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Chapter 17

Fine-Tuning Geographical Profiling

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Summary

Geographical profiling is an investigative technique that analyzes the spatial pattern of a related series of crime locations in order to predict the location of the offender's residence. After explaining how today's geographical profiling works, it is argued that such profiling may be improved if characteristics of the offense, the offender, and geographical circumstances are taken into account. Following that, we discuss the theoretical and practical limitations of geographical profiling.

Introduction

Most offenders undertake just a relatively short journey to the site of their crime. It appears that many types of crimes—such as stranger rape, robbery, burglary, and even serial murder—are committed at places where the routine of their lives brings the offenders *(1–3)*, usually in the vicinity of their residences *(4, p. 430, 5–10)*.

If the crime sites are related to the locations of the homes of the offenders, the crime site locations can be used to predict where the offender lives. With one or two crime sites from the same offender, this probably will not be a very successful enterprise. But with a larger number of crime sites, predictions can be expected to become better and better. Making such predictions is called geographical profiling.

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Geographical profiling is an investigative technique that analyzes the spatial pattern of a related series of crime locations in order to predict the location of the offender's residence *(11,12)*. Geographical profiling has the ring of being very successful, but no study to date demonstrates that it is successful in helping the police investigation in more than just a small percentage of cases *(13)*. Canter blames the limits of the effectiveness of geographical profiling to many sources of error and noise in the data that the police supplies and the profiler uses *(13, p. 665)*. Poor performance of geographical profiling may, however, be partly due to the fact that profilers tend to neglect what we know about offenders' target choices and crime behavior *(14)* and just focus on the crime locations without taking into account the geographical context, the type of crime and the type of offender.

In this chapter, we discuss the methodology of geographical profiling, we identify where problems can be encountered, and we make suggestions on how geographical profiling may be improved. We will try to convince the reader that geographical profiling can indeed be improved if more is understood of offenders' journeys to their crimes and their decision making and if crime scene and offender characteristics can be associated with their crime site choices.

Geographical Profiling With Little Theory

In cases of domestic violence, predicting the home location of the offender is a straightforward and unproblematic task. In other crimes, the location of the offense is wholly dependent on the location of the victim, as for instance the stalking of a famous actress. In such a case, geographical profiling is impossible. Many types of crimes, however, are directed at potential targets that are more or less distributed randomly in space, where the crime involves a journey by the offender and that journey depends on both the location of the crime target and the location of the offender's home. For these types of crimes the journey to and from the crime is an integral part of the offense. Examples of that type of crime may be domestic burglary, stranger rape, or commercial robberies.

Let us assume that we have identified a series of such crimes, say robberies, of which we are pretty sure that these have been committed by the same single offender; maybe because witnesses of various crimes give comparable offender descriptions *(15)* or the *modus operandi* is peculiar and the same for each crime. We do not know how long the series has to be before we can start making a profile. Rossmo *(11,12)* argues that a series of at least five crimes is necessary, but that figure seems to be based more on the needs of police investigators than on theoretical or practical criteria *(16, p. 657)*. It can be argued that even with fewer crimes, geographical profiling can be useful

(13,16,17). So, let us stay on the safe side and take as an example a series of eight crimes from the type commercial robbery.

We know that most offenders stay close to home. So, a method of profiling could be computing the geographical average or centroid of the eight crime sites. The geographical average in a two-dimensional space is computed by taking the mean of the *Y*-values and the mean of the *X*-values of the crime sites. Although this procedure is seemingly without any sophisticated theory, it appears to be rather accurate *(18)*. At the same time, the use of this method implicitly introduces some assumptions about spatial behavior of offenders. For instance, it is assumed that the offender lives somewhere in the area defined by the cloud of point of the eight crime sites. That involves another assumption that the offender randomly chooses a direction of the wind to go to a crime site and that he (all our offenders are male) travels roughly the same distance to each crime site.

