For the ***Workshop on Crime Hot Spots***:
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Parsing and Modeling Crime Routines

Marcus Felson
Rutgers University
felson@andromeda.rutgers.edu

Abstract

The routine activity approach offers us a few simple concepts that can then be elaborated. These concepts are based on the tangible *legal* activities of ordinary people, setting the stage for illegal events to occur. The focus is on events, not offenders themselves. The concepts are elaborated step by step, culminating in a recent book, *Crime and Nature* (Sage Publications, 2006). Yet the simplest ideas remain the foundation: Crime is a very tangible activity feeding on other tangible activities. Major changes and variations in crime occur without requiring shifts in human inclinations. These concepts help us study crime with the most important branch of mathematics--arithmetic.

Some of the major concepts:

Minimal elements of crime
Convergences and divergences of these elements
Eck's Triangle
Everyday supervision
Situational prevention
Crime's three main stages: *prelude, event, aftermath*
Diagramming criminal acts
Crime's ecosystem
Crime settings
Abandoned settings
Thick crime habitat
Crime adaptation
Crime symbioses, mutualisms, parasitisms
Passive assistance
Foraging by offenders and other participants
Crime's defenses
The street-gang strategy

Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

Marcus Felson
Rutgers University
felson@andromeda.rutgers.edu

For non-criminologists beginning to study crime.

FALLACIES ABOUT CRIME
From *Crime and Everyday Life*, Pine Forge (Sage, Third edition)
(A total of ten fallacies are presented there, but here are five.)

a. The ***dramatic fallacy****:* Emphasizing crimes that are most publicized, while forgetting ordinary crimes.

b. The ***not-me fallacy****:* Thinking that you are too good to commit a crime; believing that offenders are from a different population than you are.

c. The ***cops-and-courts fallacy****:* Overrating the criminal justice system's power over crime.

d. The ***ingenuity fallacy****:* Overrating the skill required to commit a crime.

e. The ***agenda fallacy****:* Linking crime reduction to your favorite ideology, religion, or political agenda.

NOTE: **Our ability to *predict*** who will commit a crime is weak, and has not improved in seventy years!

Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

SOME FORAGING PRINCIPLES RELEVANT TO CRIME

1. Offenders are "relative generalists." It is usually impractical to commit just one type of crime, and always impractical to commit all types of crime.
2. An offender can find crime opportunities
    a. Staying put
    b. In routine activities & trips
    c. Making special foraging trips.
3. Offender foraging can be very general, with unclear crime targets or just to have fun, not necessarily commit crime.
4. Foraging relevant for crime
    a. Police forage for offenders;
    b. Citizens forage for legitimate purposes, exposing themselves to risk of victimization. For example, people forage for parking spots, when shopping, and mates.
    c. Certain legal activities can enhance crime foraging.
    d. Foraging for sex generates extra risks of victimization.
5. Ron Clarke's work re-interpreted in terms of foraging. Difficult, risky, rewarding, excuses. See www.popcenter.org
6. Foraging offenders risk their own victimization, by offenders, law enforcement, and counterattacking victims.
7. Younger offenders are more likely to forage in groups, older offenders alone. Older offenders gain assistance before & after.
8. Outsiders usually commit crimes in edge areas. Insiders have an advantage committing crimes in internal habitats, where they can act more covertly and find their moments. But if insiders are apprehended there, they will be recognized.
9. A setting rich in crime targets will tend to encourage
    a. Entirely new offenders,
    b. Former offenders to return
    c. Occasional offenders to increase &
    d. Active offenders to become more efficient at crime.

