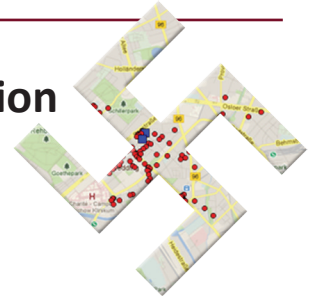
Editor's Note

(U) *Geospatial Intelligence Review* presents this article separate from its bound edition. Articles appear on the Center for the Study of GEOINT Web site as they are completed.



(U) Geographic Profiling in Nazi Berlin: Fact and Fiction

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and Steven C. Le Comber



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(U) Editor's note: The authors of this article investigated how geographic profiling might be applied to analysis of minor terrorism-related acts such as antigovernment graffiti and theft to help locate terrorist bases before more serious incidents could take place. The authors illustrate the methodology's effectiveness by examining the historical case of Otto and Elise Hampel, who distributed hundreds of anti-Nazi postcards in Berlin during World War II.

(U) The authors demonstrate that specialized analytic methods can be applied to problems with similar characteristics. Cross-domain methodology-borrowing clearly works.

(U) Not all terrorism-related events can be directly analyzed using geographic profiling. The choice of location for some acts, especially major ones, can be driven by factors other than opportunity, for example, by symbolism or the expected impact. This article deserves consideration and is a starting point because geographic profiling has been successful in the analysis of a wide variety of crimes and other incidents.

(U) Introduction*

(U) This article shows how the Gestapo [German security police] employed the basic ideas of geographic profiling during World War II. Geographic profiling analyzes the locations of connected incidents to determine the most probable area for an offender's "anchor point" (usually a home, but sometimes a workplace). This Gestapo investigation formed the basis of a classic German novel, *Alone in Berlin*, about Otto and Elise Hampel, who had distributed hundreds of anti-Nazi postcards during the war.

(U) We used modern geographic profiling methods to analyze the postcard and letter dropsites in the Hampel case and show that the technique successfully and quickly prioritizes the area that contained the Hampel's Berlin apartment. Modern geographic profiling accomplished this after just 35 of the 214 incidents the Gestapo recorded before arresting the Hampels. This study provides empirical evidence to support the idea that analysis of minor terrorism-related or subversive acts such as antigovernment graffiti and theft can help locate terrorist bases before more serious incidents occur.¹

* (U) The authors thank the *Bundesarchiv* [National Archive], Berlin, for access to the files and thank colleagues at Queen Mary University of London and Texas State University, especially Jonathan Allen, Richard Nichols, and Yannick Wurm, for helpful comments. The authors are also indebted to K.A. Lankheit for his help locating the original Gestapo files, to T. Gegeny for granting temporary access to Dr. Gruyter's historical online resource, and to M. Kuhnke for additional historical information.

(U) Cases of serial crime such as murder, bombing, and arson typically involve large numbers of suspects. For example, the Yorkshire Ripper investigation in England generated over 268,000 suspects.² Suspect prioritization and information management are therefore critical for major investigations. This is also true in counterterrorism investigations; as of December 2012, the US Government's terrorist watch list contained the names of over 875,000 individuals.³

(U) Geographic Profiling

(U) Geographic profiling is a frequently used method of prioritizing large lists of suspects. The technique was developed in the early 1990s to analyze the locations of a series of connected incidents to determine the probable area of an offender's anchor point.⁴ Geographic profiling does not provide an "X" that marks the spot; rather, it is an information management and suspect prioritization methodology. The technique has been successful in criminal investigations and is now used routinely by law enforcement agencies around the world. More recently, it is being applied to military, biological, and epidemiological data.^{1,5,6,7,8,9,10}

(U) The methods underlying geographic profiling depend on the integration of two concepts: distance decay and the buffer zone.^{4,11,12} Distance decay reflects the fact that most crimes take place relatively close to the offender's anchor point; for example, 70 percent of serial arsons take

place within 2 miles of an arsonist's residence.¹³ The buffer zone is an area around the offender's anchor point in which offenses are less likely to occur, partly because of an increase in detection risk related to reduced anonymity and partly because the number of opportunities increases with the distance from the anchor point. The combination of these opposing effects produces a probability distribution that resembles a volcano with a caldera; the likelihood of incidents increases with distance up to the limit of the buffer-zone radius and then decreases or "decays" with distance.

(U) Geographic profiling uses this buffered distance-decay function to determine the offender's probable anchor point for each incident location within the area of interest. The profile produces an offender base probability surface ("jeopardy surface") from the point pattern of the incident locations.⁴ When a jeopardy surface is overlaid on a map of the search area, the result is a geoprofile. Locations are then prioritized by their position on the geoprofile.

