

MY PET CAR: ASSIGNING LIABILITY WHEN ARTIFICIAL INTELLIGENCE CAUSES HARM

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Expert systems are software programs designed to make decisions. While expert systems once needed to be laboriously hand-coded to include every possible permutation of the conditions to which they may be applied, advances in machine learning have allowed the rapid development and deployment of algorithms to make decisions in a myriad of contexts. Algorithms developed by machine learning are now used in consumer smartphone cameras, social media timelines, credit score calculators, and driver assistance systems such as automatic braking (to name only a few).¹ Tools to create, train, and implement machine-learning-derived algorithms are now available at no cost and are capable of running on common computer hardware.²

Machine learning systems generally require a training dataset where a set of conditions with a known output is presented to a learning system. In a simple example, an algorithm to classify images might be presented with 100,000 photographs and told which 25,000 photographs contain cats. The learning system then considers all the information encoded in the photographs and determines the best predictors for whether a cat was or was not in a specific photograph. The system could then be used to determine whether a cat is present in a new photograph presented to it.³

¹ Sam Byford, *How AI is Changing Photography*, THE VERGE (Jan. 31, 2019), <https://www.theverge.com/2019/1/31/18203363/ai-artificial-intelligence-photography-google-photos-apple-huawei> (regarding consumer smartphone cameras); Paige Cooper, *How the Facebook Algorithm Works in 2020 and How to Make it Work for You*, HOOTSUITE BLOG (January 27, 2020), <https://blog.hootsuite.com/facebook-algorithm/> (regarding social media posts); Amy Fontinelle, *Are Algorithms Hurting Your Finances? What You Need to Know*, THE ASCENT (January 30, 2020), <https://www.fool.com/the-ascent/research/algorithmic-bias-finance/#:~:text=An%20algorithm%20decides%20whether%20to%20give%20you%20a,score%20is%20a%20big%20factor%20in%20those%20decisions> (regarding credit scores); Vasantha Angappan, *How Vision and Image Processing Algorithms Propel Automotive ADAS Development*, EINFOCHIPS (October 16, 2018), <https://www.einfochips.com/blog/how-vision-and-image-processing-algorithms-propel-automotive-ad-as-development/> (regarding automatic braking in vehicles).

² Bernard Marr, *What Is GPT-3 And Why Is It Revolutionizing Artificial Intelligence?*, FORBES (Oct. 5, 2020), <https://www.forbes.com/sites/bernardmarr/2020/10/05/what-is-gpt-3-and-why-is-it-revolutionizing-artificial-intelligence/?sh=379acdf3481a>.

³ In practice, commercial systems are far more powerful than this simple hypothetical suggests. For example, Google Photos is able to distinguish which of one author's two cats is present in a picture.

However, improperly trained algorithms have caused numerous failures in recent years. Some have been high profile, such as when a Stanford Medicine algorithm assigned only 7 of its first 5,000 doses of a COVID-19 vaccine to frontline medical workers while reserving other doses for senior staff who do not interact with sick patients.⁴ Other failures have only been visible to specific communities, like when one-third of California Bar Exam applicants were mistakenly flagged by an algorithm for cheating on the exam.⁵ Racial bias has even been demonstrated in algorithms that select recipients for organ transplants and recommend bail decisions for incarcerated individuals, thereby exacerbating, rather than reducing, inequitable outcomes in the medical selection process and criminal justice system.⁶

I. ASSIGNING LIABILITY TO THE MANUFACTURER

Judith Jarvis Thomson's infamous ethical dilemma, *Bystander at the Switch*, has taken on new life in the age of artificial intelligence.⁷ Thomson's dilemma involves a trolley car hurling toward a group of five workmen on the tracks and requires the subject to decide between (i) pulling a level and diverting the trolley car to a different set of tracks, upon which only one person is sitting; or (ii) doing nothing and allowing those five people to be killed by the oncoming trolley, thus saving the life of the lone individual on the second set of tracks.⁸ If written today, Thomson's thought experiment might consider the decisions made by a self-driving vehicle's algorithm when presented with the scenario of a pedestrian suddenly darting out in front of the oncoming vehicle. How should the algorithm react? Should it prioritize protecting the vehicle's occupant(s) or the pedestrian? Though these questions remain largely unanswered, we are nearing the day they may be raised in a courtroom.

⁴ Caroline Chen, *Only Seven of Stanford's First 5,000 Vaccines Were Designated for Medical Residents*, PRO PUBLICA (Dec. 18, 2020, 4:23 PM), <https://www.propublica.org/article/only-seven-of-stanfords-first-5-000-vaccines-were-designated-for-medical-residents>.