10. In studying foraging, we should distinguish overt crimes (violent or property crimes that draw attention) from covert crimes that draw less notice.
11. In studying foraging, we should distinguish criminal acts directly known
    a. To a lone offender,
    b. To co-offenders,
    c. To his friends and associates,
    d. To a direct family victim,
    e. To other family members, or
    f. Beyond personal circle.
12. One does not usually forage for something one cannot carry or overcome physically, unless there's extra means for doing so. Accomplices and vehicles help offenders extend their reach.
13. Offenders try to minimize search and handling time, compared to their gains.
14. When offenders forage farther away, they expect larger gains.
15. Offenders forage neither with total randomness, nor total regularity.
16. To prevent crime, one should disrupt foraging routines, make it more costly, and render offenders less efficient (Reverse of #5, above).

Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

ELEVEN SIMULATION MODELS DEALING WITH CRIME

Marcus Felson
Rutgers University

(Most of these Model Ideas are Based on my book ***Crime and Nature***, 2006, Sage Publications) as well as many ideas from the Brantinghams, George Rengert, Ron Clarke, and others.

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Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

Model 1. One crime leads to another – Direct Burglary Multiplier Model

a. Divide crime into its prelude, incident, and aftermath.
b. The aftermath of one crime is the prelude to the next.
c. The aftermath of a burglary is the prelude to selling stolen goods, is prelude to receiving and then re-selling stolen goods.

The sequence:
1. a burglary occurs, and property might be taken.
2. a burglar sells stolen goods,
3. to someone who knowingly buys stolen goods,
4. who re-sells these stolen goods

We can vary these probabilities:
p_b = Pr. that burglaries will involve non-cash goods (see Hot Products, R. Clarke. About 0.58)
p_f = Pr that non-cash goods are fenced (cf. Sutton's work in Britain. Let's say 0.7)
p_r = Pr that stolen goods are resold (Let's say 0.9)

(If the second buyer is not aware of that the goods were stolen, that purchase is not a crime. I should add a pr. of such awareness.)

Model 1 Accounting

Initial burglaries		1,000	B
Of which cash burglaries are	(580)		$P_B\ B$
Of which first sale of stolen goods might be		406	$P_B\ P_F\ B$
Of which first purchase of stolen goods migh be		406	$P_B\ P_F\ B$
Of which resale of stolen goods might be		365	$P_B\ P_F\ P_R\ B$
Subtotal	(1,177)		T-B
Total crimes generated equal		2,177	T

$$2{,}177 = 1{,}000 + (406 \times 2.9)$$

CONCLUSION:

Every 1,000 burglaries yield (inclusively) 2,177 crimes,
and the burglary-fencing multiplier is 2.177

Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

Model 2 – Theft reduction and drug abuse

For years, drug researchers assumed that drug abuse generated property crimes. They assigned a number to that and projected how many property crimes would be produced by changes in drug prices and availability. Often this assumed addiction was dominant. Other research finds that addictions were less rigidly dominant. Some of us think that property crime drives drug abuse more than the other way around.

a. Start by finding empirical research giving distribution of drug abusers by degree of compulsion, perhaps disaggregating by drug type.

Group A 0.30 totally compulsive with a daily habit
Group B 0.40 half compulsive users, every other day habit
Group C 0.30 discretionary users
1,000 abusers = 300 compulsive + 400 half-compulsive + 300 discretionary users

b. Figure out probable daily property-crime take, e.g. $50 each. Figure out average cost of habit, e.g. $100 a day. Figure out difficulty for c property crime.

c. When crimes are ***easy*** to do:

Group A: 300 abusers X 2 thefts per day = 600 daily prop. crimes
Group B: 400 abusers X 1 theft per day = 400 daily prop. crimes
Group C: 300 abusers X 0.7 thefts per day =210 daily prop. crimes
TOTAL DAILY THEFTS: 1,210

d. When crimes are ***more difficult*** to do

Group A: 300 X 2 thefts per day = 600 daily property crimes
Group B: 400 X 0.7 thefts per day= 280 daily property crimes
Group C: 300 X 0.3 thefts per day = 90 daily property crimes
TOTAL DAILY CRIMES: 970
CRIMES REDUCED: 240; REDUCTION: 20%

This model can be easily complicated to take into account different drugs, areas, and user populations.

Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

Model 3 – Street Prostitution and Robbery

Assume

2,000 street solicitations by prostitutes
2,000 street solicitations by johns (*note double counting*)
400 acts of prostitution by prostitutes
400 acts of prostitution by johns
12 robberies of prostitutes by johns
5 robberies of johns by prostitutes (direct)
7 robbery setups (indirect with prostitute involvement)
8 unlinked robberies taking advantage of the nightlife

We can divide the 400 acts of prostitution and their crime constellation into three categories

Lead-in offenses	4,000 solicitations
Ancillary offenses	8 robberies
Consummated offenses	800 acts of prostitution
Follow-up offenses	24 robberies

A total of 4,832 offenses (with double counting). This model neglects loitering for purposes of prostitution, as well as pimping and other offenses (including thefts) connected with prostitution in the area.

This model can easily be complicated to involve other crimes linked to prostitution, as well as annoyances that draw police in, even if they are not always crimes.

Do the multipliers go in both directions, from the acts to solicitations and from the acts to the sequelae?

Marcus Felson, Rutgers University

felson@andromeda.rutgers.edu

Model 4. The Consequences of an Easy-Needle Policy

Vancouver's easy-needle policy includes:

1. Needle exchange.
2. Nurse-administered illicit drugs on skid-row
3. Cheap needles purchased in pharmacies easily, cheaply, and legally.

The third of these might be the worst, since it makes it easy to become a *new* intravenous drug abuser. An easy-needle policy makes it easy to *remain* a drug abuser, and attracts drug abusers from elsewhere. Even if an easy-needle program *reduces* the case infection *rate* for AIDS, that benefit can be offset if it *increases the size* of the drug-abuse population. Hence the program can be self-defeating, making drug abuse safer in any given instance but more extensive in the local population.

To inquire, one can disaggregate the local drug abuse population, considering continuing abusers, new abusers, desisters, deaths, in-migrating abusers, and out-migrating abusers.

T_t = Total drug abuse population in year t

N_t = New local drug abuse population in year t

M_t = Deaths of local drug abuse population in year t

D_t = Desisting local drug abuse population in year t

I_t = In-migration of drug abusers to local area in year t

O_t = Out-migration of drug abusers from local area in year t

(a) $T_t = T_{t-1} + N_t - M_t - D_t + I_t - O_t$

Rearranging,

(b) $T_t = (T_{t-1} + N_t + I_{t)}) - (M_t + D_t + O_t)$

In other words, this year's drug abuse population is augmented by three components and depleted by three other components.

Augmenting the drug-abuse population:

Last year's surviving local drug abuse population,
New local abusers, and
In-migration of abusers to the local area from elsewhere.

Depleting the drug-abuse population:

Deaths of local drug abusers,
Desistence of local drug abusers, and
Out-migration of local drug abusers.

Of course, a negative sign on the depletion components turns them into augmenting variables.

I concede that easy-needles can reduce this year's drug abuse mortality rate. I also concede that mortality from AIDS and other diseases might decline among *existing* abusers, who now have cleaner needles.

But I argue that all the other components of drug abuse can worsen because of easy needles. A local easy-needle policy

Encourages local non-abusers to become abusers (N_t)
Attracts in-migration of drug abusers from elsewhere (I_t)
Reduces desistance of drug abuse by local abusers (D_t)
Reduces out-migration of drug abusers (O_t)

It's interesting to consider the more direct impact on deaths among the local drug abuser population (M_t). It is quite possible that M_t will go down. If these abusers continue their abuse, given easy access to needles, they then augment the drug abuse population the following year via T_{t-1}. How do we evaluate this?

If the existing local drug abuse population does not increase its *incidence* of abuse, safer needles makes them live longer and sicken more slowly. If this population augments their drug abuse with easy access, they might undergo a slower death but still get sicker. Thus any health gains this year are followed by health losses next year.

In any case, with augmented overall drug abuse population, AIDS and other infections will grow in the community, despite any successes with the existing local drug abuse population, narrowly conceived. Unfortunately, new abusers and in-migrating abusers do not automatically fill out forms.

Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

Model 5. The Social Spread of Drug Abuse

Illicit drugs are locally procured via five routes:

1. Drugs offered free by friends;
2. Drugs procured by friends, sharing the cost but not the procurement;
3. Drugs bought from familiar people in familiar settings;
4. Drugs bought from relative strangers in public places; and
5. Buy from relative strangers in unfamiliar private settings.

Assume that all drugs procured via route #1,#2, and #3 were originally procured via either route #4 or #5. That is, even those drugs procured *directly* from familiar persons and settings were *originally* obtained from relative strangers, before transfer to final users. (This neglects the drug production and distribution network prior to its arrival near the local area.) Thus we can assume that

$$(D_1 + D_2 + D_3) = K (D_4 + D_5), \quad \text{where } 0 < K < 1$$

(We might be able to use 1/K as the general multiplier!)

Suppose a town closes down drug sales from public places (#4). What does that do to local drug sales overall? It is difficult to cut off the fifth type of procurement. But removing the fourth type is often feasible, and interferes with the first three types of drug sales, and also makes it harder to recruit new youths to drug abuse. Moreover, most youths in categories 4 and 5 were once in categories 1,2, and 3. So cutting off category-4 opportunities has a multiplier effect in reducing drug abuse. Suppose that the distributions are as follows

D_1 / D_{total} = 0.35 (of all drug sales
D_2 / D_{total} = 0.35
D_3 / D_{total} = 0.15
D_4 / D_{total} = 0.10
D_5 / D_{total} = 0.05 Total 1.00

Suppose that 0.7 of persons in categories D_1, D_2, and D_3 received their drugs indirectly from those in category D_4, that is, those who procured drugs from relative strangers in public places. That implies that removing the D_4 drug source reduces overall drug use by 0.10 + (0.7 x 0.85) = .695. (Is the specific crime multiplier might 6.95??)

More modestly, suppose the city is able to cut off one-third of the drugs sold in public places, D_4. that might reduce overall drug sales by about 20 per cent very soon. The longer-run result could be even better, since D_1, D_2, and D_3 offenders would no longer be progressing to D_4 and D_5 levels. Moreover, the attraction of outside drug offenders to the local area would likely decline.

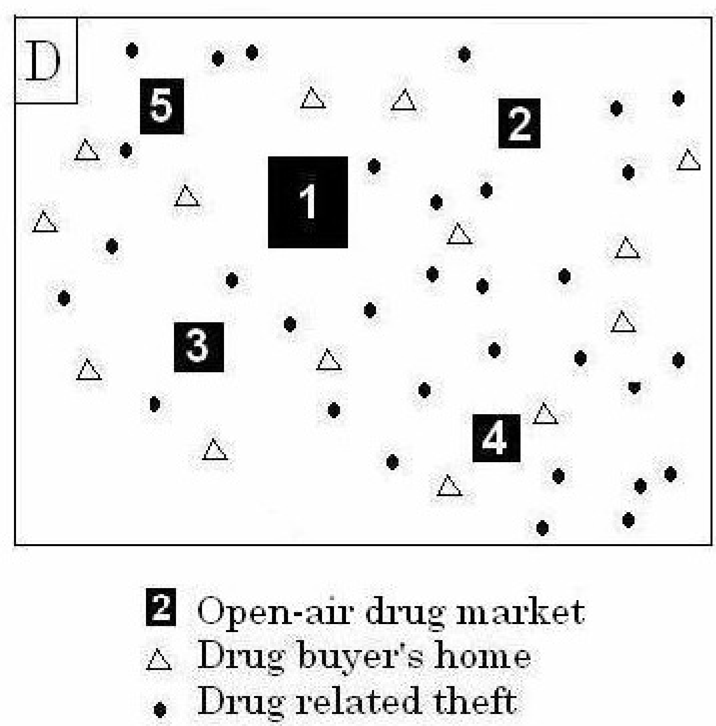
Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

