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## Stopping crime before it starts

Sophisticated analysis of data can sometimes tell police where criminals are headed. It's academic now, but the LAPD plans to get involved.



Lt. Sean Malinowski oversees the department's crime analysis unit. He's spent years immersing himself in the world of predictive technology and has advised U.S. Atty. Gen. Eric Holder on the subject. (Anne Cusack / Los Angeles Times / March 18, 2010)

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By Joel Rubin, Los Angeles Times

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The future of crime fighting begins with a story about strawberry Pop-Tarts, bad weather and Wal-Mart.

With a hurricane bearing down on the Florida coast several years ago, the retail giant sent supply trucks into the storm to stock shelves with the frosted pink pastries. The decision to do so had not been made on a whim or a hunch, but by a powerful computer that crunched reams of sales data and found an unusual but undeniable fact: When Mother Nature gets angry, people want to eat a lot more strawberry Pop-Tarts.

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Officials in the [Los Angeles Police Department](#) are using the anecdote to explain a similar, but far more complicated, idea that they and researchers say could revolutionize law enforcement.

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"As police departments have gotten better at pushing down crime, we are looking now for the thing that will take us to the next level," LAPD Chief Charlie Beck said. "I firmly believe predictive policing is it."

Predictive policing is rooted in the notion that it is possible, through sophisticated computer analysis of information about previous crimes, to predict where and when crimes will occur. At universities and technology companies in the U.S. and abroad, scientists are working to develop computer programs that, in the most optimistic scenarios, could enable police to anticipate, and possibly prevent, many types of crime.

Some of the most ambitious work is being done at [UCLA](#), where researchers are studying the ways criminals behave in urban settings.

One, who recently left UCLA to teach at Santa Clara University near San Jose is working to prove he can forecast the time and place of crimes using the same mathematical formulas that seismologists use to predict the distribution of aftershocks from an earthquake.

Another builds computer simulations of criminals roving through city neighborhoods in order to better understand why they tend to cluster in certain areas and how they disperse when police go looking for them.

"The naysayers want you to believe that humans are too complex and too random — that this sort of math can't be done," said Jeff Brantingham, a UCLA anthropologist who is helping to supervise the university's predictive policing project.

"But humans are not nearly as random as we think," he said. "In a sense, crime is just a physical process, and if you can explain how offenders move and how they mix with their victims, you can understand an incredible amount."

The LAPD has positioned itself aggressively at the center of the predictive policing universe, forging ties with the UCLA team and drawing up plans for a large-scale experiment to test whether predictive policing tools actually work. The department is considered a front-runner to beat out other big-city agencies in the fall for a \$3-million [U.S. Justice Department](#) grant to conduct the multiyear tests.

LAPD officials have begun to imagine what a department built around predictive tools would look like.

Automated, detailed crime forecasts tailored to each of the department's 21 area stations would be streamed several times a day to commanders, who would use them to make decisions about where to deploy officers in the field.

For patrol officers on the streets, mapping software on in-car computers and hand-held devices would show continuous updates on the probability of various crimes occurring in the vicinity, along with the addresses and background information about paroled ex-convicts living in the area.

In turn, information gathered by officers from suspects, witnesses and victims would be fed in real time into a technology nerve center where predictive computer programs churn through huge crime databases.

If any of this ever becomes reality, it will be in large part because of Lt. Sean Malinowski, a bookish, soft-spoken former Fulbright scholar who oversees the department's crime analysis unit. With the blessing of former Chief William J. Bratton and now Beck, Malinowski has spent the last few years immersing himself in the world of predictive technologies.

In law enforcement circles, where confusion and skepticism about predictive policing run deep, he has established himself as one of only a few people who know both what it is to be a cop and how predictive technology could fit into the job. Malinowski was recently summoned to Washington by U.S. Atty. Gen. Eric Holder, who wanted a tutorial on the topic.

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It is not by chance that the LAPD is pursuing predictive technologies. No city in the U.S. stands to gain more from the potential payoff than Los Angeles.

The city is one of the most severely under-policed in the country, with just shy of 10,000 police officers on its payroll. At any given time, only a fraction of them are on duty, spread across 469 square miles that are home to more than 4 million people. Predictive tools, if they work, would allow the LAPD to get more out of its meager force.

The use of crime data by police agencies is nothing new. Many big-city departments today make decisions on how to deploy officers based, in part, on computer mapping programs that track crime patterns and hot spots as they develop.

The LAPD and other agencies have become adept enough at channeling this flow of information from officers in the field that crimes committed in the evening are included on the next day's crime maps.

