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Applications of Geographical Offender Profiling

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Chapter 5

The Road to the Robbery: Travel Patterns in Commercial Robberies

Peter J. Van Koppen and Robert W.J. Jansen*

Previous research suggests that the distance travelled from home to the scene of the crime is related to both the characteristics of the offender and of the offence. In a study on robberies in the Netherlands, the relation between distance travelled and characteristics of robbers and robbery was studied. The data set consisted of robberies for which the perpetrators were convicted in 1992. The cases (434 robberies on commercial targets committed by 585 robbers) were drawn from case files provided by the Dutch police to the courts.

Results show that greater distances from the residences of the robbers to the target of the robbery are travelled by robbers who are more professional, who attack more difficult targets, in more rural areas. Far away robberies are not more successful than those nearby, but if successful generate more proceeds. The results suggest that robbers travel further because they expect more money in specific targets.

Commercial robberies seem a uniform crime: the robbers go in, extort money from the victims with threat of violence and leave as quickly as possible. In practice robberies show quite a lot of variation. Some robbers, for instance, come alone on a bicycle, do not wear any disguise, and flee at the first sign of resistance. Other robbers come in well-organized groups, use considerable violence, and only rob after extensive preparations.

One of the aspects in which robberies vary considerably is the distance travelled from home to the target of the robbery. In this article we examine the relationships between variations in travel patterns and characteristics of robbers and robberies.

Travel Distance

Since the 1960s the spatial distribution of crime has been a growing field in criminology (e.g., Brantingham and Brantingham 1984; Evans and Herbert 1989; Figlio et al. 1986; Georges-Abeyie and Harries 1980; Harries 1980; Herbert 1982).

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Little research, however, has been done on how robbers choose their robbery target (an exception is Duffala 1976), and why some travel further than others.

Criminals prefer to operate, in areas they are familiar with (Brantingham and Brantingham 1984). Thus, travelling into unknown territories to locate crime sites is very rare (Repetto 1974). This is usually explained by the cost in time, money and energy that is necessary to overcome distance (Baldwin and Bottoms 1976; Bullock 1955; Capone and Nichols 1976; Turner 1969). The journey-to-crime literature suggests that criminals combine effort minimization and opportunity maximization (Harries 1980). Since criminals in general prefer easily available targets (Gottfredson and Hirschi 1990), they tend to choose targets close to home, provided they are available there. This pattern of travel to the sites of crime results in the so-called distance-decay function (see Figure 5.1): many crimes occur close to the criminals' homes and the further away from home, the fewer crimes are committed.

The distance-decay function is widely supported in research (Capone and Nichols 1976; Rengert 1989). Capone and Nichols, for instance, found that 33 per cent of trips from home to the place where the robbery was committed were less than one mile (23 per cent for fixed premises); over 50 per cent were less than two miles (41 per cent for fixed premises) (Phillips 1980). The distance-decay function, however, does not decline monotonically. Very close to home, criminals commit few crimes, apparently because there the risk of recognition and thus of apprehension is much larger. Targets close to home are just bad targets (Brantingham and Brantingham 1984).

The distance travelled from home to the scene of the crime is related to both characteristics of the offender and of the offence. To commit a crime, a motivated criminal must come into contact, in time and space, with a victim without the benefit of adequate guardianship (Cohen and Felson 1979). If potential targets are

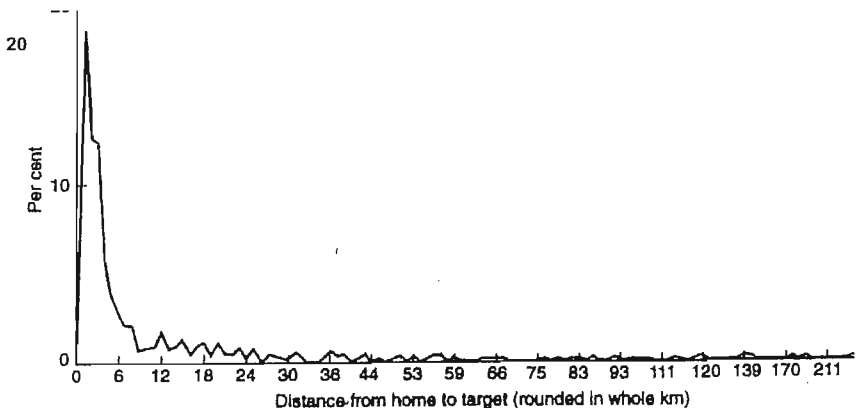


Figure 5.1 Distribution of distances travelled from home to target of robberies, rounded to whole kilometres (876 units of analysis)

dispersed, obviously the criminal has to travel further. Thus criminals committing armed robberies on fixed targets travel further than other kinds of criminals (Capone and Nichols 1976; Rengert 1989), while rapists stay closer to home (LeBeau 1987; Rhodes and Conly 1981).