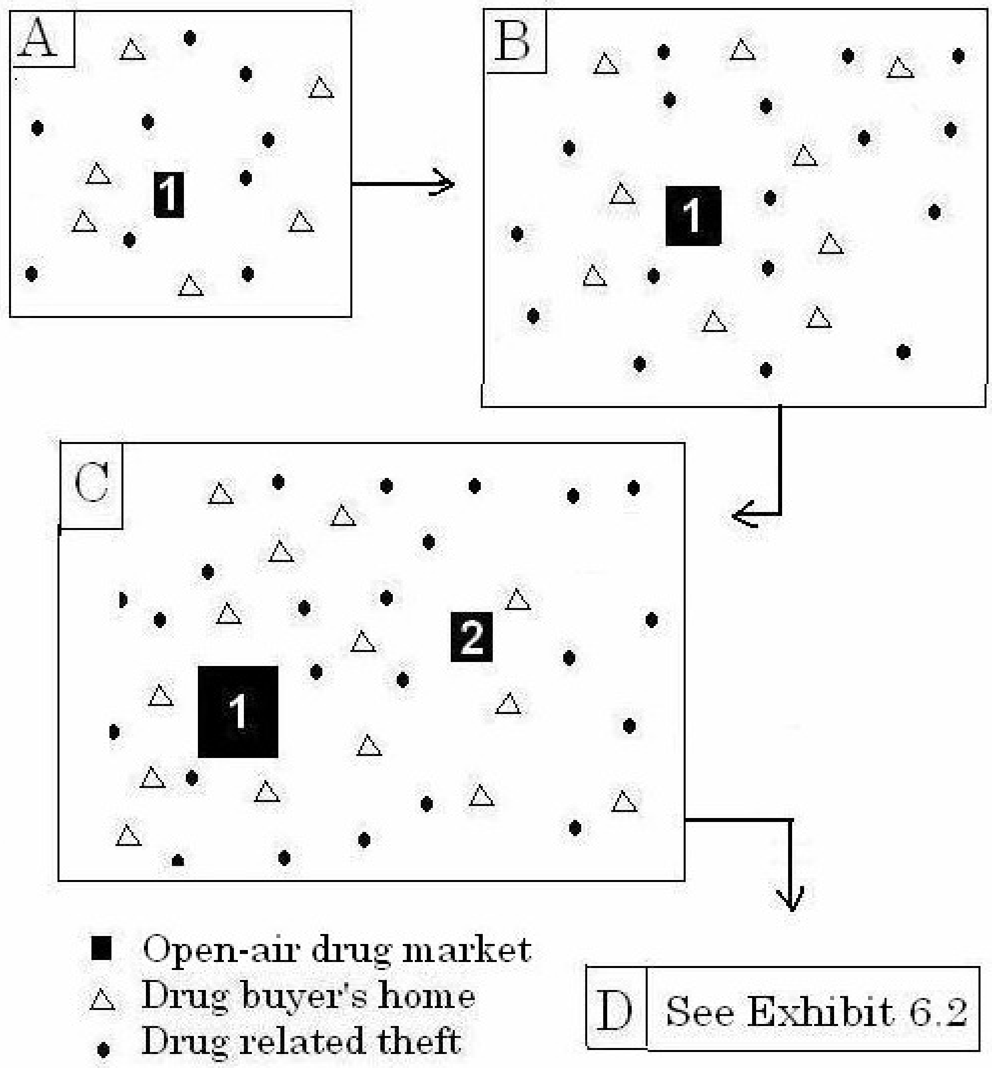
Model 6. Fractal-Like Spread of Crime

Pages 108-109, Felson, *Crime and Nature* (based on the work of George Rengert.)

The problem: Find a way to model this fractal-like spread of drug markets and crime surrounding them. Fractal-like is not strictly self-same, but rather, repetitive application of the same rule to show spread of a problem.

HOW DID THIS HAPPEN?