The simple methodology of the centroid could be refined to some extent. Next to the geographical mean one could, for instance, use the median. That is, the middle value of the distribution of the *X*-coordinates and *Y*-coordinates. Compared to the centroid, the median is less sensitive to extreme values; less sensitive to these one or two faraway crime sites, the offender may have chosen without any particular reason or because there happened to be a very attractive target.

Another measure is even simpler: the center of the circle. That is, the midpoint of a circle with the distance between the two offenses most distant from one another. In fact, some theory is introduced here. Canter and Larkin *(19)* proposed the circle theory of environmental range. Apart from the assumption that there is a relationship between the crime sites and the residence of the offender, they introduced two additional assumptions. First, there must be evidence that the offender is operating from a fixed home base, that is, the offender is not a drifter. Second, that it is appropriate to apply a geographical model that is as simple as possible. That model would be the domo-centricity assumption, where the residence of the offender is predicted to be in the middle of the circle *(20,21)*.

We could introduce some more theory, by adding the generally accepted notion in criminology that most criminals try to offend with as little effort as possible *(22)*, the so-called least-effort principle *(23)*. Using that, one could predict that for our eight robberies, the robber lives in an area around the spot that has the lowest total distance to the eight crime sites, the so-called center of minimum distance. In other words, it is the location from which it takes the least combined time and effort to travel to all the eight crime sites. It is not possible to directly compute that spot. An iterative computation is necessary and with eight crime sites that iteration is so complex that a computer is needed.

It goes for all the methods discussed that, after that spot is computed, the profiler needs to determine how large the area around that spot has to be to have an acceptable probability that the offender lives there. We do not know of a method to compute the magnitude of that area, based on the desired probability that the offender lives there [but see *(11)*].

Distance Decay

More refined methods of profiling are based on some version of the so-called distance-decay function [see for an overview of the techniques used in geographical profiling *(24,25)*]. If travel patterns of offenders are studied, typically this distance-decay function emerges (Figure 1). This function shows that most offenders commit their crimes at locations a relatively short distance from their residences; the farther away from home, the fewer crimes are committed. However, only few crimes are committed in the area immediately around the offender's residence *(5,26,27)*. This zone with few offenses is called the buffer zone.

An explanation of the occurrence of the distance-decay function is given in the rational choice theory *(3,28)* and closely resembles the least-effort principle. The economist Becker *(28)* argued that offenders, like other people, base their decisions on a cost and reward analysis. All else being equal, the option will be chosen that is associated with the least effort and costs and that renders the most profit *(29–33)*. Because the chances and the costs of being caught in a

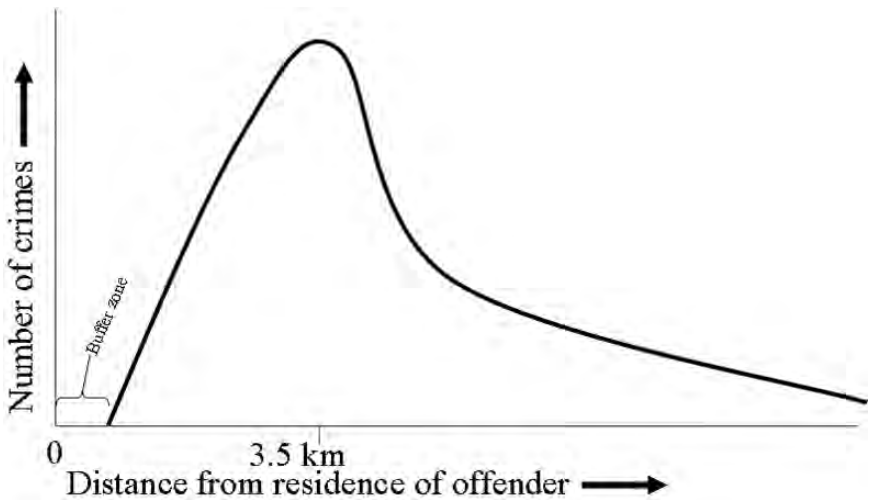

Fig. 1. Distance-decay function.

familiar area are high, offenders seem to have a buffer zone. In this way, a distance-decay function emerges, indicating that the area immediately around the offender's residence is associated with low traveling costs but higher costs of getting caught. The areas far away, however, are associated with higher traveling costs but lower costs of getting recognized and caught. An optimum will be found at or around the top of the function where there is a balance between costs of traveling and getting caught. For commercial robberies in the Netherlands, for instance, this top is 3.5 km from the residence of the offender *(5)*.