Although most crimes are committed close to home, there is still a substantial number of criminals who travel greater distances. Their crimes must involve some incentive to leave known territory; some crime targets are attractive enough to do so. Those typically are crimes which are more profitable, but more difficult to commit. Examples may be kidnapping or attacking a strongly protected bank. These are usually also crimes which require much more planning (Capone and Nichols 1976).

The distance travelled also varies with the characteristics of the offender, such as gender (Rengert 1975), race (Nichols 1980; Pettitway 1982), and age (Baldwin and Bottoms 1976; Nichols 1980; Phillips 1980). Nichols (1980), for instance, found that the average distance travelled by older offenders was 4.98 miles, while for younger offenders it was 2.02 miles. Whites travelled further (6.67 miles) than blacks (2.29 miles).

Commercial Robbery

Robbers of commercial targets in general travel further than other kinds of criminals (Capone and Nichols 1976; Rengert 1989), though one can still expect variation. In our analysis we adopt the so-called routine activity approach; which states that to commit a crime, a motivated criminal must come into contact, in time and space, with a victim without the benefit of adequate guardianship (Cohen and Felson 1979). In a densely populated country like the Netherlands, suitable targets can be robbed relatively close to home. There is no need to travel far for a robbery. This effect is augmented by the fact that criminals have a preference for easy available targets (Gottfredson and Hirschi 1990). Thus, criminals stay close to home, unless they have incentives to travel further. One incentive may be that they expect more money at a far away target. It is assumed that the distance travelled to the target of the robbery depends on the distribution of suitable targets, the type of offence, and characteristics of the offender.

Distribution of Targets

The major determinant of the distance travelled is the availability of suitable targets. In rural areas targets for commercial robberies are more widely dispersed than in densely populated areas and thus the robbers need to travel further. The distribution of various types of commercial target also differs; there are simply fewer banks to rob than there are, for instance, shops.

Type of Robbery

Types of target also vary in the amount of planning which is necessary for a robbery. Banks are more difficult to rob than petrol stations, usually because banks have more personnel and a higher level of security. On the other hand the level of security is positively related to the money available. This incentive for robbers may encourage them to skip the relatively easy shops and petrol stations, and rob a bank. To overcome the security measures, however, they have to put more energy into preparations, have to plan more carefully, and divide up tasks. That, in turn, can make the robbers more target selective which may necessitate a longer journey before a suitable bank is found. As a consequence, more professional robbers can be expected to travel further to their target.

In the present study various measures of professionalism were available: the level of security at the target, level of disguise, kind of weapon, the preparations for the robbery, the number of robbers, and the division of tasks during the robbery. All these variables can be considered approximations of the level of professionalism of the robbers. One additional distinct sign of being a beginner in the robbery community is starting the robbery with shouting 'This is a robbery'. A robbery which starts by passing a note, on the other hand, is considered much more professional (Kroese and Staring 1993). In general, however, more professional robberies can be expected to be performed further away from robbers' homes than amateur robberies.

We did not include the mode of transportation among these variables, because the choice in part depends on environmental circumstance. A car may seem the best option to get away quickly after the robbery, but for some targets they are unsuitable. In an old inner city, for instance, riding a bicycle is often much faster. A few years ago some highly successful robberies – from the point of view of the robbers – were committed using boats in Amsterdam. Boats apparently were a better option in Amsterdam, with its many canals, than any other means of transport.

The number of robbers is not a straightforward measure of professionalism. A single robber has more problems in executing a complicated robbery, but extra hands during the robbery risk errors in execution or too much talk afterwards. Given these problems, three seems to be an optimum number. One robber collects the money, a second can restrain bystanders, the third can either be on the look-out and/or drive the car. The robbers, then, must divide the tasks to take advantage of their greater number.

The causal relations between the factors mentioned above and the distance travelled are not always clear. A robber may, for instance, rob a target further away because he has a car that cannot be connected to him, for instance because it is stolen. On the other hand robbers may steal a car or have a car stolen with the express purpose of robbing a distant target. The same problem holds for the availability of firearms.

Robbers

One typical group of robbers is drug addicts. They often need quick and easy money to sustain their addiction (Åkerstrom 1985). As a consequence they choose easy targets: cafeterias and shops which have few security measures and are located close to the robber's home. Robbers who are not addicted are able to attack more difficult targets.