No matter how quickly crimes are plotted, however, these mapping programs leave cops stuck in reaction mode. They show where crimes have occurred in the past, but police still must make educated guesses about where future crimes will occur.

George Mohler and [Martin Short](#) believe they can change that.

In a yet-to-be-published research paper he wrote while at UCLA, Mohler, a mathematician, makes the case that the time and place of past crimes can be used to determine where and when future crimes are most likely to occur. To do this, he argues, police need to start thinking of crimes the way seismologists think of earthquakes and aftershocks.

Mohler's theory stems from a peculiar aspect of crime. Much as an earthquake sets off aftershocks, some types of crimes have a contagious quality to them.

When a home is burglarized, for example, the same house and others in its immediate surroundings are at much greater risk of being victimized in the days that follow. The phenomenon is called an exact or near-repeat effect.

The same dynamic can explain the way rival gangs retaliate against one another. And, although it is harder to pin down in more complex crimes that are motivated by passion or other emotions, experts believe it holds true there as well.

Mohler wasn't all that interested in what it is about criminals that makes this so. He focused instead on adapting the math formulas and computer programs that seismologists use to calculate the probability of aftershocks, fitting them to crime patterns. (Aftershocks can occur hundreds of miles from an epicenter and many months after an earthquake, while the elevated risk of burglaries and other crimes tends to subside over a matter of weeks and several city blocks.)

Using LAPD data, Mohler tested his computer model on several thousand burglaries that occurred in a large section of the San Fernando Valley throughout 2004 and 2005. The results, he said, were far more effective than anything on the market today.

The program divided the Valley area into patrol zones that were each roughly the size of several neighborhood blocks and then calculated which zones had the highest probability of experiencing burglaries the next day.

In one test, in which Mohler assumed there were enough cops to patrol 10% of the area, the model accurately identified the zones where the officers should have gone in order to thwart about a quarter of all the burglaries that occurred that day.

Mohler's approach is a bare-bones dissection of time and space. His former officemate is using high-level math to get inside criminals' minds.

Martin Short earned a doctorate in physics but, like Mohler, he spends much of his time thinking about crime. His research is based on a foundational, common-sense theory in criminology. In it, little attention is given to the social, economic or psychological factors — such as poverty, revenge, greed — that can motivate someone to commit a crime. Instead, criminals are viewed as rational decision-makers who commit crimes only when they come across opportunities that meet certain criteria.



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For a crime to occur, the theory holds, a would-be criminal must find a target that is sufficiently vulnerable to attack and that offers an appealing payout. An empty house with no alarm on a poorly lighted street, for example, has a much higher chance of being burglarized than one with a barking dog on a busy block.

Short's computer models simulate this decision-making process and give him the chance to decipher how crime clusters form in certain areas that criminals consider prime for plunder. The present models are random and theoretical and therefore not capable of real-world predictions. But with enough funding and computer power, Short said, a far more sophisticated model could be built to replicate actual buildings in real neighborhoods in Los Angeles. Then, he suggested, the decisions of the computerized criminals could be used to predict the movements of actual criminals.

Like any radical, unproven idea, predictive policing has its share of skeptics. Some question whether any amount of number-crunching can replace the intuition and street smarts that a cop develops over time.

"There is the science of policing, and there is the art of policing," said LAPD Deputy Chief Michael Downing, who relies heavily on technology as the head of the department's counterterrorism efforts but remains wary of predictive policing.

"It is really important that we learn how to blend the two. If it becomes all about the science, I worry we'll lose the important nuances," he said.

It remains to be seen whether work like Mohler's and Short's can translate into helping cops make day-to-day decisions. The science has progressed only so far.

Much of the work at UCLA and other universities focuses on burglaries, because there are a lot of them and their times and locations are easy to pin down. Building predictive tools capable of addressing rarer and more complex crimes, such as homicides and rapes, will be far more complex.

Malinowski knows as well that the LAPD will have to overcome significant obstacles. Perhaps most pressing is the need to dramatically upgrade the department's technology infrastructure and improve the way it collects crime data.

And there is a public relations battle that must be won. Malinowski is trying to preempt the likely concerns of civil rights advocates who worry that predictive policing could be used to profile and harass individuals before they do anything wrong. He is quick to say that the technology will not turn the city into a real-life version of "Minority Report," a 2002 science fiction film in which cops arrest people for crimes they are about to commit.

"This will be the opposite of a dragnet, where we just go out and pick up everybody because they're on a certain street corner at the wrong time. We'll be basing our decision on facts. It will be dispassionate," he said. "We still have a Constitution, and we're still going to be arresting people based on probable cause, not on the probability that they'll commit a crime."

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