The distance-decay function is well established as an aggregate description of travel behavior of offenders, although the shape varies depending on the type of crime or type of offender. The existence of the buffer zone, however, is under discussion. There is little agreement on how the buffer zone should be defined or how it should be measured *(16)*. Indeed, in some studies, no buffer zone is found *(34,35)*. If geographical profiling is done with the assumption of a buffer zone, it is not more accurate *(36)* or even less accurate than that without the assumption of a buffer zone *(37)*.

With or without a buffer zone, the distance-decay function is usually explained using offenders' knowledge of costs and benefits. In reality, however, offenders do not know the real costs, efforts, and profits of the different options, and their decisions are far less rational than is commonly assumed. Rather, their decision making is based on the perceived costs and efforts and the expected profits. This adapted model, called the bounded rational choice model *(38,39)*, proposes that possible crime locations close to an offender's residence will probably be avoided because of the higher perceived risk of apprehension. Furthermore, possible offense locations very far from home will often be avoided because the perceived costs of traveling are too high, when alternatives closer to home can be found. If, however, faraway targets are very promising, a longer journey is undertaken *(5)*.

Geographical Profiling With More Theory

The distance-decay function is used in computer programs that have been developed to aid geographical profiling, such as David Canter's DRAGNET *(37)*, Kim Rossmo's RIGEL *(11)*, and CrimeStat by Ned Levine *(24,40)*. At least they come close. In reality, Canter's DRAGNET uses a negative exponential function that resembles the linear distance-decay function but differs from it in the sense that the probability of an offender living at a particular location decreases exponentially, instead of linearly. Also, Canter's program does not include a buffer zone. The functions used in Rossmo's program resembles a truncated negative

exponential function that is a mix of a positive linear function and, after a peak at some distance, a second negative exponential function. Both the programs draw a probability function around each crime site and sum, for each point (or cell) in space, the values of the functions derived from each crime site. In that manner, each point gets a probability value for being the offender's residence.

However, the distance-decay function is not without limitations. For example, Van Koppen and De Keijser *(41)* demonstrated that the distance-decay function may be an aggregation artifact. They started from a simple model, where each offender has a range of operation around his residence. That range of operation can be depicted as a circle in a two-dimensional space. Not each offender has the same range of operation. Assume that all offenders attach at random places in their respective ranges of operations. If offenders who are in the habit of committing a particular type of crime indeed have different ranges of operation, automatically, a distance-decay function emerges at the aggregate level. This is so, because at relatively close distance, all or most of the offenders contribute to the distribution depicted in the curve, whereas the farther from home, the lesser offenders contribute to the curve [this is more fully explained in *(41)*]. So, an aggregate distance-decay function does not reflect that individual offenders also have as a distance-decay function.

An individual range of operation would mean that, within that range, each potential target has an equal probability to be targeted by that offender. If Van Koppen and De Keijser *(41)* are right [see for a critique *(4)*], the distance-decay function is not necessarily useless. In fact, then the distance-decay function is a function of the distribution of ranges of operation of the offenders. It could still be used for geographical profiling if nothing is known about the range of operation of a particular type of offender under investigation.

The concept of range of operation, however, could be useful to do geographical profiling in another manner in computer programs as in Dragnet and Rigel. Take, again, as a starting point, the eight robberies of our offender under investigation. One could draw circles around the crime sites with a randomly chosen but equal diameter. Then increase or decrease the diameter of all circles such that all just overlap at a single point or, if that is not viable, with an area as small as possible. That would deliver a prediction of the offender's residence. As a next step, the diameter of all circles could be increased to enlarge the search area for the offender's residence. Of course there is a trade off. A large area gives a higher probability that indeed the offender resides in the area, but the potential suspects also increase in number. But, again, there is no rule to decide how large this area should be.