⁵ Joe Patrice, *California Bar Exam Flagged a Third of Applicants as Cheating*, ABOVE THE LAW (Dec. 18, 2020, 11:44 AM), <https://abovethelaw.com/2020/12/california-bar-exam-flagged-a-third-of-applicants-as-cheating/?rf=1>.

⁶ Gissela Moya, *Algorithmic Racial and Gender Bias is Real. The California State Legislature Must Act*, THE SACRAMENTO BEE (Jan. 13, 2021, 7:51 AM), <https://www.sacbee.com/opinion/op-ed/article248316280.html> (regarding organ transplant patients); Tom Simonite, *Algorithms Were Supposed to Fix the Bail System. They Haven't*, WIRED (Feb. 19, 2020, 8:00 AM), <https://www.wired.com/story/algorithms-supposed-fix-bail-system-they-havent/> (regarding bail decisions).

⁷ See Judith Jarvis Thomson, *The Trolley Problem*, 94 YALE L. J. 1395 (1985).

⁸ *Id.* at 1397.

Consider this scenario: Company A designs an algorithm that operates a fully self-driving vehicle manufactured by Company B. O owns one of these cars and, while operating the car normally and without human driver oversight, the car finds that it must decide between striking one of two pedestrians. It solves the problem by striking and injuring P, a pedestrian standing on the sidewalk. Who is liable for P's injuries and on what legal grounds?

David Vladeck suggests the pedestrian could assert claims under two theories of product liability, which is largely governed by strict liability doctrine under state law.⁹ Though each state has its own nuances, many choose to follow either the Restatement (Second) of Torts or the Restatement (Third) of Torts.¹⁰ Under the Restatement (Second), the pedestrian may be able to assert liability against the vehicle manufacturer based on the consumer expectations test, which requires a jury to ask whether the product is unreasonably more dangerous than a typical user might expect.¹¹ Under the Restatement (Third), the pedestrian may be able to claim a design defect and will then need to show that the risks of the harm stemming from the product could have been reduced by designing the product in some reasonably different way.¹²

However, software is generally not considered a "product" for the purposes of strict liability.¹³ Outside of strict liability, the only remaining cause of action for P would be to claim gross negligence or ordinary negligence. Assuming industry standards and customary practices have been followed, it is unlikely that the companies involved in the vehicle's creation would have committed gross negligence, which requires that a defendant act with "a major departure from the standard of care."¹⁴

Could the manufacturer of the car or the developer of the software controlling the car have committed ordinary negligence? Ordinary negligence requires the breach of a duty owed to the plaintiff by a defendant, upon which the breach of that duty caused

⁹ David C. Vladeck, *Machines Without Principals: Liability Rules and Artificial Intelligence*, 89 WASH. L. REV. 117, 134 (2014).

¹⁰ Am. L. Inst., *State Supreme Courts Adopt Restatement Sections*, (Dec. 10, 2018), <https://www.ali.org/news/articles/state-supreme-courts-adopt-restatement-sections/>.

¹¹ Vladeck, *supra* note 13, at 134.

¹² Vladeck, *supra* note 13, at 135.

¹³ Frances E. Zollers, Andrew McMullin, Sandra N. Hurd & Peter Shears, *No More Soft Landings for Software: Liability for Defects in an Industry That Has Come of Age*, 21 SANTA CLARA COMPUT. & HIGH TECH. L.J. 745 (2005); Seldon J. Childers, *Don't Stop the Music: No Strict Products Liability for Embedded Software*, 19 U. FLA. J. L. & PUB. POL'Y 125 (2008).

¹⁴ *Storrs v. Lutheran Hosps. & Homes Soc'y*, 661 P.2d 632, 634 (Alaska 1983).

damages.¹⁵ In our hypothetical, the damages themselves are clear. Less clear, however, is the specific duty that may have been breached and whether that breach could be found to have been the cause of the accident.

Science-fiction author Isaac Asimov posited three laws of robotics, the first of which is that a “robot may not injure a human being or, through inaction, allow a human being to come to harm.”¹⁶ This is a reasonable statement of how society would expect highly-autonomous products to interact with society. However, the artificially-intelligent software in our hypothetical is not an entity subject to judgement. Rather, it is a chattel owned by O. In this sense, it is like a domesticated animal, for which there is generally a duty to control that animal in a manner that prevents injury to others.¹⁷ Given that O had not controlled his vehicle in that way, P may have a valid claim against him.

