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Autonomous vehicles may one day be controlled at junctions by technology that varies car speeds

Successfully negotiating congested city streets by car requires a complex set of nuanced behaviours which motorists who stick exclusively to quieter rural roads may not fully appreciate. Such as the little flick of the hand to invite another driver out of a side road, the subtle nod to someone hoping to pull in ahead of you, or avoiding eye contact if you are not feeling generous.

Most city drivers seem to switch effortlessly from asserting themselves one minute to politely letting someone in first the next. Making progress in heavy traffic while remaining safe relies, does it not, on an equal distribution of give and take.

And it is testament to how humans behave (99% of the time) when behind the wheel in busy urban areas that the vast majority of vehicles on the roads don't look as if they take part in stock car racing every weekend.

So imagine taking away those subtle human interactions between drivers in our largest cities and letting autonomous vehicles make crucial decisions for you, including who deserves to have priority at junctions not controlled by traffic lights.

This concept was put to the test in a car park near the French city of Bordeaux early in October, albeit on a very small scale. Two driverless vehicles in conversation with a roadside unit were set off to cross paths at a junction.

When they both reached the intersection together the technology on trial worked out the optimal speed for each vehicle so they could pass safely. Without input from either driver it was up to the technology to decide which car should take priority and which should slow down, or stop.

"This technology would be useful to avoid deadlock situations," explains my driver Abbas Turki, an assistant professor with the Université de Technologie Belfort-Montbéliard in eastern France. "When there are a few autonomous vehicles in a city there should be no problem. But when there are lots there is the risk of gridlock."

Allowing autonomous vehicles to pass safely through an intersection without stopping promises to help create added capacity on urban roads, I was told. But there is perhaps another interpretation of what might be meant by 'gridlock' without the use of this, or other such junction control systems.

### SKETCH

***"When there are lots of driverless vehicles in a city there is the risk of gridlock at junctions."***

Imagine a future scenario where a city is dominated by driverless cars that do not know what to do next at a junction if their path is blocked. Without the intervention of a human which car would know to move first?

Within five years Abbas hopes that the 'X icars' system may begin to control a network of vehicles as part of a personal rapid transport system. In the next 10 to 15 years it could start being used within cars but, he says, this depends on the development and uptake of autonomous vehicles.

During the demonstration the Renault on test was driven autonomously, with the steering wheel performing elaborate turns of its own accord, moving the car around a figure of eight track.

Passengers inside the car were assured that the driver can regain control at any time and, if the situation arose, override the technology that allows vehicles to negotiate the junction on their own. But disabling the autonomous control did not involve a light flick of a switch on the dashboard or a deft touch of a computer screen.

Abbas instead opened a small compartment between the two front seats and pulled out a device which was instantly recognisable and whose function was clear; but was not something you would expect to find inside a modern car.

Granted, this was a prototype system and the equipment far from fully formed. But it seemed fitting – and somewhat amusing – to see that the first thing a factory worker would reach for if a large piece of industrial machinery was to malfunction was right before our eyes: a bright yellow box featuring a large red button. MW