We would like to propose that this method may produce better results, but without empirical validation, it is merely a hopeful contention. Please

note that Canter *(13)* pointed out that all current methods produce similar results *(11,24,37,40)*. So probably any new method will not perform completely different or much better.

All methods discussed until now assume that potential crime targets are distributed randomly in space. Of course this is unrealistic. For instance, targets for commercial robberies in European cities are far more readily available in the city center and along main streets. Targets for stranger rapes at night are more available around entertainment areas. Also, all methods discussed until now assume that all directions from the offender's residence have an equal opportunity to be chosen. And, again, this is unrealistic. Criminal travel behavior is influenced by geographical characteristics, such as seas, lakes, rivers, and main roads *(42,43)*. Travel behavior is also influenced by social boundaries between neighborhoods *(44)*. More general, search patterns of offenders are usually not normally or uniformly distributed *(45)*. Instead, criminal trips appear to be determined by routine activity, availability of targets, and geographical and social conditions. Present day methods of geographical profiling do not incorporate these peculiarities and even seem to ignore them.

The Offender's Routine Activity

People know best the environment around the place where they live, the places they visit often, and the routes between them, like their commute to their work place and its surrounding area. They organize the knowledge of their environment around these anchor points *(46)*, also named activity nodes *(47,48)*. Brantingham and Brantingham *(47–50)* assume that offenders search their targets in their activity space that is defined by their activity nodes and the paths connecting them. Indeed, crime trips into unknown territories to locate crime sites are relatively rare *(51)*. This contention is based on the so-called routine activity model *(1,2,52,53)*. In this model, "opportunity" is an important concept to explain criminal behavior. Offenses occur as a result of the convergence in space and time of three important elements: a motivated offender, a suitable and vulnerable target, and the absence of a capable guardian against crime *(52)*. In the words of Brantingham and Brantingham *(48, p. 284)*:

> The patterns in crime are potentially explicable when the decision process that is crucial to its commission is viewed in conjunction with the actual activity backcloth of offenders and victims, together with general variation in criminal motivation that are themselves not independent of the opportunity backcloth. In some types of offences triggering events dominate crime patterning. For other types of crimes, past behavioral history, the actual availability of

suitable targets, the creation of a decision template and the current activities of potential offenders drive the pattern.

In current models of geographical profiling such decision processes hardly have a place. As a consequence, many relevant factors that play a role in the offenders' spatial behavior are not used to aid profiling. The distance traveled, for instance, varies with characteristics of the offender, such as gender *(27)*, race *(35,54–56)*, intelligence *(6)*, and age *(6,26,29,54)*. Nichols *(54)*, for instance, found that the average distance traveled by older robbers was 4.98 miles while by younger robbers it was 2.02 miles. Whites travel farther (6.67 miles) than Blacks (2.29 miles). Also, the type of crime matters. Offenders travel farther for property crimes than for crimes against people *(5,8,29,57,58)*. Robbers of commercial targets, for instance, travel farther than other kinds of criminals *(32,42)*.

Even within types of crimes, relevant differences are found in crime trips. Robbers travel further for a target with a potentially big loot *(5,9)*. Sexually sadistic rapists may show excessive driving before they commit their rape *(59)*. And circumstances matter. Robbers travel farther when their mode of transportation is faster, and they travel farther in rural areas *(5)*.

Even the country matters. Lundrigan and Canter *(60)* demonstrated that American serial murders travel farther—both for their encounters with the victims as for dumping the bodies—than serial murderers in the United Kingdom [see also *(11,20)*]. Also the day of the week makes a difference; weekend rapists travel farther than weekday rapists *(56)*.

Although most of the studies mentioned were done on aggregate data, their results are relevant to geographical profiling. If, for instance, the police know that a commercial robbery was committed by an older White offender in a rural area using a car and the robbery generated a big loot, a longer trip can be assumed than if the crime was a rape committed by a Black youngster on foot in an urban area. Incorporating these elements in models of geographical profiling might enhance their utility considerably.