(U) The Gestapo Investigation of Otto and Elise Hampel

(U) Given that geographic profiling was not developed until the early 1990s and requires sophisticated computer software, it was surprising to discover the Gestapo's investigation of the Hampels used the concepts of distance decay and buffer zone. In *Jeder Stirbt für sich Allein* (a novel written by Joseph Ditzen in 1947 under

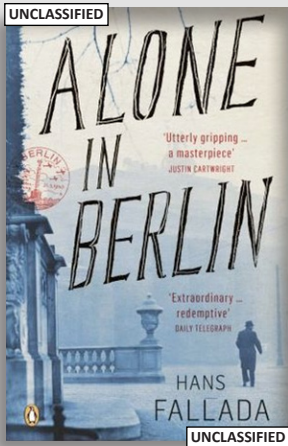


Figure 1. (U) *Alone in Berlin*¹⁴
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London

the pen name Hans Fallada), published in English as *Alone in Berlin* (figure 1), the writer describes the police search:

“The dust-coloured man had pulled out a streetmap of Berlin and pinned it on the wall. Now he stuck in a red flag, exactly over the office block in the Neue Königstrasse. ‘You see, this is all I can do for the moment. But over the next few weeks, more and more flags will go up, and where the density is greatest, that’s where our hobgoblin will be found. Because over time he will wear out, and he won’t want to go all that way to drop one of his postcards.’”

The inspector led the gentlemen back to the map, and, speaking in a whisper, showed them how although there were flags evenly sowed all over the area north of the Alex [the Alexanderplatz], one little area had none at all.

“And that’s where my Hobgoblin [SIC] lives. He doesn’t drop any cards there, because he is too well known; he would have to worry that a

neighbour might see and identify him. It’s a little working-class enclave, just a couple of streets. That’s where he lives.”¹⁴

(U) Fallada’s novel, which Primo Levi† called “the greatest book ever written about German resistance to the Nazis,” is based on the case of Otto and Elise Hampel. After Elise’s brother was killed in France, the Hampels began leaving postcards in apartment buildings around Berlin, denouncing the Nazis (figure 2). Roughly translated, the card in figure 2 says “Free Press! Continue with the Hitler [?] system and the common soldier Hitler and his gang will plunge us into the abyss! This Hitler Goring Himmler Goebbels gang is for Germany only a death chamber.” After a tip from an informant, the Gestapo arrested the Hampels in October 1942 (figure 3). They were tried, found guilty, and executed in Plötzensee Prison in 1943.

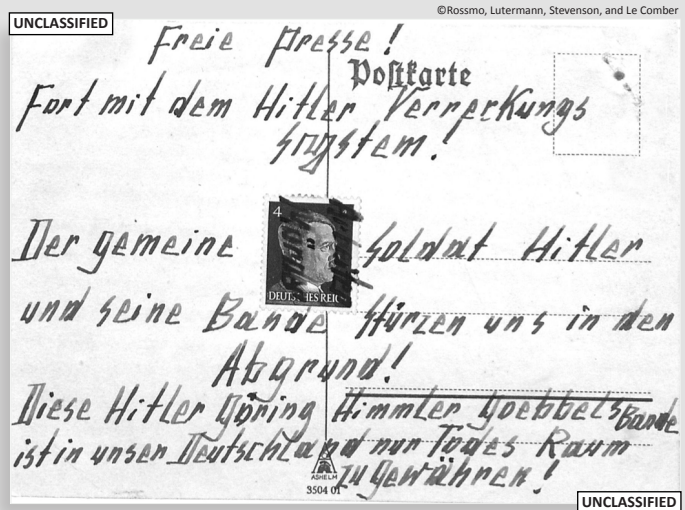


Figure 2. (U) Hampel Postcard

†(U) Levi wrote *Survival in Auschwitz* about his year in that concentration camp.

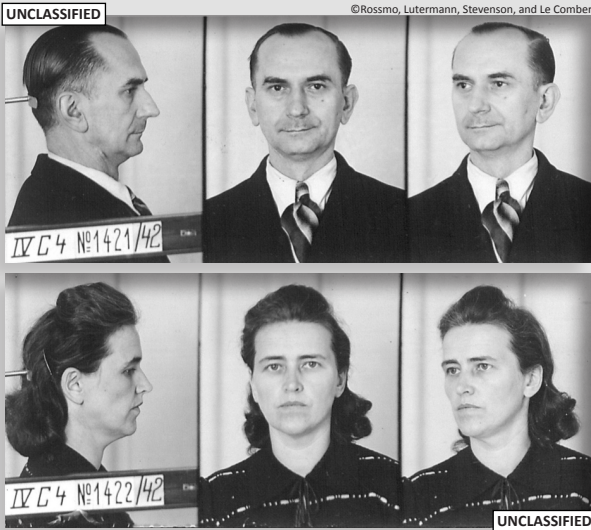


Figure 3. (U) Otto and Elise Hampel

(U) The concepts of distance decay and buffer zone were clearly used in the actual Gestapo investigation led by a *Kriminalsekretär* (Detective Sergeant) Püschel:

