Crime Analyst's Research Digest

International Association of
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Serving the Crime Analysis Community Since 1990

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General Topics

Table of Contents

Introduction

Dear IACA Members,

Just in time for your summer reading, we are pleased to present the latest issue of the Crime Analyst's Research Digest. It's been over one year since the IACA Publications Committee produced the first issue of the digest, and this marks our fourth issue.

Included are summaries on topics such as:

- Clusters of burglaries in relation to the optimal foraging theory, which considers how offenders weigh rewards in relation to effort and potential risks of committing a crime.
- The deterrent effect of CCTV on criminal behavior from the offender's point of view.
- Social network analysis (SNA) as it relates to criminal and terrorist organizations. While many crime analysts focus on strategic and tactical analysis, this summary provides a good reminder that understanding how individuals are related is also an important aspect of crime analysis.
- Clusters of poverty and their effect on violent crime. While the authors developed several hypotheses about the relationship between poverty and crime, their findings showed no significant effect.

These are only four of the ten valuable articles that were summarized in this issue.

If you have ideas for future issue themes or summaries on particular topics, or if you have feedback on how you use the information that you read here, please e-mail us at publications@iaca.net. Enjoy the rest of your summer and the great contributions of the reviewers who helped to make this issue possible.

Tom Scholten
Editor, Crime Analyst's Research Digest
IACA Publications Committee

How Much Time Should the Police Spend at Crime Hot Spots? Answers from a Police Agency Directed Randomized Field Trial in Sacramento, California

Cody W. Telep, Renée J. Mitchell and David Weisburd

Summary by Cody W. Telep, George Mason University

Summary

A series of studies suggest the effectiveness of hot-spot policing, but gaps remain in understanding how, specifically, officers should apply increased attention to high-crime areas. This experiment in Sacramento, CA, tested Koper's (1995) recommendation that officers randomly rotate between hot spots, spending about fifteen minutes patrolling each one to maximize the deterrent effect. The results suggest significant overall declines in both calls for service and serious crime incidents in the treatment hot spots, relative to the controls. Additionally, the Sacramento Police Department conducted the study with no outside funding or overtime, suggesting that the implementation of evidence-based approaches without great added expense is possible.

Data and Methods

The study was a randomized, controlled trial comparing 21 treatment street-block hot spots to 21 control hot spots. The hot spots were paired based on similarity in appearance and prior crime, and randomized within each pair. During the intervention, officers were assigned from one to six hot spots in their patrol areas, and were given a random order in which to visit their hot spots. Officers were instructed to visit each hot spot for 12 to 16 minutes, and to try to treat each hot spot once every two hours during downtime between calls for service. Officers had no specific instructions on what to do while in the hot spots, but were given suggestions on proactive activities. The experiment ran daily from 9:00am until 1:00am for 90 days. During this time, control hot spots received standard police services. Paired t-tests and non-parametric Wilcoxon signed-rank tests were used to analyze the results.

Findings

Overall, the treatment group hot spots relative to control group hot spots had significantly fewer calls for service and Part I crime incidents in the 90-day intervention period, compared to the same time period for the previous year. The intervention did not have a significant impact on soft crime (i.e., disorder) incidents. Not every treatment group hot spot improved in terms of reduced Part I crime and calls for service, suggesting that a treatment relying primarily on increased presence may have been insufficient to address chronic problems in some hot spots. Still, the overall results suggest that increased police response in medium-length, randomly timed increments is an effective way to decrease both total calls for service and serious crime incidents.

For more information, see Telep, C. W., Mitchell, R. J., & Weisburd, D. (In press). How much time should the police spend at crime hot spots? Answers from a police agency directed randomized field trial in Sacramento, California. *Justice Quarterly*, 1-29. doi:10.1080/07418825.2012.710645, and Koper, C. (1995). Just enough police presence: Reducing crime and disorderly behavior by optimizing patrol time in crime hotspots. *Justice Quarterly, 12*(4), 649-672. doi:10.1080/07418829500096231

Foot Patrol in Violent Crime Hot Spots: The Longitudinal Impacts of Deterrence and Post-treatment Effects of Displacement

Evan T. Sorg, Cory P. Haberman, Jerry H. Ratcliffe and Elizabeth R. Groff

Summary by Evan T. Sorg, Temple University

Summary

This research examined the long-term impacts of the Philadelphia Foot Patrol Experiment and examined whether: (a) the foot patrols had lasting effects once the experiment ended, (b) the benefits of the foot patrols diminished over the course of the experiment, and (c) the displacement that was uncovered became a lasting problem after the experiment.