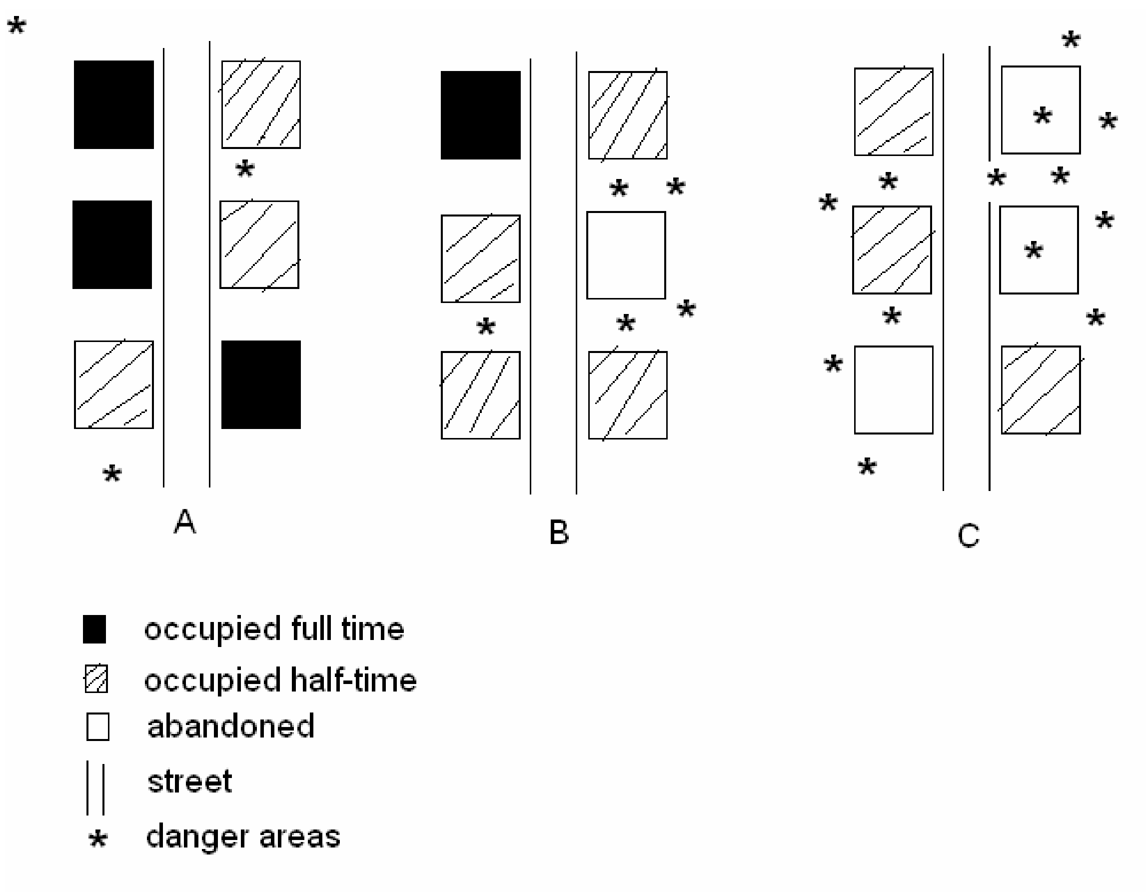




The task is to model this using fractals. Needed: Amonth-by- month data on how a drug market spreads, and how local thefts occur. One needs to specify a "seed" and show how it spreads repetitively and sequentially.

Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

Model 7. Abandonment and Supervision of Space



1. State rules by which these three types of occupancy produce supervision of space.
    a. Derive from C.Ray Jeffery and the Brantinghams' work,
    b. Use isovists.