“Hauptverbreitungsgebiet ist nach wie vor die Gegend des Wedding, vor allem die Strassenzüge beiderseits der Müllerstr. Die Fundorte der Hetzschriften lassen nach wie vor nur den Schluss zu, dass der Hersteller bzw. der Verbreiter nur in der Gegend der Müllerstr; etwa in Höhe der Brüsseler und Amsterdamer Str. wohnen kann.”‡

“[The main focus of distribution remains the area around Wedding, particularly the streets on both sides of Müller Strasse. These sites at which the inciteful writings were found still suggest

that the author or distributor must live in the vicinity of Müller Strasse, probably between Brüsseler and Amsterdamer Strasse.]”

(U) After Otto Hampel was identified as a suspect, Püschel noted the existence of what we would now call a buffer zone around the Hampels’ apartment:

“Die Überprüfung der Vorgänge in Bezug auf die Fundorte und die Person Hampel ergab, dass in Wohngrundstück des Hampel derartige Karten nicht gefunden worden sind. Dagegen sind früher einmal die nächsten beiden Eckgrundstücke Thriner Str. 46 und 48 mit derartigen Hetzschriften belegt worden.”

“[Further enquiry into possible connections between retrieval sites and Hampel revealed that no such cards were found on the premises he is living on. However, cards have been retrieved from neighboring corner properties 46 and 48 Thriner Strasse.]”

**(U) Geographic Profiling:
Alone in Berlin**

(U) For this study, we digitized and geocoded the 214 addresses at which the Gestapo had found a postcard or letter between 2 September 1940 and 16 September 1942. The Gestapo records subdivide the

(U) “The concepts of distance decay and buffer zone were clearly used in the Gestapo investigation . . .”

‡(U) German language passages from police file number *Stapo IV A 1 c*, 25 September 1942.

214 locations into seven volumes that were assembled in the temporal order in which the cards or letters were discovered (figure 4).

(U) The addresses were analyzed using the software Rigel (ECRI Canada), which is based on the criminal geographic targeting algorithm.[§] Ten incidents that could not be associated with a precise location were excluded from the analysis. For example, incident number 181 was assigned only to the Wedding neighborhood.

(U) We used historical maps from the online *Berlin City Map Archive* at URL: <http://www.alt-berlin.info/> to identify locations on a modern map, then further verified the locations by a site visit to Berlin. Figure 5 shows the residences of the Hampels and their relatives. Red dots mark the 207 incident locations in this frame where the Gestapo recovered anti-Nazi postcards or letters.

(U) The modern Berlin street layout closely matches that of World War II maps and, surprisingly, many of the original buildings are still in existence. Figure 6 shows a

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Heftschrift "FRITZ PRESSE"
Band III.

Nr.	Tag	Zeit	Ort	Art
61.	12.4.41		Hausburgstrasse 10	1 Karte
62.	12.4.41		Fritz-Schuls-Str. 41	1 Karte
63.	16.4.41	15,00	Hägelberger Strasse 9	1 Bogen
64.	16.4.41	15,00	Gross-Beeren-Str. 36	1 Bogen
65.	15.4.41	16,00	Fritz-Schuls-Str. 41	1 Karte
66.	20.4.41	12,45	Fassmüller Strasse 15	1 Bogen
67.	27.4.41		Seestrasse 57	1 Bogen
68.	27.4.41	15,15	Hundenstrasse 2	1 Bogen
69.	23.4.41		Hennigsdorfer Str. 3	1 Karte
70.	1.5.41	18,30	Wittstocker Strasse 25	1 Bogen
71.	4.5.41	19,45	Wagnitzstrasse 41	1 Bogen
72.	5.5.41	14,15	Brunonstrasse 53/54	1 Bogen
73.	11.5.41	11,00	Linarstrasse 2	2 Karten
74.	11.5.41	12,00	Willenowstrasse 5	1 Karte
76.	14.5.41	9,00	Hüllerstrasse 34 a	1 Karte
75.	15.5.41		Glasgower Str. 7	1 Karte
76.	15.5.41	18,30	U-Bahn Alexanderplatz	1 Karte
77.	15.5.41	21,00	Luxemburger Strasse 2	1 Karte
78.	16.5.41		Bahnhofstrasse 13	1 Bogen
79.	17.5.41		Wiesenstrasse 44	1 Karte
80.	17.5.41	16,00	Hüllerstrasse 145	1 Karte
81.	18.5.41	12,30	Wiesenstrasse 22/23	1 Karte
82.	18.5.41		Treskowstrasse 32	1 Bogen
83.	18.5.41		Schulstrasse 5	1 Bogen
84.	19.5.41	18,30	Wittstocker Str. 25	1 Bogen
85.	20.5.41	21,00	Uttrichter Strasse 28	1 Karte
86.	21.5.41	21,30	Berfustrasse 18	1 Karte
87.	26.5.41	11,30	Schererstrasse 7	1 Bogen
88.	26.5.41	20,00	Wischerstrasse 10	1 Bogen
89.	26.5.41	20,45	Wischerstrasse 7	1 Bogen
90.	27.5.41	20,00	Hüllerstrasse 151	1 Karte
90.	5.6.41	20,45	Tytestrasse 37	1 Bogen

