Kicking hybrids out of carpool lanes backfires, slowing traffic for all

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UC Berkeley transportation researchers found that after single-occupant hybrids got kicked out of the carpool lanes, traffic slowed for everyone.

(PhysOrg.com) -- The end of a California program granting free access to carpool lanes by solo drivers of hybrid cars has unintentionally slowed traffic in all lanes, according to transportation engineers at the University of California, Berkeley.

The program, which began in 2005 and ended on July 1, gave consumers an extra incentive to buy low-emission cars. By 2011, some 85,000 low-emission vehicles had gotten the coveted yellow stickers that gave them entry into the carpool lanes, but critics of the perk argued that solo drivers of hybrid cars were clogging up the lanes for carpoolers.

Researchers at UC Berkeley's Institute of Transportation Studies (ITS)

used traffic flow theories and six months of data from roadway sensors measuring speed and congestion along all freeway carpool lanes in the San Francisco Bay Area. They used the information to predict the impact on vehicle speed of the hybrids' removal from carpool lanes. Additional data collected after the program's July 1 expiration supported their predictions.

Michael Cassidy, UC Berkeley professor of civil and environmental engineering, and Kitae Jang, a doctoral student in civil and environmental engineering, presented their analysis in a new report released by ITS.

"Our results show that everybody is worse off with the program's ending," said Cassidy. "Drivers of low-emission vehicles are worse off, drivers in the regular lanes are worse off, and drivers in the carpool lanes are worse off. Nobody wins."

A carpool lane along a four-mile stretch of I-880 in Hayward, for instance, saw a 15 percent reduction in speed after single-occupant hybrids were expelled after July 1.

The counterintuitive results reflect dual – and opposing – influences on traffic speed in the carpool lanes, the researchers explained. One factor is the presence of additional cars, including hybrids, which slow down traffic. One might think that moving vehicles out would allow the remaining cars in the lane to go faster.

But the data show that traffic speed in the carpool lane is also influenced by the speed of the adjacent lanes. Moving the hybrids into the neighboring lanes increases congestion in those lanes, which in turn slows down the carpoolers.

"As vehicles move out of the carpool lane and into a regular lane, they

have to slow down to match the speed of the congested lane," explained Jang. "Likewise, as cars from a slow-moving regular lane try to slip into a carpool lane, they can take time to pick up speed, which also slows down the carpool lane vehicles."

Human nature likely plays a role, too, the researchers said. "Drivers probably feel nervous going 70 miles per hour next to lanes where traffic is stopped or crawling along at 10 or 20 miles per hour," said Cassidy. "Carpoolers may slow down for fear that a regular-lane car might suddenly enter their lane."

Currently, the only single-occupancy vehicles allowed in California's carpool lanes are federally approved Inherently Low Emission Vehicles, or ILEVs, such as hydrogen fuel cell, 100 percent battery electric, and compressed natural gas vehicles with white clean air vehicle stickers. According to the California Air Resources Board, only 14,000 vehicles in the state have qualified thus far.

A new program, pending federal approval next January, will allow 40,000 super-clean plug-in-hybrids or hydrogen-powered internal combustion engine vehicles to claim green clean air vehicle stickers and enter carpool lanes.

But the researchers predict that this will not be enough. They argue that freeway traffic conditions will improve for everyone by increasing, not decreasing, the numbers allowed access to carpool lanes.

"I think we need to start managing carpool facilities in a smarter way, and letting those hybrids back in the carpool lane would be a good first step," said Cassidy. "And given the way that regular-lane speeds influence carpool lanes, added efforts to alleviate congestion in regular lanes could benefit all drivers."

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