Professional Perspective

Advanced Vehicle Control Systems & Human Error

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Human error accounts for a vast majority of automobile accidents. Recent government statistics put the figure at upwards of 94% of all crashes. But as driving functions become increasingly automated, the temptation to blame the vehicle when things go wrong, and in turn assigning liability to auto manufacturers, becomes more tempting. But what actually constitutes human error in the context of a crash, particularly where automated driving functions may be implicated?

When we talk about human error causing crashes, it's usually not about drivers who simply botch the basic function of driving—interacting with the three primary driving controls of steering, braking, and throttle. Human error occurs in a broader context. For example, tailgating is a good example of human error that frequently causes crashes. The driver is perfectly capable of applying the brakes when the lead vehicle slows, but hasn't allowed enough time to do so and avoid a crash. The human error is the lapse in judgment of following too closely, not a deficit in the driver's reaction time before executing a hard brake application.

But, of course, there are certainly examples of crashes caused by human error when drivers botch the driving function itself. Perhaps the most infamous example is unintended acceleration claims involving electronic throttle systems. Despite dominating headlines for years, it is now generally accepted that the overwhelming cause of unintended acceleration events was human error in the form of pedal misapplication.

Drivers believed they were pressing the brake pedal when in fact their foot was on the gas pedal. A common refrain was that "the harder I pressed the brake, the faster my car accelerated." With the benefit of hindsight and context, it now seems obvious that vehicles from the mid-2010s weren't suddenly experiencing catastrophic throttle system malfunctions and simultaneous total failures of their independent braking systems. But the auto industry still consequently endured years of costly litigation and intensive governmental scrutiny.

Why wasn't it obvious at the time? Part of the hysteria was fueled by media sensationalism. But at the root, the American consumers have only a rudimentary understanding of how their vehicle control systems actually work. They know if you push the gas pedal, the vehicle accelerates. This lack of understanding breeds imaginative excuses for crashes that were actually caused by human error.

Modern vehicles use sophisticated drive-by-wire technologies. And for good reason. Old-fashioned throttle-body cables, hydraulic braking systems, and mechanical steering linkages are clunky, inefficient, and less reliable. These legacy mechanical systems are, as a result, less safe in many ways. The National Highway Traffic Safety Administration (NHTSA), the governmental agency responsible for vehicle safety standards, adopted standards for electronic throttles and braking, but not yet steering, although many manufacturers are going in this direction voluntarily.

The standards call for redundant safety features, failsafe modes, and other protections that ensure consistent and dependable performance. Importantly, these drive-by-wire technologies readily interface with autonomous and semi-autonomous control systems, which are necessary for the transition to autonomous driving.

As driving functions become increasingly automated, the temptation to assign fault to the vehicle when things go wrong becomes even more tempting. This is because consumers do not have a solid understanding of how their vehicle control systems actually operate. While consumers can understand mechanical systems more easily—you can look at them, touch them, and in most cases watch them in action to see how they work—in contrast, the operation of the hardware and software underlying autonomous and semi-autonomous vehicle control systems, is not readily observable.

Signals are inputted, the computer does its magic, and out comes a function that, in the case of a vehicle control system, dictates vehicle speed and direction. Unless you are a software engineer or have specialized knowledge in control systems, you likely don't know how your vehicle translates a particular input into action.

For auto manufacturers, this transition away from legacy mechanical control systems has created new challenges in defending their products. In a recent multi-fatality products liability trial involving an electric power steering assist, a jury had to decide between assigning fault to a "computer gremlin" in the semi-automated steering system, or old fashioned

human error. The plaintiffs contended that the steering wheel suddenly began to wobble, causing the driver to lose control before colliding head-on with a bridge abutment at highway speed.

The wobble was allegedly caused by a faulty module that determined the correct amount power steering assist – a phantom errant and intermittent signal loss that essentially took over the steering from the driver. From the perspective of a lay juror, the circumstances of this allegation were appealing. Certainly the driver would not have intentionally left the roadway for no reason with her family inside. That sentiment, coupled with jurors' unfamiliarity with automated vehicle systems, was a dangerous recipe for a substantial verdict against the manufacturer.

In reality, the driver had dozed off momentarily due to fatigued driving, a common occurrence of driver human error that leads to thousands of crashes every year. There was never a steering wobble. The trial resulted in a win for the manufacturer, but only because substantial evidence pointed in the direction of human error, and the evidence of a mysterious control system gremlin was very thin. It also helped that there were two engineers on the 12-person jury.

In contrast to the situation where vehicle control systems are blamed for causing a crash, auto manufacturers increasingly face allegations that a particular vehicle control system, if equipped, would have prevented one. Automatic emergency braking, for example, will slow or even stop your vehicle to mitigate certain frontal collisions. But not all vehicles have incorporated this new technology, and plaintiffs are bringing lawsuits when, in this circumstance, the vehicle does not step in to prevent or mitigate rear-end collisions that would otherwise be attributable to human error. Such cases are categorized as failure-to-equip claims. The argument is that a technology was available, however the manufacturer hadn't yet implemented across their model line-up, but probably should have when viewed through the lens of adding an available safety benefit. On its face, failure-to-equip is a logical argument and is often persuasive to juries.

Automatic emergency braking and other crash avoidance technologies that override human error are fundamental to the promise of semi-autonomous and autonomous driving . However, new vehicle take rates on crash avoidance features are proving that consumers are resistant to paying for enhanced safety, and some even outright reject it. In their eyes, cars may already be safe enough. Several studies have even shown that drivers consistently disable automatic emergency braking, forward collision warning, lane-keep assist, and other crash avoidance systems. They find them distracting. This begs the question: while statistically the net risk of driverless transportation may be lower because human error is mitigated, forcing everyone to give up active control of the driving function isn't likely.

As we assess liability for manufacturers' efforts to make the road safer, it is important to keep in mind that scapegoating technology when human error is to blame does not encourage manufacturers to implement these systems, nor does it promote public trust to accept them. Furthermore, in the context of failure-to-equip claims, before criticizing a manufacturer that sold a product without a particular crash avoidance technology, we should be mindful in considering other factors including that fact that it may ultimately have been the consumer who opted-out of the added costs. For the time being, however, auto manufacturers will continue to develop and deploy incremental improvements that benefit the public. Those who innovate and provide greater value to consumers in this regard will likely sell more.