A common explanation for the fact that criminals tend not to commit crimes far away from home is their unfamiliarity with the area. Robberies in unfamiliar areas are more difficult to commit for several reasons. First, more energy has to be put into picking a suitable target. Secondly, preparations for the robbery are more difficult. If robbers, for instance, want to observe the target for an extended period before the robbery, they have to travel to the target repeatedly. Thirdly, an essential part of a robbery is the getaway. Unfamiliarity with the area can cause major problems here. In the present study, for instance, several robbers got lost when fleeing. In a small country like the Netherlands unfamiliarity with the area may cause fewer problems for native Dutchmen than for people who were born abroad. It was therefore expected that people of foreign descent stay closer to home than Dutchmen.

From One Robbery to the Other

We argued above that more professional robberies are committed further away from the robbers' residences than less professional ones. If that is true, it can not only be expected that more professional robbers travel greater distances, but also that individual robbers tend to travel further with every next robbery they commit. Robbers learn from each robbery and thus in a series of robberies become more and more professional.

Method

The data for this study came from official court records. The records consisted both of evidence gathered by the police and the subsequent trial. These cases were robberies for which one or more of the robbers were convicted by the criminal division of a Dutch trial court in 1992. Only robberies of commercial targets were included in the study, excluding robberies of dwellings and street mugging.

In the Netherlands, almost all criminal trials are conducted using documented evidence, mainly produced by the police; witnesses rarely appear in court. The police therefore put much energy into preparing the case files. Both witness and suspect statements are recorded extensively. The disadvantage of using case files, however, was that we could not interview the witnesses or suspects ourselves, but had to rely on the work done by the police officers who took their statements.

The study included 434 different robberies in which 585 different robbers were involved. Since not all robbers were apprehended, we only knew the addresses of the homes of 524 robbers.

For our study we needed court files. Consequently we could not draw a sample of the robberies *committed* in a certain year, but had to turn to cases in which suspects had been *convicted* for robbery in a particular year. For that reason we cannot give exact figures on how large a proportion of robberies and robbers are included in the study compared to all robberies. An estimate, however, is possible based on police figures for all Dutch robberies (CRI 1993). Since there is often a delay between the robbery and the arrest of the robber and always a delay between arrest and conviction, we compare the number of robberies committed in 1991 and 1992. On average, 1,829 robberies were committed per year, of which 32 per cent were solved by the apprehension of one or more of the robbers. Almost all apprehended robbers are convicted, producing an expected conviction rate for 585 *robberies* in 1992.¹ Our sample can thus be estimated to consist of 74 per cent (i.e., 434 robberies) of the population of robberies. There are no data available to estimate the relative size of our sample in terms of *robbers*.

The robberies most commonly involved two offenders (38 per cent of the robberies), 35 per cent were committed by a single robber, and the remainder by more than two offenders, with a maximum of seven robbers in a single robbery. The robberies took place all across the country and included the whole range of possible commercial targets: e.g., banks, post offices, 28 per cent, catering industry, 21 per cent, shops, 30 per cent, petrol stations, 10 per cent, offices, 3 per cent, and an additional 8 per cent in other premises, which included taxis and public transport.

The values of variables in the present study were based on a multitude of sources in the case files: on statements made by the suspects and witnesses and on findings of the police. If sources contradicted, we used the statements made by the suspect as source, then the police, then witnesses. Most of the robbers in the sample (75 per cent) were convicted for a single robbery in 1992; the others for more than one robbery, with a maximum of 13 robberies.

The unit of analysis is a robber involved in a robbery. Thus, robbers were counted for each robbery they committed and were convicted for in 1992. Additionally, robberies were counted for each robber whose home address was known at the time of the robbery. This produced 876 units of analysis.

Professionalism

The measures of professionalism identified above were almost *all* strongly related with each other (see Table 5.1). The relationship may be strong, but there did not emerge a pattern of what might constitute a typical professional or a typical

1 The number of 585 robberies for which perpetrators are convicted equals the number of robbers in our sample purely by chance.

non-professional *modus operandi* of a robbery. Therefore, we refrained from combining these variables into a single index of professionalism.

Comparison with all Robberies

For the present study we could of course only use robberies which had been solved by the police, otherwise we would not have known the home addresses of the robbers. There is, therefore, the hazard of drawing conclusions that only hold for the less successful robberies and robbers. In part we could check this.

The criminal intelligence division of the Dutch national police force routinely collects data on all robberies committed in the country since 1988. That enables the police to compare the *modus operandi* of robberies, which in turn may help in solving robberies. The data collected by the national police are not as extensive as the data we collected in the present study on each robbery, but the database of the police allowed for comparison of our data on some variables to all other robberies committed in 1991 through 1992 (N=3,657), namely on type of target, number of robbers, district in which the robberies occurred, success of the robbery, and type of transport. The robberies in the present study only differed significantly on number of robbers (robberies with a single robber are undersampled; $\chi^2 = 90.9$, $df = 3$, $p < .001$) and on district (the most rural district, Leeuwarden, and one of the two most urban districts, The Hague, are oversampled; $\chi^2 = 49.2$, $df = 4$, $p < .001$).