Kopie aus dem Bundesarchiv

Figure 4. (U) Incident Locations 61 Through 90 in Volume III

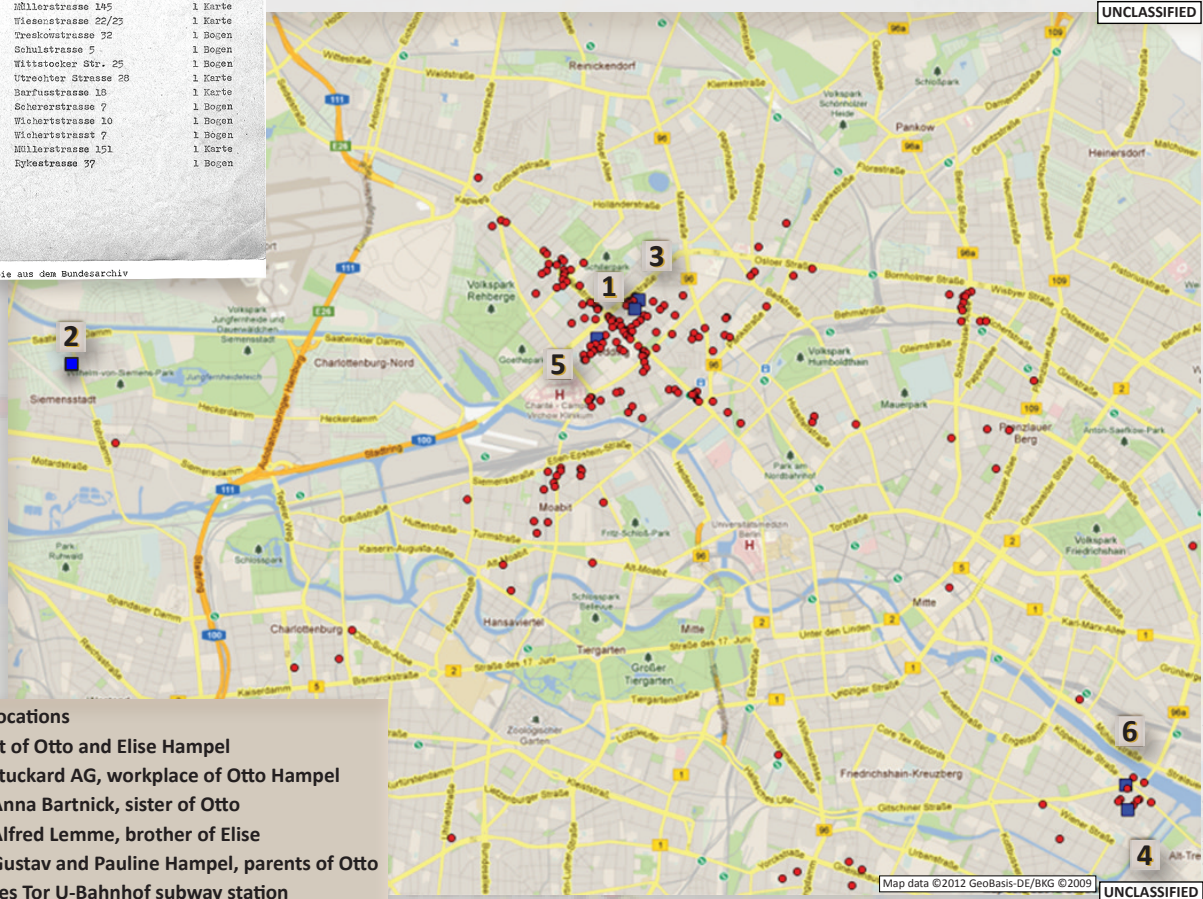


Figure 5. (U) Central Incident Area in the Hampel Case

§(U) Described in detail in *Geographic Profiling*.⁴

typical location (incident 64), where a one-page anti-Nazi letter was recovered from an apartment building at Gross-Beeren-Strasse 36, in the Kreuzberg district, on Monday, 14 April 1941. Observe how the Gestapo listed incident 64 in figure 4 (on page 6).

