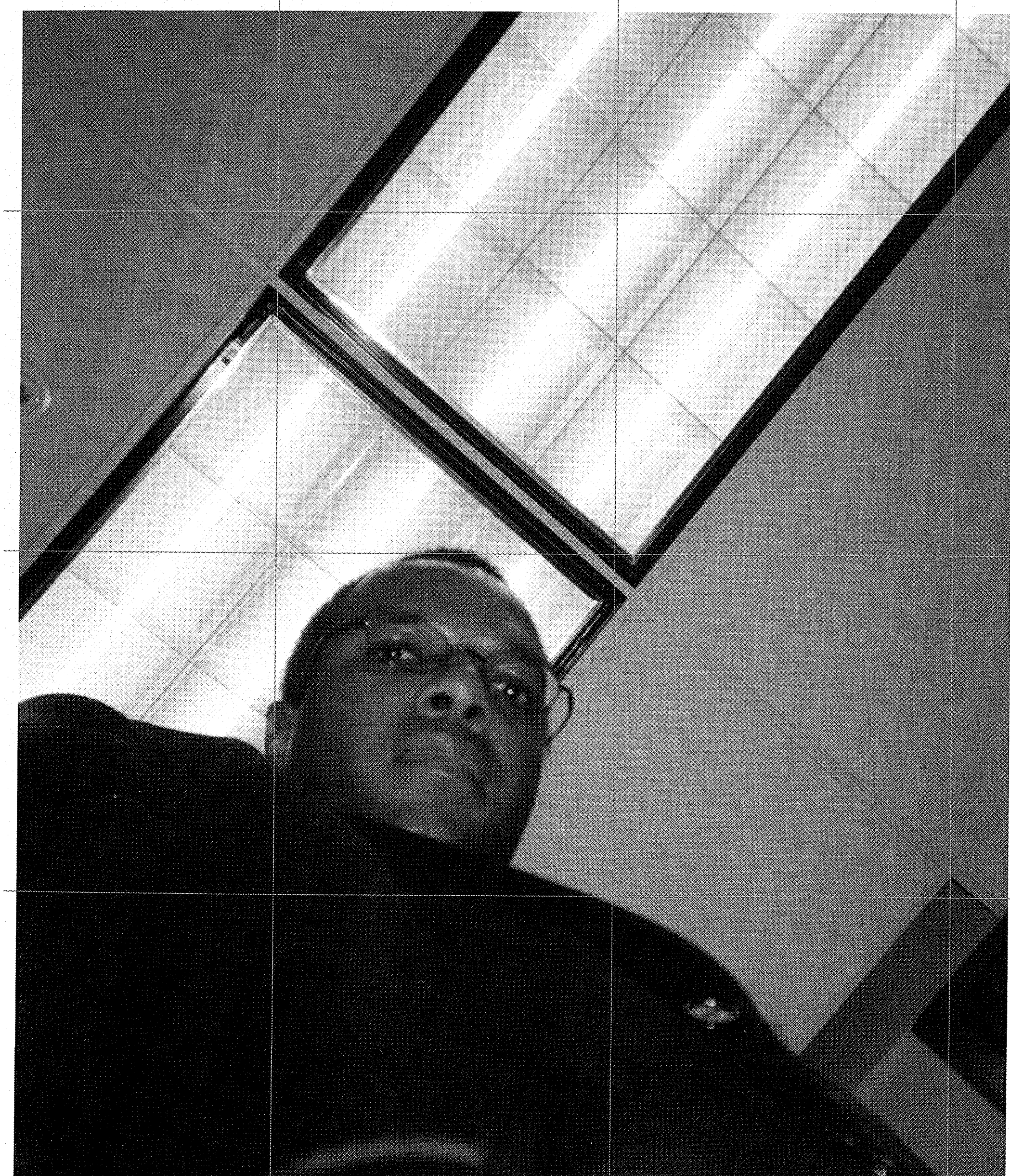
MATHEMATICIAN/COUNTERTERROR ENTREPRENEUR

JONATHAN FARLEY

BY YOHANNES EDEMARIAM

Most of the time, the tidy abstractions of pure math have no place in a messy world away from the blackboards or the pages on which they were proved. So says Jonathan Farley, a 35-year-old award-winning mathematician at MIT. "But there's a small part of it, maybe 0.001%," he says, "which is useful. It just so happens, that percentage is very useful."



With this in mind, he decided, a few years ago, to apply his mathematics to fighting terrorism.

Farley, who from time to time consults for cinema and TV shows involving math, was inspired by the film *A Beautiful Mind*, which tells the story of Nobel Prizewinner John Nash, whose theories helped the US military during the Cold War. After watching the movie, Farley attended a talk at MIT given by Gordon Woo, a risk-management specialist who was modeling terrorist networks using simple graphs. Woo's graphs used dots to represent individuals and lines connecting two dots to represent a relationship between two terrorists. The problem with the model, says Farley, was that it didn't address the impact of rank, the difference between leaders and foot soldiers, on a network. He realized that a good way to answer Woo's question—how many terrorists need to be captured before a graph becomes disconnected and a terrorist cell can be labeled inert—was to use lattice theory, the abstract study of order and hierarchy.

This idea, which Farley published in a 2003 issue of the journal *Studies in Conflict and Terrorism*, attracted attention from intelligence agencies and the military. Farley went on to found Phoenix Mathematical Systems Modeling, which is developing software the authorities can use to foil terror attacks. (Stefan Schmidt, a fellow lattice theorist, and Vladimir Lefebvre, a Russian who worked for the Soviets during the Cold War and is famous for his work modeling enemy behavior, were also instrumental in the new venture.) Such software would incorporate data provided by law enforcement agents and return probabilities on how successfully they had disrupted terror cells. Farley disavows 100% accuracy with such modeling. "But," he says, "it does...give you a rational basis to consider the likelihood of whether you've succeeded in your past counterterrorism operations, so that you can make decisions about how you should allocate resources for the future." This could prove invaluable to the Department of Homeland Security, which will spend over $30 billion on counterterrorism next year.

In November, Farley hosted the 2nd Conference on Mathematical Methods in Counterterrorism and hopes to soon open an institute dedicated to studying the field. Shortly beforehand, he moved to California to assume the position of Science Fellow at Stanford University's Center for International Security. His work there includes describing a "perfect" terrorist cell—in other words, the most robust or difficult cell to disrupt—as well as modeling terrorism as a contagious virus that spreads from person to person. Although his research is intended to help law enforcement officials in the war on terror, Farley is careful to distance himself from any partisan disputes on how it is being fought. "This is about studying terrorism and terrorist groups," he says. "It's not about politics. It's about saving lives."