Journey Travelled

The X and Y coordinates of both the residences of the robbers and the targets were based on postal codes. In the Netherlands a postal code covers about 40 houses. The resulting X and Y coordinates have a precision of about half a kilometre. Although we knew the residential address of each robber and target of the journey, we did not know the route travelled. The Dutch scenery gives the additional problem that cities are not built on a grid system, as is common for many American cities. Therefore, we decided to use the crow-flight approach. The distance D between home and target was computed by Pythagoras's theorem, thus:

$$D = \sqrt{(X_{\text{target}} - X_{\text{home}})^2 + (Y_{\text{target}} - Y_{\text{home}})^2}$$

Offender Characteristics

Most case files included information on whether the robbers were drug addicts or not. Some of the robbers were addicted to a multitude of drugs. It should be noted that many of the non-addicted robbers use some form of drugs (alcohol or other) prior to a robbery to control their nerves (Kroese and Staring 1993).

Number of robbers	1	3	12	4	3	4	7	0	3	4	0	6	7	3	6										
	2	5	29	9	11	5	14	2	3	7	2	24	17	10	12										
	3	9	17	5	5	3	9	1	2	5	2	15	7	5	10										
	>3	7	18	7	4	3	7	2	4	3	1	16	5	6	13										
	χ^2	18.2***; N=552				17.1***; N=643				57.8***; N=865				31.8***; N=678											
Divisions of tasks (robberies with multiple robbers only)	No	4	11	6	2	3	6	3	3	2	1	7	8	5	6	9	4	4							
	Yes	21	64	20	22	11	30	3	7	14	4	57	26	20	35	34	24	25							
	χ^2	0.04; N=470				9.8*; N=488				58.5***; N=749				6.7*; N=5738.5*; N=755											
Type of target	Bank, post office	0	40	4	6	4	13	0	3	1	1	21	10	5	13	4	11	7	3	3	22				
	Catering	12	12	6	8	2	10	3	3	3	0	15	6	7	7	2	7	6	10	5	22				
	Shop	9	10	9	8	5	8	1	1	8	1	16	11	5	10	5	10	7	6	4	22				
	Petrol station	0	10	3	2	2	3	0	1	3	1	5	2	4	2	5	1	1	1	2	7				
	Company office	1	3	2	1	0	1	0	0	1	0	3	2	1	2	0	1	1	2	0					
	Other	1	0	1	1	1	3	1	2	2	1	4	3	4	4	0	4	2	2	3	7				
	χ^2	185.4***; N=552				37.9***; N=598				160.7***; N=865				37.9***; N=678				100.6***; N=876				15.5**;			

N=755

p < 0.01; *p < 0.001

	χ^2	18.2***; N=552				17.1***; N=643				57.8***; N=865				31.8***; N=678							
Divisions of tasks (robberies with multiple robbers only)	No	4	11	6	2	3	6	3	3	2	1	7	8	5	6	9	4	4			
	Yes	21	64	20	22	11	30	3	7	14	4	57	26	20	35	34	24	25			
	χ^2	0.04; N=470				9.8*; N=488				58.5***; N=749				6.7*; N=5738.5*; N=755							
Type of target	Bank, post office	0	40	4	6	4	13	0	3	1	1	21	10	5	13	4	11	7	3	3	22
	Catering	12	12	6	8	2	10	3	3	3	0	15	6	7	7	2	7	6	10	5	22
	Shop	9	10	9	8	5	8	1	1	8	1	16	11	5	10	5	10	7	6	4	22
	Petrol station	0	10	3	2	2	3	0	1	3	1	5	2	4	2	5	1	1	1	2	7
	Company office	1	3	2	1	0	1	0	0	1	0	3	2	1	2	0	1	1	2	0	
	Other	1	0	1	1	1	3	1	2	2	1	4	3	4	4	0	4	2	2	3	7

In the Netherlands the race or ethnicity of offenders is not recorded. We doubt whether race in itself would be of any relevance in the present study, since race has another meaning in the Netherlands than, for instance, in the United States. Differences between races in travel distance are often explained by the slum structure of large cities (Pettitway 1982), which necessitates robbers having to travel from one community to the other. There are no slums in the Netherlands, so we expect that differences between Dutch robbers and robbers who were born abroad stem from their familiarity with the country, rather than from racial differences.

As an approximation to familiarity with the Netherlands we used the country of birth. The Netherlands have some large ethnic communities. In the 1970s and 1980s many people from the former colonies the Dutch Antilles and Surinam emigrated to the Netherlands. A decade earlier many came from both Turkey and Northern Africa (especially Morocco) to work here.

