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Don't Think, Just Drive

As taxi drivers can tell you, many New Yorkers believe they can figure out the least crowded route across Manhattan. But strategic navigating may only exacerbate congestion, a team of theoretical physicists reports. Heavy traffic would flow more smoothly, they say, if drivers choose their routes at random.



Crosstown traffic. Some shortcut strategies only worsen congestion.

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received information about the volume of traffic on the routes they weren't taking on a particular day--the model's version of personalized traffic reports. Ironically, however, that information had to be imprecise, or "noisy," to be helpful. Otherwise, random picking remained the better strategy.

The results show that "too much intelligence" can impede traffic, says Michael Schreckenberg, a traffic physicist at the University of Duisburg-Essen in Germany. The study suggests that a dash of randomness can restore order to traffic, agrees Damien Challet, a theoretical physicist at the University

Physicists have modeled city drivers reacting to one another as they fight their way across a grid of streets. When traffic becomes too dense, a tentacular traffic jam spreads across the city. In such simulations, however, drivers respond to only what's near their bumpers, rather than planning to avoid traffic.

But even drivers who think ahead won't necessarily beat traffic, report Andrea De Martino of the University of Rome, La Sapienza, Matteo Marsili of the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy, and Roberto Mulet of the University of Havana. The researchers concocted a grid model in which each driver had to travel, for example, from work to home, day after day. Each driver could choose from one of several routes, each the same length. When the density of drivers was low, traffic flowed more evenly if each driver relied on past experience to select the least-crowded route.

When the density exceeded a critical level, however, traffic flowed more evenly if drivers simply chose those their routes at random, as the researchers report in a paper submitted to *Europhysics Letters*. If the drivers tried to pick the least-crowded route, the number of cars on a given street would fluctuate wildly day to day. The traffic-jamming fluctuations eased if drivers also

of Oxford, U.K. "[A] tiny amount of noise has a tremendous effect," Challet says. "This was not expected."

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De Martino, Marsili, and Mulet's preprint

Transport and traffic physics at the University of Duisburg-Essen