2. Apply those rules to six houses in a row, three on each side of a street segment.

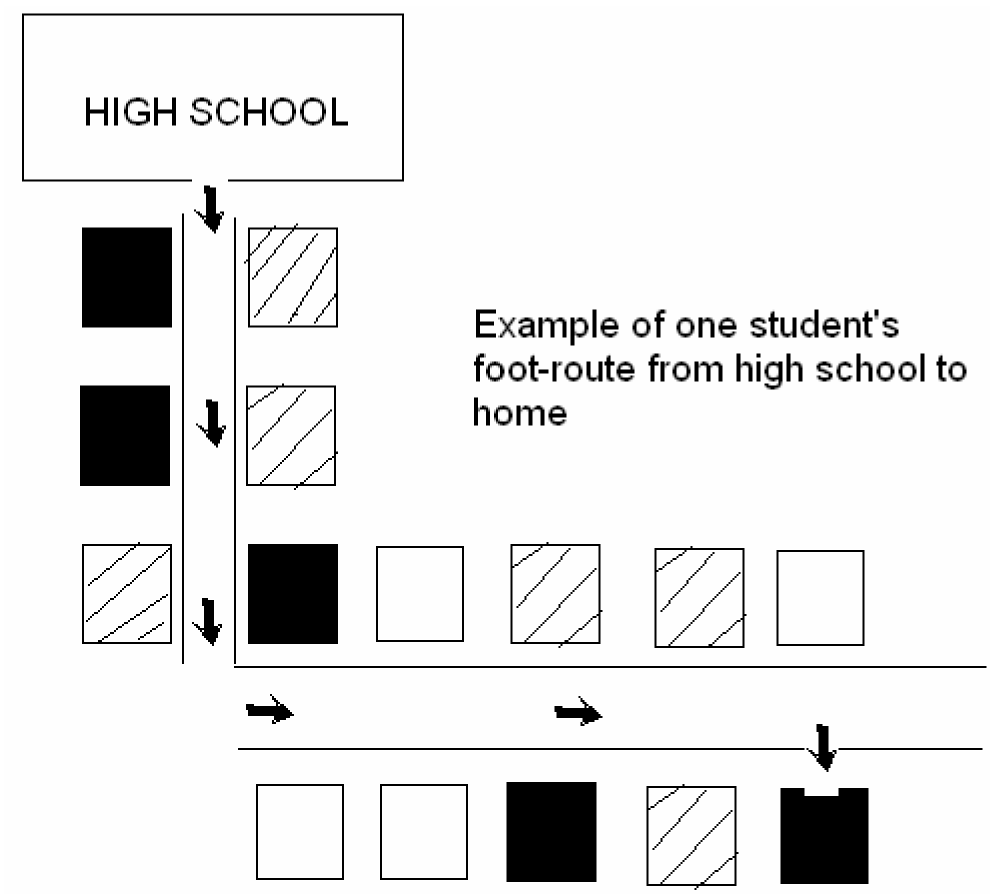
3. Calculate increment in unsupervised space resulting from degrees of abandonment.

(Reverse legend to let dark boxes reflect abandonment?)

Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

Model 8. The Trip Home from High School.

1. State rules for how residences, businesses, abandoned properties, and unsupervised properties affect immediate crime.
2. Take into account BOTH offending and victimization on the way home.
3. Piece together the route home from school (on foot) under alternative conditions.
4. Calculate increments in crime participation resulting from different routes home.



Considerations:

a. Varying degrees of property abandonment along the way.
b. Youths walking from a bus stop to home. They are targets and offenders.
c. Targets near school, available for attack during school hours.

An elaborated model could consider school buses, walking towards public transit, walking towards youth hangouts, walking from bus stops, etc.

Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

Model 9 The Farrell, Clarke, Ellingworth, Pease Simulation

See “Of Targets and Supertargets: A Rotuine Activity Theory of High Crime Rates.” Internet Journal of Criminology, 2005. (www.internetjournalofcriminology.com , accessed December, 2006)

This model incorporates repeat victimization and the concentration of crime in certain areas. It disaggregates the presence of offenders, crime targets and guardians against crime. It distinguishes incidence from prevalence.