Geographical Profiling Without Computing

Geographical profiling is typically done with a computer program, because some methods involve heavy computing *(11,24,37,40)*. It is a fair question whether all this computing is necessary *(61,62)*. Snook and colleagues *(25)* compared the accuracy in predicting the offenders' residences, between complex and less complex methods of profiling. They defined the complexity of profiling methods as the number of mathematical steps (such as adding or dividing) it takes to complete the profile. They found that the more simple

methods where as accurate in predicting the location of offenders' residences as the more complex ones, regardless of the number of crimes in a series.

If simple methods would do for profiling, that leads to a second question: Is all that computing really necessary? Again Snook, with other colleagues *(18)*, tried to answer this question. They compared the accuracy of human and computer-based geographical profiling. Participants were given ten displays, each depicting three crime locations of a real serial killer. The participants were given a written description of two basic geographical profiling principles: (i) the majority of offenders commit offenses close to their residences (distance decay) and (ii) the majority of offenders' residences can be located within a circle with its diameter defined by the distance between the offenders' two farthermost crimes [matching Canter and Larkin's circle hypothesis *(19)*]. Participants who were given these instructions were better in predicting the murderers' residences than participants who were not instructed. More importantly, instructed participants performed as well as the geographical profiling system DRAGNET.

Two Types of Criminals

The study by Snook and colleagues *(18)* did not produce uniform results for the ten series of serial murders. Participants performed well for five series. Those were the series where the murderer lived within the area of the crime sites. In the other five series, both Snook's participants and DRAGNET performed much poorer. These were the series where the offender commuted to the area of the murders. Canter and Larkin *(19)* made a distinction between marauders and commuters. These two types of offenders differ in the sense that marauders live within their criminal range, whereas commuters travel to their criminal range from elsewhere. The criminal range is the general area where the crimes are committed; or more precisely defined, following Canter and Larkin, the area defined by the smallest circle that encompasses all crime sites of a particular offender. Then, marauders are the offenders who have their residence in that circle; commuters are the offenders who travel from their residence outside their criminal range. Contrary to marauders, there is no evident relationship between the place of residence and the criminal range for commuters. As a consequence, geographical profiling is not possible for these commuting offenders. Studies showed that between 11 and 14% of serial murderers are commuters *(60)*. But it is a fair assumption that for other types of crime, the percentage of commuters may be much higher. Kocsis and Irwin *(34)*, for instance, found that 18% of arsonist were commuters, but also 29% of serial rapists, and even 52% of burglars were of the commuting kind. Van der Kemp, in an as of yet unpublished study, also found a 50-50% division of marauders

and commuters for serial property crime offenders in the Hague area in the Netherlands as did Kocsis et al. *(63)*.

Geographical profiling, with any of the current methods, is only possible for marauders and not for commuters (Rossmo denotes these categories local hunters and poachers, respectively) *(11,12)*. An important issue, then, is how one can tell in which of the two categories a serial offender falls, based on the series of unsolved crimes. The answer is simple: we cannot with any decent probability. Rossmo *(11)* writes that before one begins to make a profile, it should be established whether the offender is a local hunter. He does not give an indication how one should make this distinction.**

Meaney *(64)* tried to identify offenders' and offense characteristics that could aid in distinguishing between marauders and commuters. Most of these characteristics, such as age, gender, nationality, and alcohol intoxication, could not be used for this purpose. Meaney did find that offenders in metropolitan areas are more likely to be a marauder, whereas rural offenders tend to be commuters. Another result of her study was that burglars were more often commuters than non-burglars, whereas serial rapists were more likely to be a marauder compared to non-rapists *(64)*. The practical value of Meaney's findings is limited, because the relationships she found are not very strong, and her study did not involve many characteristics that are usually known in a police investigation before the offender is captured. In short, there is really no way it can be decided by looking at a series of offenses whether the offender is a marauder or a commuter (see also *(13,16)*].

