

# Defectors take the car, cooperators go by bus

February 3 2009

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National economies are driven by the automobile, even during an economic downturn. Every day, hundreds of millions of people take their cars to visit remote places, to commute, and to reach the supermarket.

The total outlay for building roads amounts to trillions of dollars and millions of worker-hours. Miklos Szilagyι of the University of Arizona, Tucson suggests this is an apparent waste of resources, a serious producer of pollution, congestion, delays, and the fundamental reason for US dependence on foreign oil, but is mass transportation in large cities the best alternative. Should commuters take the bus rather than driving to work?

Writing in a forthcoming issue of the *International Journal of the Internet and Enterprise Management*, Szilagyι has used a computer simulation to help answer the transport dilemma of facing large cities.

The received wisdom suggests that the answer lies with public transportation. "If there were no cars but reliable trains and buses, everyone could get anywhere quickly and without traffic jams," says Szilagyι. His simulation greatly simplifies the issues, but works by considering each person to be cooperating if they use public transportation or defect if they selfishly choose to take their care. The decisions of all the individuals using the roads cooperatively or in defecting will accumulate over time to produce a collective order that will determine the success or failure of the transportation system.

If everyone defects, then there will be permanent gridlock. But, even if a few individuals choose the bus, this will not help, because the buses will also be gridlocked. Defectors and cooperators are both punished for the irresponsible behavior of the majority.

In contrast, if everyone uses the bus, the buses will be crowded although can move freely on otherwise empty streets. Everyone gets to their destination quickly but in less comfort and without the benefits of privacy, in-car audio, or a trunk for transporting cumbersome items.

If just a few individuals defect at this point, then they get the biggest reward, because they can move even faster, avoid the crowd in the bus, and have all the other advantages (and costs) of personal transport.

Szilagyι points out that the simulation reveals some of the characteristics of the well-known "game theory" game Chicken Dilemma. "The simulation shows that it is quite possible to achieve a situation when the majority of people prefer mass transportation," he says, "This can be done by running large buses frequently and on separate traffic lanes."

Ultimately, the simulation shows that if most people are happy to take the bus, and just a few people defect and drive by car, then there is a comfortable level of crowding on the buses, no gridlock and a few happy drivers with full trunks.

Reference: "Cars or buses: computer simulation of a social and economic dilemma" in Int. J. Internet and Enterprise Management, 2009, 6, 23-30

Source: Inderscience Publishers

Citation: Defectors take the car, cooperators go by bus (2009, February 3) retrieved 25 April 2024 from <https://phys.org/news/2009-02-defectors-car-cooperators-bus.html>

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