I think the most significant feature of the model is that it demonstrates that a low-income area can have higher crime rates without higher criminal inclinations among its residents. That helps reconcile

a. *Non-variance by SES*: Self-report studies showing similar levels of crime and deviance among youths of different social groups, and

b. *Variance by SES*: Neighborhood variations in crime levels.

Marcus Felson, Rutgers University
Workshop on Crime Hot Spots, UCLA
felson@andromeda.rutgers.edu

Model 10. Police Patrol Simulation

What happens when you triple a drop in the bucket? The Kansas City Police Patrol Experiment found that doubling police patrols had no impact on crime. In the first edition of *Crime and Everyday Life*, Pine Forge Press, Sage Publications, 1994 (pp. 10-11), I did a simple model of the amount of time police would spend driving by someone's home, given that there are 168 hours in a week. Assumptions:

1. At least 1/3 of sworn officers have desk jobs or other duties and cannot patrol.
2. Each patrol officer works 10 hours per week on roll call, paperwork, court appearances, instruction, consultation, and breaks, leaving 30 hours a week for patrol.
3. Each officer patrols alone.

As you shall see, police are unlikely to spend more than a few seconds a day anywhere near your house. Information:

1. Los Angeles County had 8.8 million people living in 4,070 sq. miles, at a density of 2,178 persons per square mile, or approximately 1,000 households per square mile.
2. Los Angeles County has 1,500 officers, who must cover 1,670 beats of 2.4 square miles each.
3. Hence each officer must protect about 2,400 households, plus several hundred businesses, schools, and other locations every day. Round it off to 3,000 locations that must be protected by each officer on patrol.

PROVISIONAL CONCLUSION IN 1994: Each location in Los Angeles can be protected only a few seconds per day. I was not careful enough explaining and verifying my calculations, but the basic point holds.

REFINEMENTS: Take into account time spent driving about and time lost in the process. Take into account looking at the road rather than the properties. Get a better idea of police schedules and time off. Compare:

Model A – random patrols.
Model B – patrolling all hotspots
Model C – patrolling worst hotspots

This is really a foraging model – police foraging for offenders!

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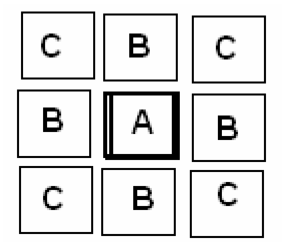
Model 11. **How Gangs Spread over a City, Month to Month**

Rule 1. If a gang is present in an area in any given month, there's a 0.5 probability ***another*** gang will form in adjacent areas the next month, and 0.25 another gang will form in semi-adjacent areas, also the next month.

Rule 2. Each month, a gang has a 10 percent chance of disappearing.



A = first urban area where gang is formed
B = areas adjacent to A, where another gang might form
C = areas semi-adjacent to A, where another gang might form

Probable adjacent spread of new gangs, neglecting chain reactions that go several steps			
	Urban Areas		
Month	**A**	**B**	**C**
1	1.0	0	0
2	0.9	0.45	0.225
3	0.8	0.4	0.2
4	0.7	0.35	0.175
5	0.6	0.3	0.15

I multiplied the probable initiation of a new gang in adjacent and semi-adjacent areas by the probable continuance of a gang in area A. But what about extensive chain reactions? (1) Gang formation in C areas should affect gang formation in B and A areas. (2) Gang formation in areas B and C should feed back upon gang continuance in area A. Consider:

(1) Gang activity should spread outwards to other adjacent areas ***in a chain reactiion***;
(2) This should reflect ***multiple interactions*** among areas;
(3) The original Area A gang should ***rebound*** as new gangs form near it;
(4) Two forces should ***compete***:
    a. The natural deterioration of gangs over time, and

    b. “extended chain-reaction gang growth” responding to proximity of other gangs

(5) Gangs ***seem to be present forever*** because the waves keep spreading in one place when fading in another.

(6) Gang ***hangouts*** are an extra force that helps them persist.