Believing machines can out-do people may fuel acceptance of self-driving cars

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If you believe that machines can out-do people in certain activities, you might be more likely to accept self-driving cars on the roads -- and that may lead to new interior design changes for these vehicles, according to Penn State researchers. Credit: PXHere

In order for self-driving cars to hit the streets, more people may need to

concede that machines can outperform humans, at least in some tasks, according to Penn State researchers.

In a survey, people who had no trouble believing that machines can outperform humans—also called posthuman ability—were more likely to accept the presence of driverless cars on the highway. The findings may help carmakers design self-driving cars, as well as help policy makers better understand the factors behind the acceptance of autonomous vehicles, a concept that has caused considerable debate, according to S. Shyam Sundar, James P. Jimirro Professor of Media Effects and affiliate of Penn State's Institute for CyberScience (ICS).

"There are two camps—one camp is very strongly in favor of these kinds of smart technologies, such as self-driving cars, and the other, which has grave concerns about giving control to machines, especially for vital tasks like this," said Sundar, who is also the co-director of the Media Effects Research Laboratory at the Donald P. Bellisario College of Communications.

According to the researchers, some people have a knee-jerk reaction that gives them faith in the effectiveness of computers and machines. That faith carries over to systems that can drive cars, said Sundar, who worked with Andrew Gambino, a doctoral candidate in mass communication.

"In this study, the strongest predictor for accepting self-driving cars was posthuman ability, the belief that computers can surpass humans in this particular task," said Gambino, the lead author of the study. "We have come to a point now where we should no longer be talking about machines approximating humans in their ability, but, rather, outperforming humans. In the sense of safety, in reliability, in doing tasks without becoming tired, there are many arguments to be made that machines have transcended human abilities."

Posthuman ability had about twice the effect on the acceptance of self-driving cars as other beliefs found significant in the survey, such as the idea that self-driving cars are cool, or a person's general openness toward new technologies.

The strength of the posthuman effect may allow designers to re-envision the interiors of self-driving cars, according to the researchers. Steering wheels, which have been standard in cars for more than a century, could be eliminated to make room for interactive devices or interfaces, the researchers suggested.

"Designers may need to think in a different way, for example there's no need to design in-car and dashboard interfaces based on what a human driver would normally use," Sundar said. "Keep in mind, the participants also say they like the agency and convenience of autonomous vehicles and they do like the fun aspect as well, so the designer might want to add features on the dashboard that can bump up those things, including gamifying the transportation experience."

In lieu of traditional features and design elements that involve human interaction with the automobile (e.g., manual transmission clutch, pedals, hand-brakes), this space might be better utilized by systems that improve communication between the user, automobile and connected automobiles, according to Gambino.

"For example, a graphical user interface that is tailored to self-driving cars might include information that visually situates the vehicle within the entire transportation system, showing other vehicles, speed, traffic, accidents and risk areas," he said.

The ability to communicate driver intent can enhance the individual's sense of control, particularly in "high-stakes" moments, according to the researchers.

"The removal of traditional features may heighten a sense of danger, but the design of interactive features that enhance driver agency and communicate the ability of self-driving cars may be practical solutions to improving their acceptance," Gambino said.

The belief in computer superiority has shaped interactions between humans and computers in the past, according to Sundar. For example, most people are no longer leery about using an electronic calculator to find the answer to a challenging math problem because people accept that calculators can perform better than humans at the task, Sundar said.

The researchers, who report their findings today (May 8) at ACM CHI Conference on Human Factors in Computing Systems held in Glasgow, U.K., also found that the men in the survey were more likely to accept self-driving cars than women. They added that liberals, compared to conservatives, were significantly more accepting of self-driving cars.

The researchers also found that certain beliefs and assumptions will lower acceptance of self-driving cars. The fear that autonomous cars are dangerous, or the idea that they are just creepy, significantly increased the likelihood that a person would not accept self-driving cars.

For the survey, the researchers recruited 404 participants through Amazon's Mechanical Turk, an online crowdsourcing website frequently used in studies. The participants filled out a questionnaire that sought demographic information and contained a series of questions about self-driving cars. Participants could also add comments to the researchers' open-ended questions for additional reasons for accepting self-driving cars.

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