Practical Problems

Apart from the marauder-versus-commuter problem, other practical problems emerge if geographical profiling is done in police practice. Rossmo *(11,12)* identified at least four assumptions that precede the application of geographical profiling. First, the crimes must be a series. Second, the offender must not have moved in the middle of the series. Third, the offender is not a commuter (a poacher in Rossmo's terms) but a marauder (local hunter). Fourth, the target/victims should be distributed in some uniform manner in space. Rossmo is right, but there are more practical problems in geographical profiling. We divide these into offender problems and problems of circumstances.

** There is a document produced by Rossmo indicating poacher/commuter factors however this is neither published or empirically validated.

Deviant Offenders

The basis of geographical profiling is that offenders travel from the residence to the crime sites. But many offenders do not, for various reasons. First, some offenders do not have a steady place to live. These include itinerants and the homeless, but also groups of foreigners who travel around the country committing crimes. As soon as witness statements give some indication that the offender may be from these categories, any geographical profile is of very limited value. Second, in the discussion until now, we assumed that offenders start their crime trip from the place where they live. But offenders may have multiple places they start from, for instance, both their home and the place where they work. As a case illustration a few years ago, the second author had been working on a case of a serial robber in Amsterdam. Making a geographical profile seemed straightforward, but after the robber had been arrested—not with the help of the profile—it turned out that he was moving from hotel to hotel in the city, never staying long in a single one. Another case example relates to a prolific serial rapist who was active in Amsterdam. After his arrest, it turned out that he came to Yugoslavia and had done the same in both Yugoslavia and Germany. He committed the rapes in Amsterdam while staying with his aunt. These kinds of problems may be present in a minority of cases *(1*,*3*,*65)*, but they do make geographical profiling useless in these cases or even misleading.

A third problem applies to cases with multiple offenders. There is no empirical basis that allows for making a geographical profile for cases with multiple offenders. This point holds true even more for groups of offenders who commit crimes in varying subgroups. We simply do not know whether, for instance, a dominant member of the group determines the crime locations or that the effects of their places of residence is somehow pooled. The latter would imply a larger search area for crime target if the group members do not live close to each other.

A fourth problem is that some offenders have an atypical routine or that offenders suddenly deviate from their routine. An example of the latter is the following case. A few years ago, in a study on robberies (*66*, this case is not reported there), we came across a pair of robbers who had the habit of committing bank robberies in their home town Eindhoven in the south of the Netherlands. At some point in time, they suspected that the local police was on their heels. So they decided to change their work area to the very north of the country, rented a car, and found a suitable bank there. At their first robbery in the north, they were apprehended, thanks to an alert victim.

A fifth and final offender problem is *modus operandi*. Geographical profiling is done on a series of crimes by the same offender. So a prerequisite

is that we know that the series has been committed by the same individual. That is usually assessed by the police on the basis of the *modus operandi* or offender descriptions by witnesses or based on CCTV. In many cases, however, the police are not very certain about whether all crimes in a series came from the same offender. The *modus operandi* poses another problem: not all aspects of it are always clear cut. For instance, in the previous study on commercial robberies *(5)*, it was found that witnesses cannot always give information on the means of transportation that was used by the robbers. Sometimes witnesses report that the offender came on foot, whereas after apprehension, it turns out that he came by car but had parked it out of sight. Knowing the means of transportation, however, is important for geographical profiling. For commercial robberies in the Netherlands, 78% of the offenders who come on their bike traveled less than 6 km, whereas 55% of car driving offenders traveled more than 6 km *(5)*.

Deviating Circumstances

Geographical profiling is commonly based on the distance-decay function. The distance-decay function, however, is just an aggregated and crude image of criminal activities. For individual offenders and in the particular circumstances of the area of the crime sites, routine activities may deviate considerably along the following lines.