Robbery Characteristics

In the present study the number of robbers varied between one and seven for each robbery. Robberies with more than four robbers, however, were quite rare. Therefore we recorded all larger groups of robbers to the category four or more.

Robbers use all kinds of means of disguise. No disguise is unprofessional, but too much disguise (such as balaclavas) attracts attention during flight. Experience shows that some simple means, as for instance a combination of baseball caps, sunglasses, and a false moustache, are quite effective in preventing recognition, both by witnesses (Penrod and Cutler 1995) and by cameras in the targets. We estimated the percentage of the face and hair of each robber that was covered by disguise using statements of eyewitnesses to the robbery. This estimation is fully explained elsewhere (Van Koppen and Lochun 1997).

We also divided the weapons used into five categories. Some robbers go into the target without the benefit of any weapon. The most common are real guns and knives. But a distinct number of robbers use imitation guns (toy guns etc.), alarm guns and air guns. All others we put into the category 'Diverse weapons'. Most of the weapons in that category were explosive devices – in this study all imitation – but also included baseball bats, etc. One robber in this study even committed a robbery using a bottle of 4711 Eau de Cologne to imitate a weapon.

As mode of transportation we took the transportation used by the robbers to go to the site of the robbery. Some robbers are caught during or right after the robbery, so their escape plans are unknown. Of those we know, however, almost all used the same mode of getaway transport as for arriving.

The Site of the Robbery

The Netherlands are a densely populated country (452 inhabitants/km²; 1171 inhabitants/sq. mile). We assumed that commercial targets are evenly distributed

over the country, but are more dense in populated parts. We divided the country into the five districts of the five appellate courts. The districts of Leeuwarden and Arnhem are the most rural (respectively 193 and 322 inhabitants/km²), while the districts of The Hague and Amsterdam cover the densely populated west of the country (respectively 792 and 874 per km²). The district of 's-Hertogenbosch has an intermediate position (476 per km²). Dividing the country into only five areas may seem a bit crude, but analyses using the 12 provinces or the 25 police districts did not produce any different conclusions.

The variable type of target could have been divided into more categories. Preliminary analyses showed that robberies of banks and post offices hardly differ – at least in the Netherlands. The category for catering includes some hotels, restaurants and a brothel, but most catering targets were either cafeterias or cafes. The category for shops include all kinds of shops, among which tobacco and fashion shops are the most popular. There were no robberies of jewellers in the study.

Results

Travel Distance

The robbers differed considerably in the distance travelled. One robber robbed the shop across the street from his house, but robberies were also committed more than 200 km from home. The longest trip was 267.4 km (166.2 miles). The distribution of the distance between residence and target was heavily skewed: although the mean distance was 19.2 km (sd = 37.5; N = 876), the median was 3.5 km (see Figure 5.1 above).

When considering the distribution in Figure 5.1, we decided to divide the distances travelled into five distinct categories: less than 2 km (N = 270), from 2 to 6 km (the distance one can walk in an hour; N = 255), from 6 to 20 km (the distance one can ride on a bicycle in an hour; N = 154), 20–60 km (the distance one can drive in a car in an hour in traffic; N = 115), and everything above 60 km (N = 82).

Drug users travel less than non-addicts, multi-users especially stay close to home (see Table 5.2). Travel patterns differed depending on the country of birth. Robbers born in Turkey, in other European countries (outside the Netherlands), and in the category 'elsewhere' stayed close to home compared to native Dutchmen. Contrary to expectations, however, robbers from the Dutch Antilles and Surinam committed more robberies a little further away from home, while a group of both Turks and other Europeans fell into the highest category.

The Robbery

As predicted, single robbers stayed close to home. Those who committed robberies in pairs travelled further, and trios travelled even further. Robbers who operated in

