

# An accident? Construction work? A bottleneck? No, just too much traffic

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A new study from a Japanese research group explains why we're occasionally caught in traffic jams for no visible reason. The real origin of traffic jams often has nothing to do with obvious obstructions such as accidents or construction work but is simply the result of there being too many cars on the road.

The research, published today, Tuesday, 4 March, in the *New Journal of Physics*, shows how model patterns, normally used to understand the movement of many-particle systems, have been applied to real-life moving traffic. The research shows that even tiny fluctuations in car-road density cause a chain reaction which can lead to a jam.

The research found that tiny fluctuations in speed, always existing when drivers want to keep appropriate headway space, have a cumulative effect. Once traffic reaches a critical density, the cumulative effect of gentle braking rushes back over drivers like a wave and leads to a standstill.

The researchers in Japan used a circular track with a circumference of 230m. They put 22 cars on the road and asked the drivers to go steadily at 30km/h around the track. While the flow was initially free, the effect of a driver altering his speed reverberated around the track and led to brief standstills.

Yuki Sugiyama, physicist from Nagoya University, said, "Although the emerging jam in our experiment is small, its behaviour is not different

from large ones on highways. When a large number of vehicles, beyond the road capacity, are successively injected into the road, the density exceeds the critical value and the free flow state becomes unstable.”

The researchers will be advancing their research by using larger roads and more vehicles to further test their findings.

The research suggests that it might be possible to estimate critical density of roads, making it possible to build roads fit for the number of drivers needing use of it or, on for example toll roads, only allowing the right number of cars access to the road to stop mid-flow traffic jams.

Source: Institute of Physics

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