

Destroying drug cartels, the mathematical way

Killing drug lords gets headlines, but complexity analysis suggests they are the wrong people to target to bring down a cartel

By Sara Reardon



WHEN the Mexican navy announced on 9 October that Heriberto Lazcano, leader of the country's most violent criminal cartel, Los Zetas, had been killed it was hailed as a major victory in the war on drugs. But it's doubtful that Lazcano's death will be the end of Los Zetas – or reduce violence in Mexico. After all, there is already a new leader.

More useful targets might be those apparently minor players with key connections, according to a complexity analysis approach that could help Colombia – the world's largest producer of cocaine – investigate and prosecute cartel members.

Complexity analysis depicts drugs cartels as a complex network with each member as a node and their interactions as lines between them. Algorithms compute the strength and importance of the connections. At first glance, taking out a central “hub” seems like a good idea. When Colombian drug lord Pablo Escobar was killed in 1993, for example, the Medellín cartel he was in charge of fell apart. But like a hydra, chopping off the head only caused the cartel to splinter into smaller networks. By 1996, 300 “baby cartels” had sprung up in Colombia, says Michael Lawrence of the Waterloo Institute for Complexity and Innovation in Canada, and they are still powerful today. Mexican officials are currently copying the top-down approach, says Lawrence, but he doubts it will work. “Network theory tells us how tenuous the current policy is,” he says.

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Now Colombian prosecutors have a new tool to add to their investigation methods: network analysis. This can be an integral part of the modern war on drugs, says Eduardo Salcedo-Albaran, director of the Vortex Foundation based in Bogotá.

Vortex uses network-analysis algorithms to construct diagrams for court cases that show the interactions between cartel members, governors and law enforcers. These reveal links that are not otherwise visible, what Salcedo-Albaran calls “betweeners” – people who are not well-connected, but serve as a bridge linking two groups. In Mexico and Colombia, these are often police or governors who are paid by the cartels.

“The betweener is the guy who connects the illegal with the legal,” says Salcedo-Albaran. Because many cartels depend on their close ties with the law to operate successfully, removing the betweeners could devastate their operations.

It's a reasonable strategy, says Michael Kenney of the University of Pittsburgh in Pennsylvania, although it shouldn't be the only one governments use. The ideal strategy depends on government goals. If it is the end of the drug trade they are after, removing the leaders may work. But if the goal is to reduce violence, as incoming Mexican president Enrique Peña Nieto has vowed to do, targeting kingpins like Lazcano will have the opposite effect, says Vanda Felbab-Brown of the Brookings Institution in Washington DC. Smaller organisations that emerge from a broken cartel tend to assert their power by torturing and killing people.

Fighting all these factions would require even more firepower. Sean Gourley, of the data analysis organisation Quid in San Francisco, used public data from nine recent insurgencies, including Colombia's drug war, to determine mathematically how these battles play out (*Nature*, doi.org/bv2tf5). “Unfortunately, if you put more forces on the ground, you elongate the violence,” he says.

Data collected by the Transborder Institute in San Diego, California, supports this. Prior to the crackdowns that began in 2006, drug-related crimes in Mexico killed about 3700 people per year. In 2011, that number was more than 16,000.

“People keep saying that the violence [in Mexico] will get worse before it gets better, and the cartels are at the end of their lives, but those predictions have been going on for years,” says Lawrence. At some point, he suggests, a more mathematical approach will win out.

Lost your cartel? Just Google it

Mexican cartels aren't subtle about their whereabouts. To intimidate their rivals and the government, they advertise their latest crimes through the media and threaten each other on blogs and websites.

But this practice has been revealing their inner workings to Viridiana Rios and Michele Coscia of Harvard University. In a paper that will be presented at the CIKM conference in Hawaii this month, the two created a program called MOGO that searches Google News for references to the different cartels, their locations and their influence between 1999 and 2011.

They used MOGO to construct a map showing where all the cartels were working at each point in time. Their map turned out to be quite accurate, correlating closely with those developed by the global intelligence firm Stratfor.

The cartels' movements reveal a lot about their business strategies, says Rios. Some, such as Los Zetas, are very aggressive, expanding quickly into new territories and competing with rivals. Older organisations such as Sinaloa prefer to strengthen their own territories rather than seek new ones. Understanding the cartels' logic might make it easier to predict their movements, Rios says.

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