Methods

Since the foot patrol beats were introduced in two phases, each phase was analyzed separately. Violent crime counts were aggregated to two-week time blocks for a one-year pre-experiment period, the experimental period, and a three-month post-experiment period. The first analysis re-examined the benefits of the foot patrols during the experiment. The second analysis measured whether the impact of the foot patrols was diminishing during the experiment. The third analysis tested whether foot patrol had lasting benefits once the experiment ended. Multilevel growth curve models were used for these analyses.

Results

The first analysis reiterated that the foot patrols prevented crime. Phase 1 beats had 16% less crime than the controls, and the phase 2 beats had 20% less crime than the controls. The second analysis found that the benefits of the phase 1 beats (staffed for 22 weeks) were diminishing over the course of the experiment. This was not the case for the phase 2 beats (staffed for 12 weeks), which saw no decline in effect. The third analysis found that there were no lasting benefits once the experiment ended. The displacement analysis found that the areas surrounding the foot patrol locations did not experience lasting increases in crime. After the experiment, crime declined by 15 percent in the areas surrounding the foot patrol beats, while the foot patrol beat areas saw increases in crime.

Implications for Practice

Longer-term foot patrols may be somewhat inefficient. It may be beneficial to randomly rotate officers across different hot spots rather than staff them continuously. Since there were no program benefits after the experiment, this also suggests that targeted enforcement will not produce lasting crime reductions, and that more innovative, holistic strategies may be necessary. Results suggest that displaced offenders may have returned to the foot beats after the experiment ended; therefore, a focus on known criminals offending within hot spots may be beneficial.

For more information, see: Sorg, E.T., Haberman, C.P, Ratcliffe, J.H and Groff, E.R. (2013). Foot patrol in violent crime hot spots: Longitudinal impacts of deterrence and post treatment effects of displacement. *Criminology, 51*(1), 65-102. doi:10.1111/j.1745-9125.2012.00290.x

Exploratory Space-Time Analysis of Burglary Patterns

Sergio J. Rey, Elizabeth A. Mack and Julia Koschinsky

Summary by Gohar Petrossian, John Jay College of Criminal Justice

Summary

This study presents two new methods of crime analysis, which consider both the spatial and temporal dynamics of a criminal act. The study uses residential burglary data from Mesa, AZ, to demonstrate the utility of employing spatio-temporal analytical techniques in understanding crime patterns, as well as to highlight the importance of neighborhood context within which crime occurs.

Data and Methods

The study uses residential burglary data obtained from the Mesa Police Department for the period from October 2005 through December 2009. The data were geocoded and organized into 685 police reporting grid cells, which are based on the city's quarter-mile sections and used by the Mesa PD for operational purposes. Data on the count of residential units per grid cell were obtained from the Maricopa County Assessor's Office. Two new analytical methods are introduced to examine the spatial patterns of residential burglary, as well as their evolution over time. Both techniques are based on the Markov chain theory.

Results

The cells with burglaries occurring in the initial month had an estimated 0.435 probability of experiencing additional burglaries in the following months, while the probability for the cells with no burglaries in the initial month was 0.190. That is, the future burglary status of a grid cell was not independent of its state in the preceding period. When considering neighborhood context, the following patterns were found:

1. The odds of a cell that was free of burglaries experiencing a burglary in the next period were 2.7 times greater if that cell's neighbor experienced burglary in the first period
2. Burglary to burglary-free probability was 0.50
3. Remaining in burglary state probability was 2.2
4. Remaining free of burglaries probability was 0.4

All these patterns indicated negative consequences for cells neighboring those with burglaries. Moreover, cells that were in the burglary state with neighbors in the non-burglary state required, on average, 1.38 months to become burglary free, while those in burglary state with neighbors also in that state required, on average, 1.8 months to become burglary free. Lastly, the return time to the burglary state for cells surrounded by burglary was, on average, 3.4 months, while that for those surrounded with burglary-free neighborhoods was, on average, 8.4 months. In short, the transitions of a location into and out of the burglary state were highly dependent on the transitions experienced by its neighbors.