Table 5.2 Distance travelled by robbers for each robbery⁸

	<i>Distance between home and target in km</i>					<i>N</i>
	<i><2</i>	<i>2-6</i>	<i>6-20</i>	<i>20-60</i>	<i>>60</i>	
Use of drugs ($\chi^2=33,55835$, $df=8$, $p<0.001$)						
No drugs	28	31	20	11	10	503
Drug user	33	25	14	21	7	198
Multi user	54	42	0	4	0	26
Country of birth ($\chi^2=72,56127$, $df=20$, $p<0.001$)						
Netherlands	29	30	15	18	8	352
Rest of Europe	49	18	3	15	15	33
Dutch Antilles, Surinam	27	30	23	9	9	344
Northern Africa	28	25	18	21	9	57
Turkey	46	18	4	4	29	28
Elsewhere	46	33	5	7	10	61
Number of robbers ($\chi^2=51,33511$ $df=12$, $p<0.001$)						
Single robber	48	20	11	17	4	119
Two	24	30	20	17	9	327
Three	28	34	14	9	15	212
Four or more	35	28	21	9	7	218
Moment decided to commit robbery ($\chi^2=3,63974$, $df=4$, ns)						
Day of robbery	34	24	19	13	10	302
Prior to day of robbery	28	27	17	15	13	196
Preparations for robbery ($\chi^2=8,98177$, $df=8$, ns)						
No preparations	27	27	17	15	13	242
Already familiar with target	33	28	21	12	6	162
Special preparations	33	25	16	15	12	274
Division of tasks during robbery ($\chi^2=36,32858$, $df=8$, $p<0.001$)						
No division	38	32	16	8	6	124
Division	26	30	19	13	11	631
Single robber	48	20	11	17	4	119
Mode of transport to robbery site ($\chi^2=101,82648$, $df=16$, $p<0.001$)						
Car	19	27	20	20	15	411
Motorcycle	52	24	12	4	8	25
Bicycle	47	31	10	11	2	94
Walking	42	30	19	5	5	230
Public transport, taxi	12	24	32	24	8	25

Table 5.2 continued

	Distance between home and target in km					N
	<2	2-6	6-20	20-60	>60	
Level of disguise ($\chi^2=17,60351$, $df=12$, n.s)						
No disguise	32	23	16	17	13	151
<50% face covered	27	32	24	13	4	136
50-80% face covered	29	36	12	16	7	89
>80% face covered	32	27	20	14	7	222
Weapon used ($\chi^2=39,04078$, $df=16$, $p<0.001$)						
No weapon	37	33	17	9	4	46
Various weapons	34	28	15	16	7	98
Knife	45	25	14	12	4	153
Alarm gun, air gun	34	26	32	3	5	38
Revolvers and other heavy guns	26	30	18	14	12	530
Type of target ($\chi^2=111,16609$ $df=20$, $p<0.001$)						
Bank, post office	18	25	16	20	21	223
Catering	29	37	20	7	7	217
Shops	38	30	19	9	5	240
Petrol station	50	19	9	18	5	80
Company office	18	38	21	21	3	34
Other targets	39	23	18	15	5	82
Security in target ($\chi^2=32,73722$, $df=4$, $p<0.001$)						
No	37	41	14	7	2	132
Yes	27	26	17	16	15	420
Counter in target ($\chi^2=55,57647$, $df=8$, $p<0.001$)						
No counter	22	28	24	15	11	46
Open counter	35	31	17	11	6	572
Counter enclosed with security glass	18	26	17	19	20	202
District of robbery ($\chi^2=106,24237$, $df=16$, $p<0.001$)						
Leeuwarden	26	19	9	7	40	43
Arnhem	40	4	19	21	17	53
Amsterdam	32	32	16	15	6	263
The Hague	30	34	22	10	4	366
's Hertogenbosch	30	24	13	17	17	151

‡ 876 units of analysis; cell entries are percentages of row total; italic type = observed frequency higher than expected frequency.

larger groups, however, stayed closer to home (see Table 5.2). This suggests that, as hypothesized, the more professional the robber the further he/she travels.

A number of other variables were also used as indicators of professionalism. For most of these variables we found that the less professional, the closer to home the robberies are committed. Robbers who committed the robbery within a day of making the decision, stayed close to home. Robbers who robbed familiar targets (and took the risk that the victims would be familiar with them too) stayed very close to home. Robbers who robbed without a division of tasks and the single robbers stayed closer to home than the robbers who divided tasks. The heavier the weapons used, the further robbers travelled. Robbers travelled further for targets with security measures (see Table 5.2).

The mode of transportation shows that distant robberies are done almost exclusively by car (see Table 5.2). That is not a surprising result. One would, however, expect that the slower the mode of transport, the closer to home the robbery would be committed. That was not the case. First, robberies on motorcycles (both the heavier type and the light motorcycle known in the Netherlands as a *brommer*) are mainly used close to home. A post-hoc explanation might be that robbers use motorbikes not just to overcome the distance to the target, but also choose a motorbike for a robbery to get away fast even in heavy traffic. Secondly, we found that robberies done on foot are committed further away than robberies on bicycle. Probably, this counter-intuitive result is caused by the manner in which we gathered the data. In some cases we took witness statements as source. In some cases witnesses may have reported that the robbers were on foot, while in reality the robbers came with a car that they parked around the corner.

The Target

As expected, the more difficult a target is to rob, the longer trips the robbers travel. Banks were on the one extreme, petrol stations on the other (see Table 5.2). The same pattern was shown by the presence and absence of security: longer trips were taken to rob targets with security. The same was found for the counter variable: targets with a counter (usually shops and cafes) were robbed close by, target with counter with security glass (usually banks, post offices and some petrol stations) were robbed far away, and targets without a counter (usually offices and companies) were in between.