(U) We prepared a geoprofile for each temporal volume separately, a geoprofile for all 214 incident locations (the base case), and a geoprofile from which duplicate addresses had been removed (table). The performance of a geoprofile can be measured by the hit score percentage (HS%) which is the proportion of the area covering the

incidents that must be searched before the offender’s anchor point is located. The HS% is equal to the target area divided by the hunting area; the target area is the size of that search area, and the hunting area is the rectangular area encompassing all the analyzed incident sites (equivalent to the area of interest). HS% is a measure of the

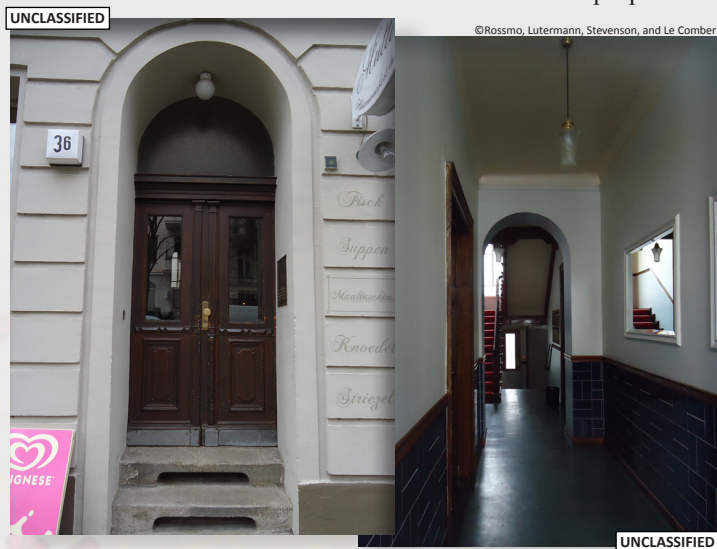


Figure 6. (U) Incident Location 64, Gross-Beeren-Strasse 36 Entrance (Left) and Interior Where a Letter Was Found (Right)

Table. (U) Incident Locations, Hit Score Percentages, and Target and Hunting Areas (in Square Miles) for Nine Geoprofiles

Geoprofiles	Incident Locations	Hit Score %	Target Area	Hunting Area
Volume I 2 September 1940 to 11 March 1941	35	.38%	0.13	34.14
Volume II 12 March 1941 to 6 April 1941	33	0.16%	0.13	82.60
Volume III 12 April 1941 to 5 June 1941	32	0.15%	0.22	144.60
Volume IV 4 June 1941 to 24 August 1941	33	3.03%	0.40	13.22
Volume V 31 August 1941 to 28 December 1941	34	.004%	0.01	24.37
Volume VI 1 February 1942 to 30 May 1942	35	.04%	0.19	43.78
Volume VII 12 July 1942 to 16 September 1942	12	0.92%	0.50	54.18
Total Incident Locations (Base Case)	214	0.08%	0.12	146.44
Unique Incident Locations	172	0.11%	0.16	146.78

(U) This table is unclassified.

ability of a geoprofile to prioritize suspects: the smaller the HS%, the more accurate the geoprofile. We would expect a hit score of 50 percent from a nonprioritized search.

(U) Figure 7 shows the frequency of incidents of recovered postcards and letters by distance from the Hampel apartment, overlaid with a kernel density curve. The distribution exhibits both distance decay

and a buffer zone. Figures 8 and 9 show the jeopardy surface (three-dimensional) and the geoprofile (two-dimensional), respectively, produced from the analysis of the incident data. Probability of offender anchor point is indicated by both color and height in figure 8 and by color in figure 9. For example, areas in red or orange have a higher probability than do those in gray or purple.