For more information, see Rey, S.J., Mack, E.A. & Koschinsky, J. (2012). Exploratory space-time analysis of burglary patterns. *Journal of Quantitative Criminology, 28*, 509-531. doi:10.1007/s10940-011-9151-9

Police-Monitored CCTV Cameras in Newark, NJ: A Quasi-Experimental Test of Crime Deterrence

Joel M. Caplan, Leslie W. Kennedy and Gohar Petrossian

Summary by Gohar Petrossian, John Jay College of Criminal Justice

Summary

This study examines the crime-deterrent effect of police-monitored CCTV cameras in Newark, NJ. An assessment of the impact of street-level CCTV cameras on shootings, auto thefts and thefts from autos was made by comparing the areas visible by cameras via direct line-of-sight to the randomly selected controls. The research considers the effects of CCTV cameras on crime from the point of view of (potential) offenders – specifically, whether they could see cameras from the camera target area and from where they planned on committing the crime.

Data and Methods

The researchers digitized the unobstructed, visible areas of police-monitored cameras by using aerial photographs from Google Earth and standard GIS editing tools. Several randomly selected viewsheds' shape, size and extent were compared to the viewsheds of the same cameras for the purpose of ground-truthing. Control viewsheds were created by generating random locations, and then following the procedures used in creating the experimental viewsheds. Crime counts that occurred 13 months before and 13 months after the camera installations were recorded within the experimental and control viewsheds.

Results

Comparing experimental cameras to the controls. When all 73 experimental cameras were compared to randomly placed controls, results did not reach statistical significance for auto theft and theft from auto. The results for shootings, although statistically significant, were substantively meaningless.

Comparing pre- and post-installation effects of experimental cameras. When comparing the crime counts within 73 experimental viewsheds pre- and post-installation, the results did not show any statistically significant reductions in thefts from auto or shootings.

Comparing the differential effects of cameras by location. The 73 experimental cameras were compared by taking the characteristics of the locations into account. When these areas were identified and crime counts were compared pre- and post-installation, statistically significant decreases were found in the number of shootings at these locations.

Comparing the linear distance from a camera. Results from regression analyses did not yield statistically significant results when examining the linear distance from a camera within its viewshed.

For more information, see Caplan, J.M., Kennedy, L., & Petrossian, G. (2011). Police-monitored CCTV cameras in Newark, NJ: A quasi-experimental test of crime deterrence. *Journal of Experimental Criminology, 7*, 255-274. doi:10.1007/s1192-011-9125-9

Generative Explanations of Crime: Using Simulation to Test Criminological Theory

Dan Birks, Michael Townsley and Anna Stewart

Summary by Leslie W. Kennedy, Rutgers University

Summary

The authors explore the application of agent-based modeling (ABM) techniques for simulating crime occurrence. They explain that ABMs are comprised of two key components: a population of agents and a simulated environment in which they are situated. The agents in ABM represent an autonomous decision-making entity. A series of condition-action rules define behavior, outlining how agents behave in certain circumstances. These decisions reflect algorithms and heuristics that are informed by a theoretical understanding of what is known about how individuals operate in different environments. Applied to crime, ABM draws on findings from environmental criminology that have explored the relationships between offenders, victims and crime locations.

Methodology and data

The authors used agents to simulate travel along transport networks. Decisions of the agents are devised based on how offenders make use of routine patterns of behavior to target victims. The choices that they make are based on target attractiveness. In addition, attention is paid to the likelihood that the offenders will repeat their offenses.

Findings

The simulations performed provide general support for theories that suggest offenders will act in clusters, and that this behavior will repeat in close proximity to previous offenses. The methods by which decisions are made, related to the rationality of the choice being made based on target attractiveness, are not as strong as the other factors in explaining the model. The authors suggest that this type of generative model provides us with the tools to test in a methodologically sound way the popular theories that have become so central to our thinking about crime and location. The advantage provided by ABM comes from the fact that the approach is less "top-down," concentrating instead on a "bottom-up" analysis of how decision making, within context, leads to crime.