The trip travelled was also related to the density of targets. We took the population density as an approximation of the density of targets. In the most rural district, Leeuwarden, the longest trips were taken; in the most densely populated district, Amsterdam, the shortest. The others are in between in sequence of the population density.

Table 5.3 Parameters of robber and robbery characteristics in HOMALS result[§]

Categories in HOMALS analysis	Units of analysis	Dimension 1	Dimension 2
Travel distance <2 km	270	-0.22	-0.54
District: Amsterdam (urban)	802	-0.58	-0.58
Weapon knife	162	-0.80	-1.03
Target shop	260	-0.73	-0.30
Other targets	89	0.02	-0.85
Walking	254	-0.80	-0.17
Born in North Africa	61	-0.10	-0.25
Travel distance 2–20 km	409	-0.31	0.25
The Hague district (mostly urban)	388	-0.41	0.61
Weapon real gun	579	0.19	0.40
Weapon bomb, etc.	102	0.01	0.35
Target catering	240	-0.54	0.58
Target company office	40	-0.06	0.03
Born in Surinam or Dutch Antilles	350	-0.85	0.19
Travel distance 20–60 km	115	0.67	-0.19
Arnhem district (medium rural)	54	1.08	-0.91
's-Hertogenbosch district (medium rural)	159	1.16	-0.47
Bicycle	101	0.82	-0.17
Born in the Netherlands	856	0.81	-0.42
Travel distance >60 km	82	1.87	0.78
Leeuwarden district (rural)	45	1.18	1.01
Target bank, post office	237	0.99	0.53
Not grouped near categories of distance (and not depicted in Figure 2)			
No weapon	54	-1.54	-0.68
Weapon starting pistol, etc.	40	0.05	-1.52
Born in rest of Europe	52	0.22	0.07
Born in Turkey	28	1.91	-0.35
Born elsewhere	62	-0.65	1.78
Target petrol station	82	0.78	-1.41
Car	442	0.49	0.18
Motorbike	26	1.32	-1.14
Public transport	29	-0.94	0.28

[§] Rows are ordered according to groupings in Figure 5.2.

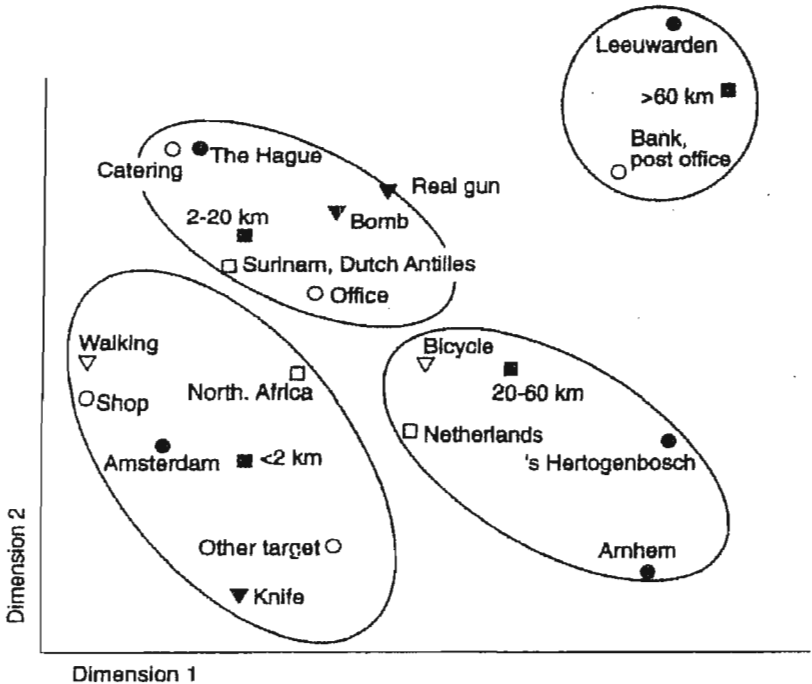


Figure 5.2 Final HOMALS solution in two dimensions

Data Reduction

The data were analysed using HOMALS (Gifi 1983). HOMALS is a homogeneity analysis by means of alternating least squares. In consecutive steps, we eliminated the variables which proved redundant, leaving the variables mentioned in Table 5.3. In this process we collapsed two categories of the dependent variable, the length of the trip, namely 2–6 km and 6–20 km, because these consistently stayed very close together in the analyses.

In the final analysis (see Table 5.3 and Figure 5.2) robberies in the most rural district, Leeuwarden, and robberies on banks came together with the longest trips, above 60 km, namely 2–6 km and 6–20 km, because these consistently stayed very close together in the analyses.

