What Autopilot Training Can Teach Carmakers and Drivers

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Air travel remains one of the safest ways to get from one place to another, but two recent deadly crashes of Boeing jetliners is a reminder of the risks that come with transportation automation — a danger that the automotive industry should heed, transportation safety scientists say.

Boeing has been criticized for not adequately trainingflight crews on the stall-prevention software that is suspected of contributingto the crashes, which is notable given that the airline industry overall hasmade great strides in training crews on the capabilities and limitations ofautomation systems in aircraft. Psychological scientists have helped drivethose advances and two researchers who were heavily involved in that work nowsay car manufacturers need to follow the airline industry's example as automationincreasingly becomes a feature of their vehicles.

"Today, airline crashes are at a historic low—following aconcerted effort by human factors professionals to raise awareness of howhumans and automation systems can and must work together as a team, with anunderstanding of the strengths and limitations of each reflected in the other,"write researchers and safety consultants Stephen Casner and Edwin Hutchins in anewly published article. "Can history repeat itself in semi-automated cars?"

Pre-collision warning, automatic emergency braking, andhands-free driving systems have been generally limited to top-of-the-line cars,leaving most consumers without these high-tech features. But that's about tochange. According to *Consumer Reports*,2019 is the year that advanced driving assistance systems will become standardfeatures in lower-priced car models.

The automotive industry is not paying sufficient attentionto educating drivers on how to use the advanced features, Casner and Hutchinswarn, a shortcoming the airline industry learned after automation began toemerge in cockpits in the 1970s.

"We saw how working with automation sometimes taxed pilots'ability to pay attention and manage distractions — ones often introduced by theautomation itself," the researchers write in their review. "We saw howautomation changed the job of flying in fundamental ways. Today, it is standardpractice to provide pilots with a basic understanding of humans, machines, andwhat happens when the two are combined. All the while, we enjoy a historic lowin the aviation crash rate."

The aviation industry can trace that safety record to itsuse of research by Casner, Hutchins, and others investigating the impact that theautomated cockpit had on flight crew performance. The research revealed thatpilots were often confused about how the automation worked and frequently lettheir attention drift when the automated systems were operating. The findings spurredbetter pilot training that emphasized automation as a tool that complemented,but did not replace, active engagement in the cockpit. Those steps paid off: UScarriers saw crashes decline steadily in subsequent years.

History is repeating itself in cars, Casner and Hutchinsreport. In lab simulators as well as in actual vehicles, drivers show theydon't understand how the automated features work, with many showing aperilously exaggerated perception of the system's capabilities. A 2018 survey bya European car safety assessment group found that 11% of drivers believe theycan nap, read a newspaper, or watch a movie when the highway pilot feature isengaged. And these misperceptions are only exacerbated when drivers *borrow* or *rent* the advanced-feature cars.

Psychological studies have confirmed that drivers naturallymonitor the driving conditions less as the level of automation in their carincreases. A 2012 research report in *Perspectiveson Psychological Science* uncovered the boredom that results when we aredisengaged from our internal or external environment and wish we could engagein something more interesting. A 2015 report in the same journal details howmind-wandering and inattentiveness can result from both overstimulatingenvironments and those that aren't stimulating enough, such as staring out ofthe window of an autonomous car.

Casner and Hutchins have examined owner's manuals of severaltech-laden cars, and found many limitations in the cars' automation systems.For example, pre-collision warning systems may fail to detect pedestrians whoare shorter than a specific height. When rounding curves, an adaptive cruisecontrol can suddenly begin tracking a car in a different lane rather than thecar ahead in the same lane.

The scientists emphasize the importance of driver trainingas cars become more technologically sophisticated, and even suggest the need torevive high school driver education programs that have gradually disappearedover the past few decades. They add that drivers need to learn more than just"the knobs, dials, and details" of the cars they purchase; they need to graspthe underlying concepts about

how car automation works.

References

Casner, S.M., & Hutchins, E.L. (2019). What do we tell thedrivers? Toward minimum driver training standards for partially automated cars.*Journal of Cognitive Engineering andDecision Making*. https://doi.org/10.1177/1555343419830901

Eastwood, J. D., Frischen, A., Fenske, M. J., & Smilek, D.(2012). The unengaged mind. *Perspectives on Psychological Science, 7*(5), 482-495. https://doi.org/10.1177/1745691612456044

McDonald A., Carney C., & McGhee D. V. (2018, September). *Vehicle owners' experiences with and reactions to advanced driver assistance systems*. Washington, DC: American Automobile Association Foundation for Traffic Safety.

Thomson, D. R., Besner, D., & Smilek, D. (2015). A resource-control account of sustained attention. *Perspectives on Psychological Science, 10*(1), 82-96. https://doi.org/10.1177/1745691614556681