For more information, see Birks, D., Townsley, M., and Stewart, A. (2012). Generative explanations of crime: Using simulation to test criminological theory. *Criminology,* 50, (10), 221-254. doi:10.1111/j.1745-9125.2011.00258.x

Space Matters: An Analysis of Poverty, Poverty Clustering, and Violent Crime

Paul B. Stretesky, Amie M. Schuck and Michael J. Hogan

Summary by Aisha Javed, Alexandria (VA) Police Department

Summary

Poverty and its relationship to crime are often analyzed from a social control perspective, where violence is attributed to disadvantage (e.g., less access to the legal resources) and subculture. While many studies examine the relationship between poverty and crime, this study focuses specifically on the spatial clustering of high-poverty areas and their correlation with violent crime. The authors hypothesize that: (1) there is a positive relationship between poverty clustering and violent crime, and (2) that poverty levels may be higher in cities with more socioeconomic density (i.e., spatially clustered poverty areas) as opposed to those cities in which poverty is spatially scattered.

Data and Methods

In order to measure poverty on a spatial scale, poverty census tracts were defined as those areas where at least 30% to 40% of residents were poor (thresholds were based on previous research). Poverty levels were determined by the Social Security Administration's poverty threshold. This experiment was conducted across the United States in 236 different cities, all with a population of at least 100,000 residents according to the 2000 Census of Population and Housing. A poverty cluster score was then given to each city, based on the percentage of residents living in poverty in each census tract. These data was then mapped and proportionate poverty census tracts were determined. Crime data for this study were obtained from the FBI's UCR, and crime rates were determined by a three-year average (1999-2001) for the following crime types: murder, rape, robbery and aggravated assault. Several variables were controlled for in each city, including median age, population density, marital status, residential segregation and former Confederate vs. Union states.

Findings

Findings from this experiment showed no significant effect of poverty clustering on violent crime as a whole. However, the results did show that spatial clustering of high poverty census tracts had a positive correlation with homicide rates. The authors believe that this may be due in part to the possible relationship between drug and gang activity to poverty clustering, suggesting that poverty may be related to these "disadvantages," which in turn lead to higher rates of homicide. It is suggested that one reason for a lack of significant findings between poverty clustering and violent crimes other than homicides may be the gross underreporting of rapes, robberies and assaults due to the poverty subculture itself (e.g., lack of faith in law enforcement). The authors suggest that future studies should incorporate other factors contributing to community disadvantage, such as unemployment and migration.

For more information, see Stretesky et. al. (2004). Space matters: An analysis of poverty, poverty clustering, and violent crime. *Justice Quarterly, 21*(4), 817-842. doi:10.1080/07418820400096001

The Analysis of Criminal and Terrorist Organizations as Social Network Structures: A Quasi-Experimental Study

Efstathios D. Mainas

Summary by Margaret (Meg) Godfrey , Palomar College

Summary

This study examines the usefulness of social network analysis (SNA) to analyze and investigate criminal and terrorist organizations. The primary purpose of this study was to explore the "what," "how, " and "why" of SNA and to evaluate the usefulness of SNA applications for analyzing and investigating crime and terrorist networks, ultimately bridging the gap between network science and criminal justice. Some key lessons include the need to make investigative associations and the need for information-sharing at the international level when dealing with terrorist organizations. Another key point is that the spread of extremist ideology encourages individuals to act independently, thus making it more difficult to identify hidden key players within isolated social networks. The author suggests that analyzing social networks requires examining their patterned interactions and structural variations, in order to focus on the ties among entities rather than on individual attributes.

Data and Methods

Two quasi-experiments were conducted using analytical frameworks that included the following measures: topological, cohesive subgroups, centrality and key players. One framework was a criminal communication network (using phone records data of a drug trafficking group from an investigation by the Analysis Unit of the Hellenic Police) and the other was a terrorist network (using a coded data set from the Counter-Terrorism Unit and Analysis Unit of Europol). For both, the pre-tests confirmed that the researcher (experimental group) had no knowledge of each case, whereas the analysis units (control groups) had very good knowledge. Post-test comparisons looked at the findings for the experimental and control groups, in order to detect any similarities or differences, any new findings, and any findings overlooked or interpreted differently.

Findings

Post-test comparison found that there were significant differences in the structural knowledge obtained between the experimental and control groups. SNA identified hidden structures – with little contextual information – which had not been detected by the control groups. The importance of finding hidden structures is a key point as noted by the Europol Analysis Unit; contacts by association are potentially targets of interest. In the future, some of those contacts have the potential to become suspects through a radicalization process.

