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New Book Explains How Math Can Help Solve Crimes
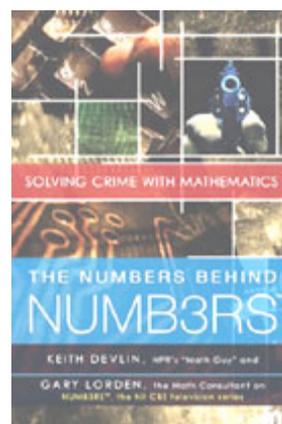
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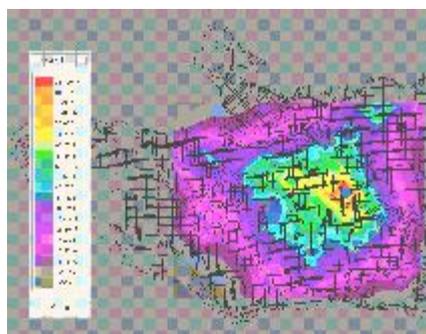*13 August 2007*

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We all have to study math in school at one time or another. And many of us have wondered: will this stuff be useful afterward, in real life? Mathematicians Keith Devlin and Gary Lorden answer an emphatic "yes". In their new book, The *Numbers Behind "Numb3rs*," they argue that math is especially useful in the science of crime-solving: the subject of the popular TV show, *Numb3rs*. The authors make the case that the *stories* on the show might be fictional, but the critical role of math is very real.

The premise of *Numb3rs*, a CBS-TV series that premiered in 2005, is simple: two brothers, one a seasoned cop, the other a genius mathematician, team up to solve crimes in modern-day Los Angeles. Keith Devlin, a professor of mathematics at Stanford University, was immediately attracted to this idea, and not just because the hero is a mathematician.

The book, published by Plume Paperbacks, will hit stands August 28th

This "hot zone" map was used to solve a series of armed robberies in 1995 in Vancouver, Canada. The offender's home is indicated by the blue dot, which shows the map obtained by using the equation was very accurate
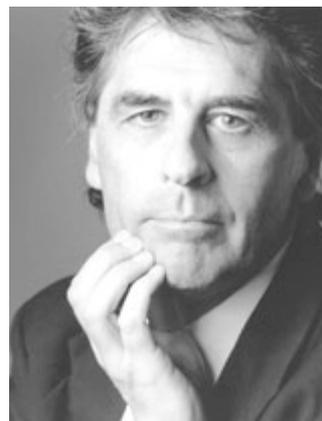
"The interesting thing about this is that it's about two different methods of problem solving," says Devlin. Don Eppes, played by Rob Morrow, has "street smarts" that he has developed by working as a cop, and uses this experience and common sense when he approaches a crime. His brother Charlie, played by David Krumholtz, has a very different kind of logic that comes from his experience as a mathematician. It's a very abstract way of approaching a problem. "And in the show, as in real life," says the mathematician, "when you put together those two different approaches to solving problems, boy, do you have a powerful combination."

Devlin and co-author Gary Lorden, who is also the main math consultant for the show, decided to write a book that was very close to the series in its way of talking about mathematics, but that takes the reader a little deeper into the subject. They basically give more detailed descriptions of how the math is being used to solve real crimes. "But it's not a mathematics textbook," he points out, "and it doesn't teach you how to do it, it just describes and explains how it works."

Devlin says that they wanted to provide examples of how law enforcement agencies use mathematics to solve real-life crimes, not just those featured in the TV show.

In one episode, an equation is used to find a serial killer based on where his crimes were committed. The idea for the episode was based on a real case, in Lafayette, Louisiana. In that case, a police officer named Kim Rossmo, who also had a PhD in mathematics, developed an equation that gave a map of where a criminal was most likely to live given the locations of his crimes. "That's a technique that really works, and yet I'm intrigued because it's an interesting mixture of, again, two kinds of thinking", says Devlin.

Devlin explains how mathematics can also be an effective tool for predicting criminal behavior. "What the Rossmo example and other examples in the book show," he comments, "is that we may think we are free agents, but we follow far more predictable patterns than what we are aware of. And mathematics can, on occasion, uncover those patterns." Devlin says this predictability has helped law enforcers put many criminals behind bars.

Keith Devlin is not only a professor of mathematics at Stanford University, he's also written numerous popular math books, he has a monthly column called Devlin's Angle, and he's the "Math Guy" at NPR

The Stanford mathematician says that single criminal acts are much more difficult to solve using mathematics, since there's no pattern yet to the criminal's behavior. He says one especially useful tool in these cases is image enhancement, which uses sophisticated mathematical techniques. Images taken from surveillance cameras, camera phones, and even helicopters, can be enhanced to show an incredible amount of detail that was not apparent before. "You can enhance that image so not only can you recognize that person, but you can see details like tattoos on people's arms, and scars on their legs," remarks Devlin.

Devlin concedes that while the mathematics in the show is very real, the series does take a few liberties. He admits that one person probably couldn't solve a criminal case so quickly, and wouldn't have the expertise in so many branches of math. Mathematics, he says, has exploded since the 19th century, and it's impossible for a single mathematician to know every single area of math.

"We have to accept that Charlie is a television superhero," Devlin says. "He's an iconic representation of all the mathematicians out there who consult for the FBI and for the law enforcement agencies. So he encapsulates the whole of the mathematical community and personifies it."

Keith Devlin and co-author Gary Lorden hope *The Numbers Behind "Numb3rs"* will help readers understand that crime-solving and mathematics are not that far apart: it's all about finding patterns, solving puzzles, pinpointing the crucial elements in a problem and determining the best strategies to solve it. The book will be published August 28th by Plume Paperbacks.

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