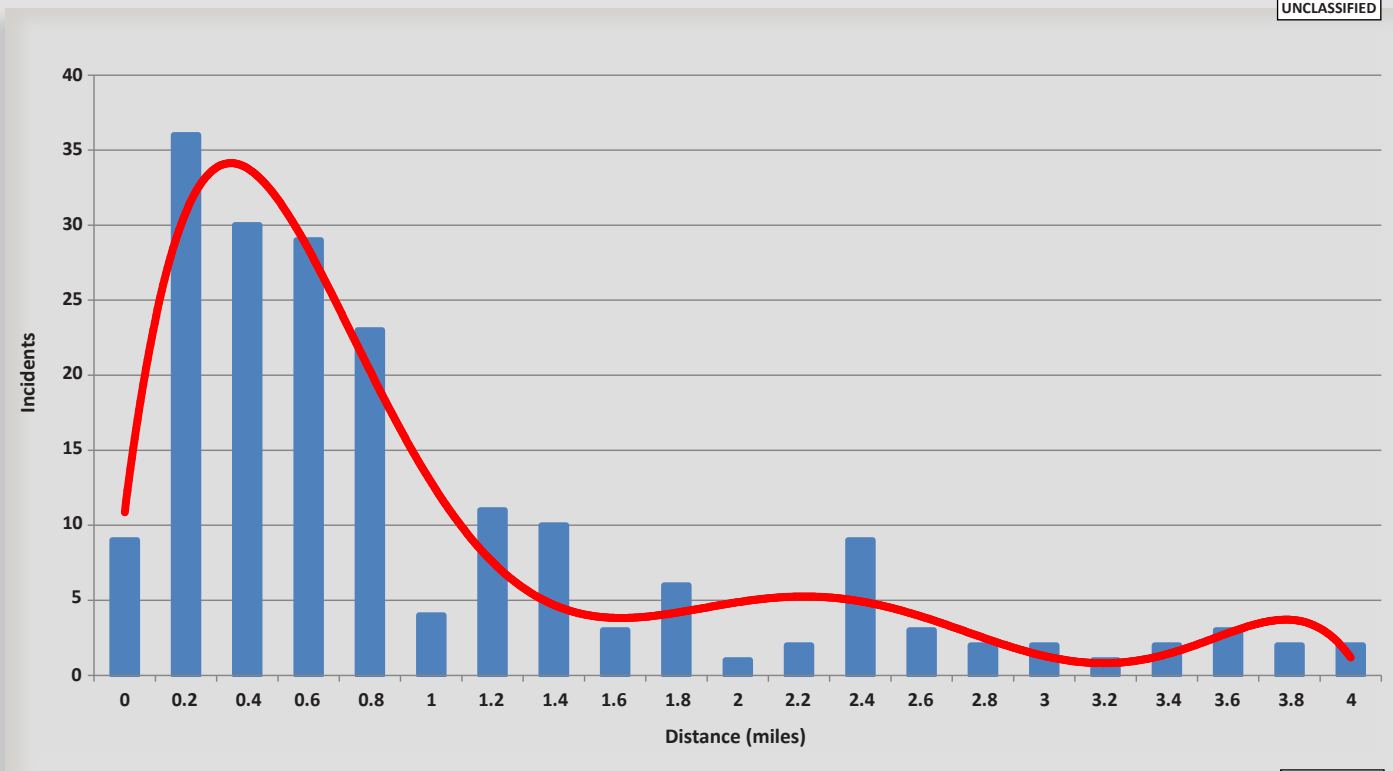
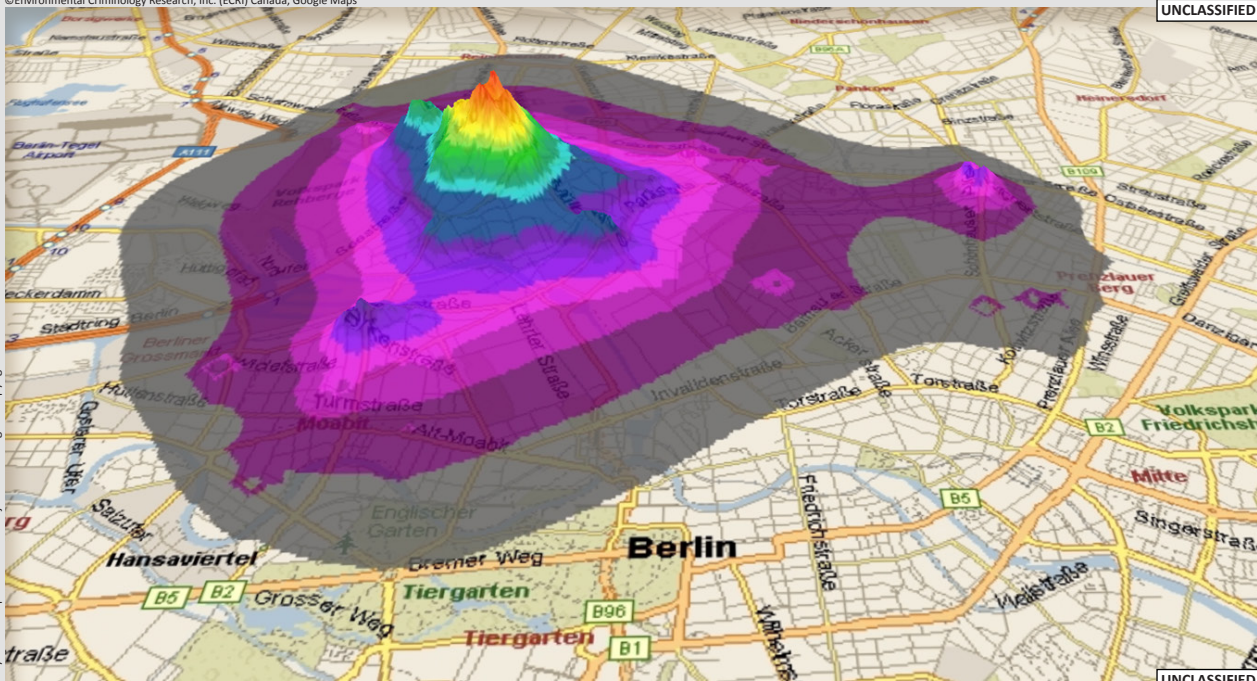