For more information, see Mainas, E.D., (2012). The analysis of criminal and terrorist organizations as social network structures: A quasi-experimental study. *International Journal of Police Science & Management, 14*(3), *264-280.*

Translating Environmental Criminology Theory into Crime Analysis Practice

Julie Wartell and Kathleen Gallagher

Summary by Barry L. Fosberg, Houston Police Department

Summary

In this paper, the authors identify the gaps in translating environmental criminology theories among crime analysts into practice within their agencies. This discontinuity contributes to challenges in the application of theory. The authors focus on the awareness by crime analysts of environmental criminology and the relative frequency of contact between analysts and academics. The authors found that most analysts are familiar with some major theories, but that they were reluctant or unsure how to convert theory into analytical practice. Few analysts had "occasional "or ongoing relationships with environmental criminologists.

Data and Methods

Five major theories were identified as being the most prevalent in environmental criminology: situational crime prevention, crime pattern theory, routine activity theory, rational choice theory and repeat victimization. The authors conducted a survey of crime analysts to test awareness of these theories. In addition, analysts were asked about their contact with environmental criminologists, about their difficulties in applying environmental criminology, and for information relative to their employing agencies and personal experience. The survey was distributed by the IACA via its listserv; of a potential 1,000 respondents, 108 replied.

Findings

Few responding analysts were either totally aware of or totally unfamiliar with all five theories. Sixty-eight percent were familiar with one or more theory. Usage of theories varied from 31% (rational choice theory) to 51% (routine activities theory). Forty-eight percent of analysts report having no formal exposure to any of these theories, and 38 of the 60 who have had some training received it in a crime mapping or crime analysis class.

In general, crime analysts report little or no relationship with environmental criminologists. Given that positive responses peaked at 17% of respondents – specifically 5 of 41 analysts in large city agencies reported contact with academics "a few times") – analyst/environmental criminologist partnerships tested as rare events. In discussing the challenges of utilizing these theories, analysts reported uncertainty over the mechanics of applying theory. This, coupled with complaints about the time needed to read publications and the lack of practical examples found therein, lead the authors to suggest that more analyst training would be appropriate.

For more information, see Wartell, J., and Gallagher, K. (2012). Translating environmental criminology theory into crime analysis practice. *Policing: A Journal of Policy & Practice, 6*(4), 377-387. doi: 10.1093/police/pas020

Generalized Network Voronoi Diagrams: Concepts, Computational Methods, and Applications

A. Okabe, T. Sato, T. Furuta, A. Suzuki and K. Okano

Summary by Breanne Cave, George Mason University

Summary

Researchers often use Euclidean distance to study events such as crime in urban areas. This may not be a realistic approach given that the presence of road networks has a significant impact on how people move through space that also influences the location of crime. Network based analytic models should instead be used to study events that occur in network space. However, using these network-based models requires significant modifications to existing spatial analytical techniques. The authors compare estimates of shortest path distance using both Euclidean and network-based methods to determine the extent of differences between these two approaches in estimating the shortest travel distances between convenience stores and parking lots.

Data and methods

The authors used locations of stores and parking lots in Shinjuku and Kyoto, Japan to analyze the differences between the Euclidean and network models' estimation of travel distance. They also describe the computational methods that are required for developing network Voronoi diagrams (VDs). VDs divide space into regions based on the locations of these points in space, and are used as the basis for many different types of spatial analysis, including for instance estimations of clustering and nearest neighbor analysis.

Findings

The analysis based on network VDs differed significantly in their estimation of path distance from the analysis based on Euclidean VDs, particularly at small travel distances (less than 500m). Efficient network VDs can be created in ArcGIS and underlie the software extension SANET (a free tool for non-profit uses). Analysts who are interested in depicting events that occur along road networks, such as crime in urban areas, should consider using network-based analytic methods, particularly when analyzing crime in small areas.

For more information, see Okabe, A., Satoh, T., Furuta, T., Suzuki, A., and Okano, K. (2008). Generalized network Voronoi diagrams: Concepts, computational methods, and applications. *International Journal of Geographical Information Science, 22*, 965-994. doi:10.1080/13658810701587891

On the False Alarm of Planar K-function When Analyzing Urban Crime Distributed along Streets

Y. Lu and X. Chen

Summary Breanne Cave, George Mason University

Summary

The authors were interested in understanding how Euclidean Ripley's K-functions differ from network K-functions in depicting the clustering of auto theft in space. The K-function determines whether an observed distribution of points is clustered or dispersed by comparing it to a pattern that is based on the assumption of complete spatial randomness. Euclidean K-functions may be problematic for analyzing crime in urban areas because the location of crime may be constrained to road networks. That is, offenders and victims move through space along roads and sidewalks; therefore, models of crime clustering that are based on Euclidean space are conceptually inaccurate. There is a lack of research that analyzes the bias that is produced from analyzing crime using Euclidean as opposed to network analytic methods.