Modern machine learning algorithms are similar to animals in that they program themselves based on data provided by their developers or collected from their surroundings.¹⁸ Unlike an animal, however, the decision-making process is made by humans and is not the product of genetics or God. Therefore, P may instead choose to bring a claim against either the manufacturer of the physical vehicle or the developer of the intelligent software—or both. However, software developers routinely disclaim any warranty of fitness for purpose when selling licenses to use their software and these disclaimers are routinely upheld.¹⁹ Even when an express warranty exists, software developers may limit their liability to fixing errors in the program rather than reimbursing damages.²⁰ Thus, it is likely that liability in such an instance would fall to the owner of the product, not the manufacturer or developer of the relevant software.

II. ASSIGNING LIABILITY TO THE END USER

The hypothetical above nearly came to life when, on March 18, 2018 in Tempe, Arizona, a pedestrian was struck and killed by an Uber Technologies’ automated test vehicle equipped with a self-

¹⁵ Legal Info. Inst., Negligence, WEX, <https://www.law.cornell.edu/wex/negligence> (last visited Feb. 6, 2021).

¹⁶ See generally ISACC ASIMOV, I, ROBOT (1950).

¹⁷ White v. Leeder, 149 Wis.2d 948, 958 (Wis. 1989).

¹⁸ Jason Dorrier, *DeepMind’s Newest AI Programs Itself to Make All the Right Decisions*, SINGULARITYHUB (Jul. 26, 2020), <https://singularityhub.com/2020/07/26/deepminds-newest-ai-programs-itself-to-make-all-the-right-decisions/>.

¹⁹ E.g., Dart Energy Corp. v. Vogel, 1991 U.S. Dist. LEXIS 10079, at *17 (W.D. Mich., Jul. 18, 1991).

²⁰ Golden Spread Coop., Inc. v. Emerson Process Mgmt. Power & Water Sols., 360 F. Supp. 3d 494, at 512 (N.D. Tex., Nov. 19, 2018).

driving system.²¹ According to the National Transportation Safety Board, the system failed to recognize the pedestrian and determined that an emergency braking maneuver was necessary only 1.3 seconds before impact.²² However, Uber explained that, when the vehicle is in self-driving mode, the system does not alert the vehicle's driver that they need to brake and instead relies on the *driver* to recognize the danger and react accordingly.²³ This is done to avoid the issue of the car braking erratically.²⁴

Though this provides a workaround to the Trolley Problem altogether and allows technology companies to escape criminal liability by placing responsibility in the hands of human drivers, it requires that the driver remain fully attentive throughout the entirety of the trip to avoid such emergencies. The inattentive Uber Technologies driver, in this instance, was watching a video on her cell phone and applied the vehicle's brakes less than one second before impact.²⁵ As a result, the driver was indicted by a grand jury on September 15, 2020 for negligent homicide.²⁶ It was recommended, though, that Uber not face criminal charges and the company eventually reached a private settlement with the pedestrian's family to avoid litigation.²⁷

In 2018, SAE International—a professional association of engineers that develops a variety of industry standards—released its standard definitions of terms related to levels of automation of self-driving vehicles and these definitions have since been adopted by the United States Department of Transportation.²⁸ The six levels of automation, numbered zero through five, are as follows:

²¹ NAT'L TRANSP. SAFETY BD., HIGHWAY ACCIDENT REPORT: COLLISION BETWEEN VEHICLE CONTROLLED BY DEVELOPMENTAL AUTOMATED DRIVING SYSTEM AND PEDESTRIAN, TEMPE, ARIZ., MARCH 18, 2018 v (2019).

²² NAT'L TRANSP. SAFETY BD., PRELIMINARY REPORT: HIGHWAY HWY18MH010 2 (2018) [hereinafter *Preliminary Report*].

²³ *Id.*

²⁴ *Id.*

²⁵ 12 News, *Uber Driver Charged in Self-Driving Crash That Left Woman Dead in Tempe in 2018*, WTSP-TV (Sept. 16, 2020, 6:41 AM), <https://www.wtsp.com/article/news/nation-world/uber-driver-charged-self-driving-crash-left-woman-dead-tempe-in-2018/75-5dbca82e-cbb4-443a-85d4-9ed498384909>.