The shortest trips, less than 2 km, were related to robberies in the most densely populated district, Amsterdam, committed on shops and the other category of targets, using a knife, robberies done by North Africans, and in which the robbers came on foot. In between are two distinct groups of characteristics which come together. One was around the 2–20 km category, into which robberies in offices and catering

fall, robberies in The Hague district, robberies committed by people from the Dutch Antilles and Surinam, robberies with heavy guns and the other category of:

From One Robbery to the Next

We hypothesized that robbers would learn from their robberies and as they become more professional, would travel further with each robbery. This was not supported in the present study: there were 127 individuals who were convicted of more than one robbery in 1992. Ignoring each first robbery, they together produced 364 units of analysis. Of these robberies 54 (15 per cent) had the same trip distance as the previous robbery, 153 (42 per cent) were closer to home, and 157 (43 per cent) further away from home. These frequencies suggest that in the limited series of robberies in this study there is no tendency to commit each consecutive robbery either closer to or further away from the robbers' residences.

This is further supported by the distribution of individual trips to the site of the robbery. For each individual robber we determined the individual range of operation by simply taking the longest robbery trip. Next, we converted the length of each trip to a percentage of the robber's individual range of operation. Ignoring the longest trip of each robber, percentages resulted which were evenly distributed between 0 and 100 per cent (mean=46.94; modus=46.98; sd=32.8; N=283). This distribution shows that, although Figure 5.1 seems to suggest the contrary, there is no individual distance decay. Rather, the robberies of each robber are dispersed almost randomly within each individual range of operation. The distribution depicted in Figure 5.1, then, stems from each robber, percentages resulted which were evenly distributed between 0 and 100 per cent (mean=46.94; modus=46.98; sd=32.8; N=283). This

Table 5.4 **Relation between robbery loot in successful robberies and distance travelled[§] (738 units of analysis)**

<i>Distance travelled</i>	<i>Units of analysis</i>	<i>Index loot^{§§}</i>
Less than 2 km	234	100
2–6 km	212	160
6–20 km	132	233
20–60 km	94	1183
More than 60 km	66	1639

[§] $F(4,733)=4.73$, $p<0.001$; computed on common logarithm of loot, because of skewedness of variable.

^{§§} For security reasons, the Ministry of Justice does not allow us to publish the actual value of the loot. Therefore we present an index figure, with the mean loot in category 'less than 2 km' set to 100.

distribution shows that, although Figure 5.1 seems to suggest the contrary, there is no individual distance decay. Rather, the robberies of each robber are dispersed almost randomly within each individual range of operation. The distribution depicted in Figure 5.1, then, stems from the aggregation of trips made by robbers with different individual ranges of operation (see Van Koppen and De Keijser, 1997 for an extensive discussion of this issue).

For each individual robber we computed the distance to the robbery performed closest to home and the one furthest away. Robberies committed closer to home than the middle between these two distances were compared to the other robberies. These two groups of robberies differed only on two variables significantly (the type of weapon used and on the target), again suggesting that individual robbers do not tend to travel further for certain kinds of robberies and stay closer to home for others.

Discussion

In the present study strong support was found for the distance-decay function: the further from the criminal's residence, the fewer the crimes committed. Half the robberies were committed within 3.5 km of the robber's home. In that sense the results of this study do not deviate from earlier studies (Capone and Nichols 1976; Phillips 1980).

The distance travelled from home to the robbery site is related to characteristics of the robberies, characteristics of the robbers, and characteristics of the targets. In general robbers travel further if they perform more professional robberies. The results support the hypothesis that criminals in committing robberies combine effort minimization and opportunity maximization (Harries 1980): they do not travel far, unless there is an incentive to do so. The most important incentive to travel far for a robbery seems to be, following the well-known robber Willie Sutton, because 'That's where they keep the money' (Sutton 1976). Indeed, the data in the present study partly show that money is the incentive. We were able to assess the relationship between distance travelled and success of the robbery. Of course none of the robbers was robberies above 60 km is more than 16 times the average loot of robberies closer than 2 km to the robbers' residences.

Again, as with other variables in this study, the causal relation is not clear here. We do not know whether robbers organize themselves more to commit a far away but lucrative robbery or that only the more professional kinds of robbers are able to leave known territories to attack profitable targets.

Only studies which give insight into the decision processes of robbers may produce insight into the causal relations involved in committing robberies. Studies in which robbers are interviewed afterwards can only in part shed light on causal relations, because afterwards robbers tend to give a much more rational and balanced account of their decision making than actually took place (Conklin 1972; Haran and Martin 1984; Katz 1991; Kroese and Staring 1993). Probably the only way to

discover the causal relations governing target choice and travel distance of robberies is by participatory observation, and that may have some ethical problems.

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