Data and methods

The authors used both the Euclidean Ripley's K-function and the network K-function to analyze patterns of auto theft in San Antonio, Texas. The data included 1,452 vehicle thefts from January-March 2002. The authors split the city into six districts and compared patterns of auto theft clustering produced by Euclidean and network methods in each district.

Findings

In general, both K-functions found that there was significant clustering of auto thefts in San Antonio. However, the amount of clustering varied between different areas of the city, and the Euclidean K function overestimated the extent of clustering of auto theft relative to the network K function. The types of differences between the Euclidean and network K-functions also differed between districts, with the Euclidean K-function overestimating the extent of crime clustering in some districts, and underestimating crime clustering in other districts. This implies that the nature of the road network may have a strong impact on overall estimations of clustering of crime.

The authors recommend that the extent of general crime clustering should be considered before analyzing for hotspots of crime, and that K-functions are one method for carrying out this type of analysis. Using Euclidean K-functions may overestimate the amount of clustering of crime overall within cities. There is a lack of knowledge about network analysis in understanding the distribution of crime, and researchers and practitioners should expand their use of network K-functions in crime analysis. Network analytical functions may be also more useful for planning purposes than Euclidean functions, as the police, like offenders and victims, often travel along road networks.

For more information, see Lu, Y., Chen, X. (2007). On the false alarm of planar K-function when analyzing urban crime distributed along streets. *Social Science Research, 36* (2), 611-632. doi:10.1016/j.ssresearch.2006.05.003

The Stability of Space-Time Clusters of Burglary

Shane D. Johnson & Kate J. Bowers

Summary by Grant Drawve, University of Arkansas Little Rock

Summary

This study examines the movement patterns of domestic burglary clusters in relation to optimal foraging theory. Optimal foraging theory suggests that offenders seek to increase their rewards while minimizing the time needed and potential risk of being caught when committing crime. This may require offenders to search for new targets when rewards decrease or time needed and risk increase. In relation to domestic burglary, once burglarizing a residence, burglars may move to burglarize nearby homes hoping to reduce the possibility of apprehension, but this would only be a temporary advantage. For burglars to further reduce the possibility of apprehension, it would be beneficial for them to move to a new area where they have not burglarized residences. This reasoning suggests that domestic burglaries would cluster for a short period of time in one area before moving to a new area where risk of apprehension is lower.

Data and Methods

Data from Merseyside, U.K., were analyzed to determine the space-time movement of burglary clusters. Data were collected from April 1999 to April 2000, totaling 1,692 records. Additionally, data were collected from April 1998 to March 1999 to determine repeat victimization. Each criminal record contained: unique crime reference number, address of the offense, grid reference of offense (x, y coordinates), date of offense, victim's name, and time of offense. Repeat victimization was determined if the most recent incident occurred within one year of the previous incident. Repeat burglaries included burglaries that occurred within 100 meters and 30 days of one another ("close pairs") but excluded exact address repeat burglaries. The close pairs were aggregated with the Census Enumeration Districts and were examined monthly for one year to determine the space-time relationship (movement).

Findings

The authors found that burglary clusters move in relation to the propositions of optimal foraging theory. Burglary clusters were found to remain in the same and neighboring areas for at least one month before moving to new areas. Results suggest that "optimal foragers" are offenders who target potentially more profitable homes and will target new areas when rewards are low or risks become too high. On the other hand, the authors state that more impulsive burglars may continue to repeatedly target poorer and more accessible residences.

Implications

Police are commonly deployed on the source of last month's burglary rates, causing an issue on where they are deployed. If burglars do move in context of optimal foraging theory, the police may be located in the wrong areas to prevent current burglaries.

For more information, see Johnson, S., Bowers, K. (2004). The stability of space-time clusters of burglary. *British Journal of Criminology, 44*, 55-65. doi: 10.1093/bjc/44.1.55