Figure 7. (U) Frequency of Incidents by Distance From the Hampel Apartment

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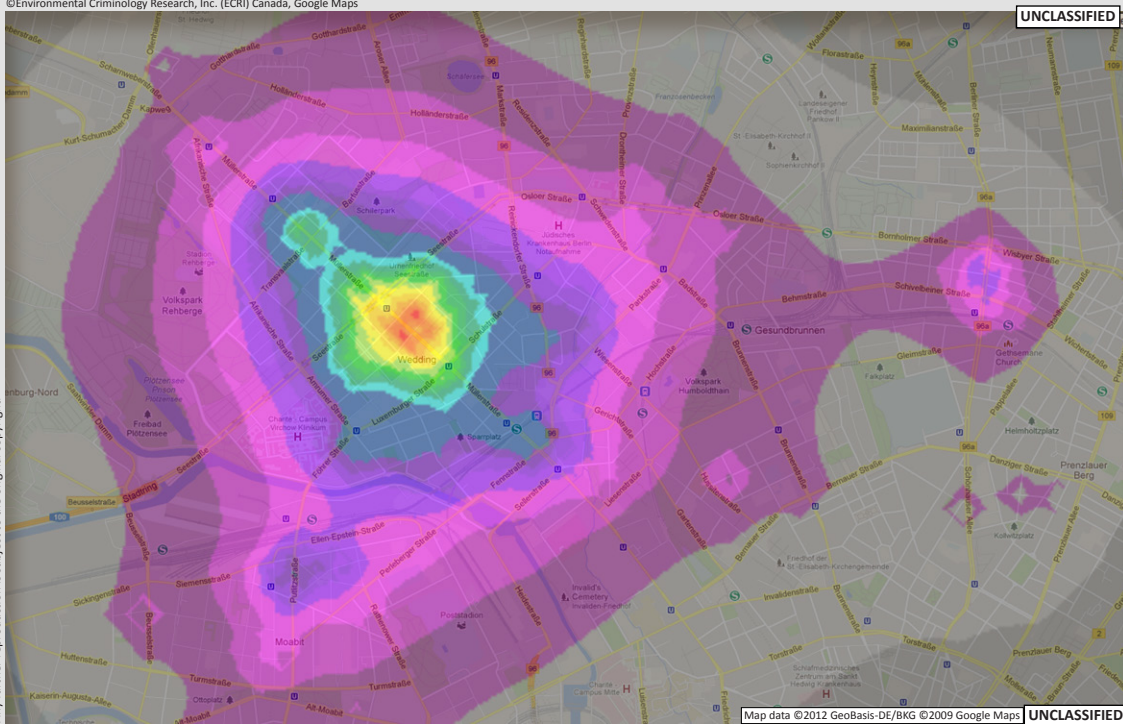
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Figure 8. (U) Hampel Base Case Jeopardy Surface (Three-Dimensional)

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Figure 9. (U) Central Area of Hampel Base Case Geoprofile (Two-Dimensional)

(U) “. . . the data would have been sufficient to prioritize the Hampels’ apartment as early as March 1941 had the Gestapo used modern techniques.”

(U) On the basis of an analysis of all 214 incident locations, the peak of the geoprofile—hence the most likely location for the offender’s anchor point—includes Amsterdamer Strasse 10, the Hampels’ apartment. Amsterdamer Strasse 10 appears in the top 0.1 percent of the geoprofile (a 500-fold improvement from a random search). The map in figure 10 shows the Hampel apartment, the home of Otto’s parents, and that of his sister, superimposed over the peak 0.1 percent of the 214-incident (base case) geoprofile.

