Traffic is a textbook chaotic system, in which seemingly minor causes can have colossal knock-on effects. If 5 p.m. is rush hour, September feels like...

Though it moves in straight lines on a regular schedule, urban road traffic is a textbook chaotic system, in which seemingly minor causes can have colossal knock-on effects on gridlock.

Annoyingly, many of them seem to cluster in September.

In Washington, D.C., for example, the average commute jumps by five minutes from August to September, even though the number of cars on the road stays the same.

The reason, city planners believe, is that in August, commuters drive at rush hour according to their own schedules, a little bit early one day, a bit late the next. But in September, those with children to drop at school suddenly have a firm time to leave, causing cars to cluster, creating the inevitable traffic jams.

This "back to school jump" is one of many seemingly inconsequential factors - like unfinished summer roadworks or a reluctance to take sick days so soon after summer vacation - that seem to have a cumulative effect of making September an awful month for driving, as drivers across Canada can probably attest to at this point.

If 5 p.m. is rush hour, September feels a lot like rush month, the annual moment of peak gridlock.

I think part of it probably is related to everybody back from vacation, everybody's on routine schedules

Some of this spike is likely in the eye of the beholder. Every traffic jam seems like the worst ever until the next, especially if holiday memories remain fresh.

But there is a science beneath the anecdotal complaints, and surveys of traffic patterns in places as diverse as Holland, China, America and Canada show that if September is not the worst, it is at least tied with April.

"My guess is that the surge of traffic that you see in September in part is observation bias," said Morris Flynn, associate professor in mechanical engineering at the University of Alberta, who has studied the dynamics of traffic flow using the principles of fluid dynamics.
"I think part of it probably is related to everybody back from vacation, everybody's on routine schedules, people aren't taking sick days, everybody thinks that they have to get to work at 7:55, they don't realize that they can blow in at 8:05 and nobody really notices," he said.

He has done research on "phantom traffic jams," when a uniform stream of traffic mysteriously clogs up in a spontaneous spike of density, as opposed to a real traffic jam caused by a fixed obstacle like a pile-up or construction site. He learned that when roads exceed their capacity, traffic becomes "a self-reinforcing system" in which "everything just gets progressively more and more bogged down."

"If you have this over-capacity of people on the roadways, and everybody on September the first feels locked into this rigid schedule, you're going to get all kinds of manifestations of an over-capacity of people on the roadway, and that includes things like phantom jams, but as soon as phantom jams happen, then the likelihood of an accident goes up, and then you have a real traffic jam."

The reason those odds increase, he said, is the relative difficulty of stop-and-start driving as compared to driving at a uniform speed.

Anecdotally, he said his wife is a teacher who is reluctant to take sick days so soon after vacation, but as with many jobs, if she calls in sick someone else has to replace her, for no net reduction in cars on the road.

Traffic's hourly and daily patterns are more familiar and usually more obvious than the seasonal ones. As a Dutch team found, "in general, a daily pattern consists of two rush hour peaks, an off-peak period, an evening period and a night period."

Weekly, Friday shows a consistent drop of 5-10% during peak hours, they found. Monday has a low off peak period, possibly because most people are at work, but Friday has a high one, possibly indicating an early start to the weekend.

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Seasonally, the Dutch research showed two peaks over the course of a year, the first in spring, when the peak lasted several weeks, and then again for a shorter time toward the end of September.

Solving this, if it is solvable, requires a sensitivity to not only the brute demands of highway infrastructure, but also the vagaries of the "human factors."

Some solutions are admirably simple. Both Ottawa and Toronto have experimented with staggered start times for major employers, which spreads out rush hour, and has a measurable (though minor) effect.

Others are bafflingly complex. Yi-Chang Chiu, a traffic engineer at the University of Arizona, is working on a new model for traffic forecasting to replace the 50-year-old one currently in use. Known as VASTO, for Evolutionary Agent System for Transportation Outlook, it aims to simulate the behaviour of actual people, who do not simply drive from origin to destination, but rather change their routes on the fly, stop for a coffee, or circle around the block for cheap parking.

"Most cities keep on building to meet peak congestion hours," Prof. Chiu said in a report on the project. "In the past we did not understand the mechanics of behaviour so we didn't know how to manage data."

Usually, though, the solution is just to build more and bigger roads, which might not be ideal.

Anthony Downs, an economist whose 1992 book Stuck in Traffic was especially influential on Vancouver's traffic system, called traffic congestion "an essential ingredient in making effective use of the nation's road systems during peak travel hours. In effect, congestion is not the problem; rather it is the solution to the real problem, which is, how can we ration our limited road space during peak hours."

He also took a fatalist view of the urge to increase road capacity to an imagined sweet spot. Traffic, as he sees it,
absorbs all available capacity.

As such, it is an indicator of economic health, a pain in the neck, but better than the alternative.

As Mr. Downs put it nearly 25 years ago on a visit to Toronto, which rivals Vancouver for the country's worst traffic: "You people here in Toronto are experiencing some of the fruits of your immense success."

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References

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