First, the local space is often disturbed by special geographical characteristics. Present day geographical profiling, however, assumes that these do not exist. Take for instance the waterfront of Brighton. It is impossible for a criminal to commit most types of crime at sea. That means that such a waterfront influences the spatial distribution of crimes. Another example is the difference between robberies in Rotterdam and Amsterdam *(67)*, which demonstrates that the pattern of streets influences robberies. Rotterdam was bombed by the Germans in the beginning of World War II. After the war, Rotterdam was rebuilt with wide streets. Amsterdam is still the old town with many narrow streets like Rotterdam used to be. The consequence is that commercial robberies in Amsterdam are committed much more in the vicinity of public transport lines, whereas Rotterdam features more robberies utilizing cars. As a consequence, not only the average distance between the residence of the offender and the crime site is much larger in Rotterdam than that in Amsterdam, but the two cities also have markedly different geographical distributions of robberies.

Second, geographical profiling assumes that potential crime targets are distributed randomly in space. But, of course, that is seldom the case. Again, commercial robbery targets are usually more frequent in the center of European cities. As a consequence, they attract more robberies. The areas of operation of

robbers therefore are often skewed towards the city center. But also more refined geographical elements may play a role. Hakim and colleagues *(68)*, for instance, demonstrated that, in residential burglary, the vicinity of an exit of a motorway may play a role, as well as whether woods and playgrounds are adjacent to the target house. The general problem is that there are no empirical studies of how potential targets are distributed in space, and there is no evidence demonstrating whether and how target backcloth influences travel behavior of offenders *(16)*.

Third, for some types of crime, one should not look at the place of the crime site. For stranger rape, for example, a relation can be expected between the residence of the offender and the place where he first "picked up" the victim. The actual place of the rape, however, is more determined by the travel direction of the victim and suitable places to rape her along her route. Thus, the place where the offender first encountered the victim is the one of interest. But that place is seldom precisely known. Also, police officers sometimes misidentify the exact place where a crime occurred. That is, errors in the information provided by police will introduce error in the process of geographical profiling *(13)*.

Fourth, profilers always look at the crimes that were committed. Bernasco *(69)* argued that it may be a useful strategy to include crimes not committed in the geographical analysis. He demonstrated that information on targets *not* selected can contribute to the quality of a profile. In the most simple version, if an offender must have passed an attractive target from the right kind that he did not attack before he came to the crime site where he committed his crime, he must have come from another direction. This manner of reasoning—or the much more sophisticated version by Bernasco—could contribute to geographical profiling, but only under a number of conditions. First, the profiler must be able to define and assess the potential targets in the relevant area. If these targets are moving—like potential rape victims or cars to be stolen—this is an impossible task. For some others, it may be possible but very costly, such as dwellings to be burgled. But for commercial robberies, this may be a desirable addition to geographical profiling, especially because robbers tend to specialize *(5)*. Second, one should be very well informed on what targets should and should not be included and, even better, be able to measure the attractiveness of target to offenders. Of course, target attractiveness may differ from offender to offender.

Conclusions

Geographical profiling can be a helpful tool for police detectives who investigate series of crimes that apparently have been committed by the same offender. Although we know little of the day-to-day use of geographical

profiling in police practice, it is assumed that geographical profiling is only helpful in a small percentage of cases *(13)*. Canter blames foremost the quality of the police data for this. But another cause may be that geographical profiling is still underdeveloped.

In our discussion, we have tried to demonstrate to the reader that geographical profiling can become more helpful to the police if more relevant variables are incorporated. One should not just use one of the computer programs—they produce similar results anyway—but one should at least incorporate in the analysis what is known about relevant characteristics of the offender, the type of crime, and the geography of criminal range and surroundings. Following the work by Snook and colleagues *(18)*, it may be a sound strategy to use a good map of the relevant area next to, or maybe even instead of, the computer program *(62)* (Chapter 10).

In this manner, geographical profiling may become more helpful to the police. But we do not expect that geographical profiling will become helpful in many cases. First, as previously outlined, there are serious practical problems. Second, several relevant factors can only be assumed at the time that a profile is made. The most important one is that a more or less large category of commuting criminals cannot be profiled. If a profile is made on these cases, it will be rather misleading than helpful. Geographical offender profiling should be fine-tuned in order not to lose its promising tone.

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