(U) Remarkably, the data would have been sufficient to prioritize the Hampels’ apartment as early as March 1941 had the Gestapo used modern techniques. In the geoprofile based on the 35 incident points in the first volume (2 September 1940 to 11 March 1941), the Hampels’ apartment is found in the top 0.4 percent of the geoprofile (table on page 7).

(U) The addresses of other Hampel family members also had a high HS%. Otto’s parents, Gustav and Pauline Hampel, lived close to Otto and Elise (HS%=0.09%), as did Otto’s sister, Anna Bartnick (HS% = 0.19%). Elise’s brother, Alfred Lemme, lived in Falkensteinstrasse until July 1942 (see figure 5, page 6); his home fell on a secondary peak southeast of the main peak (HS% = 2.28%).

(U) Secondary peaks were near other relevant locations (see figure 5, page 6). These include the stations at S-Bahnhof Schönhauser Allee and Schlesisches Tor U-Bahnhof (HS% = 2.89% and 4.96%, respectively), suggesting these were routes used by the Hampels between their apartment and Alfred Lemme’s home. In contrast, the incident location where Otto left only one note near his workplace at Siemens Stuckard AG did not rank high in the geoprofile.

(U) Discussion

(U) Beyond its historical interest, the present analysis of the Hampel case demonstrates the potential of geographic profiling in similar situations today. The problems that faced the Gestapo have parallels in modern counterterrorism investigations and counterinsurgency efforts, which must also deal with information overload challenges.^{1,3,10} This is exactly the problem geographic profiling is designed to address by prioritizing large lists of suspects in a meaningful way.



Figure 10. (U) Closeup of the Top 0.1 Percent of the Hampel Base Case Geoprofile

(U) The algorithm is robust and generalizable. The model parameters we used to analyze World War II insurgency are the same as those used for modern serial murder and rape investigations, studies of animal foraging, and identification of malaria epidemic outbreak sources.^{4,5,6,7,8} Model generalizability is an important characteristic in geospatial analysis as it provides confidence in the application of a technique in new and unique situations and in a variety of domestic and foreign environments.

(U) The focus provided by a geoprofile is significant, providing an area small enough for a variety of suspect- and area-based investigation strategies.⁴ Though most of the incident locations in the Hampel case were in the highly dense Wedding area of the Mitte borough of Berlin, the Hampels distributed their postcards over 150 square miles—44 percent of Berlin's total area. Therefore, the HS% of 0.1 covers approximately 0.15 square miles. Even in that small an area, there are over 2,500 people in almost 800 households (based on estimates of the current Berlin population density and household size).

(U) Modern geographic profiling methods are a considerable improvement on the original investigation. Despite the Gestapo's reputation for ruthless efficiency,¹⁵ two years and 214 incidents passed before the Gestapo arrested the Hampels. Of particular interest is how quickly the geoprofile narrowed in on the Hampels' apartment; after only 35 incidents (16 percent of the

total of 214 incidents), their apartment could be found in less than one-half of one percent of the area of interest. This geographic focus would have been possible as early as spring 1941, a full 18 months before the arrest of the Hampels in the fall of 1942.

(U) Although much attention is typically focused on major attacks—bombings, kidnappings, hijackings—certain terrorist or insurgent organizations may engage in low-level seditious activities similar to the Hampels' campaign. The activities may include vandalism, antigovernment graffiti, leaflet distribution, or banner posting.^{1,16,17} Rossmo and Harries¹ suggest that the creation of geospatial databases of terrorism-related graffiti could help locate terrorist support bases before more serious incidents occur, and the *Alone in Berlin* study provides empirical support for this suggestion. Of course, in this particular case, our sympathies are with the insurgents (figure 11).



Figure 11. (U) Berlin Memorial to Otto and Elise Hampel

(U) Notes

1. (U) Source Type: Journal; Authors: Rossmo, D.K. and K.D. Harries; Title: *Justice Quarterly*; Article Title: “The Geospatial Structure of Terrorist Cells”; Date of Publication: 28 (2011); Page Numbers: 221-248.
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3. (U) Source Type: National Counterterrorism Center; Author: Not Named; Publication Title: *Terrorist Identities Datamart Environment (TIDE)*; Date of Publication: 2013; URL: www.nctc.gov/docs/Tide_Fact_Sheet.pdf; Date Information Accessed: 15 July 2014.
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Date of Conference: June 2007.
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Presentation Title: *Profiling Terrorism in the United States: Understanding
Statistics Through Spatial Analysis*; Conference Name: American Society
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