²⁶ *Id.*

²⁷ Letter from Sheila Sullivan Polk, Yavapai Cnty. Att'y, to Bill Montgomery, Maricopa Cnty. Att'y. (Mar. 4, 2019) (on file with Yavapai County Attorney's Office) (recommending Uber not face criminal charges); Scott Neuman, *Uber Reaches Settlement with Family of Arizona Woman Killed by Driverless Car*, NPR (Mar. 29, 2019, 3:23 AM), <https://www.npr.org/sections/thetwo-way/2018/03/29/597850303/uber-reaches-settlement-with-family-of-arizona-woman-killed-by-driverless-car/>.

²⁸ U.S. DEP'T OF TRANSP., PREPARING FOR THE FUTURE OF TRANSPORTATION: AUTOMATED VEHICLES 3.0 vi (2018).

Level 0: No Automation — The full-time performance by the human driver of all aspects of the dynamic driving task, even when enhanced by warning or intervention systems.

Level 1: Driver Assistance — The driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task.

Level 2: Partial Automation — The driving mode-specific execution by one or more driver assistance systems of both steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task.

Level 3: Conditional Automation — The driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task with the expectation that the human driver will respond appropriately to a request to intervene.

Level 4: High Automation — The driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task, even if a human driver does not respond appropriately to a request to intervene.

Level 5: Full Automation — The full-time performance by an automated driving system of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver.²⁹

The vehicle involved in the Uber crash is likely categorized as a Level 3 product because the automated driving system controlled all aspects of the vehicle and the human was still expected to intervene in an emergency situation.³⁰ Given the lack of legal precedent regarding autonomous vehicle accidents from which to draw guidance, as well as the absence of Level 5 automation technology available to consumers today, it is suggested here that the potential civil and criminal liability faced by the user of an artificially intelligent product should largely turn on the degree of

²⁹ *Id.*

³⁰ *Preliminary Report, supra* note 2, at 2.

automation of that product and, relatedly, whether the driver or the algorithm was (or should have been) in direct control of the product at the time the harm occurred.³¹

This is assumed to have been the general rationale used in the decision to press negligent homicide charges against the driver of the Uber vehicle and the recommendation that Uber Technologies *not* face criminal penalties. As the Tempe Police Department explained in their report on the fatal collision that the “crash would not have occurred if [the driver] would have been monitoring the vehicle and the roadway conditions and was not distracted.”³² By requiring the driver to remain attentive and command control of the vehicle in the event of an emergency, Uber Technologies essentially transferred culpability for such offenses to the human driver. In other words, Uber Technologies was not criminally liable because its algorithm lacked the requisite culpability of Arizona’s negligent homicide statute, whereas the driver acted with criminal negligence by allegedly “fail[ing] to perceive a substantial and unjustifiable risk” of causing harm to a pedestrian by watching a video on her cell phone in lieu of monitoring the roadway.³³ Had the driver not been watching a video, it is probable that no criminal charges would have been brought due to the absence of culpability.

Most cars on the road today fall within the parameters of Levels 0, 1, or 2. For example, the 2020 Mazda CX-30 offers a driver assistance system with Lane-Keep Assist that corrects steering when the vehicle senses it is nearing the edge of the driving lane, likely placing the vehicle in Level 2 of the SAE International rankings.³⁴ Other vehicles, like the Uber test vehicle, may fall into Level 3 because they are largely autonomous but still require human drivers to intervene.³⁵ Because the driver of a Level 3 autonomous vehicle has the final say in how the car performs, when accidents occur, liability would be determined under the doctrine of ordinary negligence.

³¹ Jay Ramey, *Level 4 Autonomous Cars Begin Real-World Testing in Oxford*, AUTOWEEK (Oct. 26, 2020), <https://www.autoweek.com/news/technology/a34463393/level-4-autonomous-cars-begin-real-world-testing-in-oxford/>.

³² Michael Laris, *Backup Driver in Fatal Self-Driving Uber Crash was Streaming Hulu*, THE WASHINGTON POST (June 22, 2018, 6:01 AM), <https://www.washingtonpost.com/news/dr-gridlock/wp/2018/06/22/uber-safety-drivers-phone-was-streaming-the-voice-ahead-of-deadly-driverless-crash-police-find/>.

³³ ARIZ. REV. STAT. ANN. § 13-105(10)(d) (2015).

³⁴ LAS (Lane Keep Assist System), MAZDA, https://www.mazda.com/en/innovation/technology/safety/active_safety/las/.

³⁵ *Preliminary Report*, *supra* note 2, at 2.

As mentioned above, a claim of ordinary negligence requires that the plaintiff establish four elements: “(1) a legally cognizable duty owed by defendant to plaintiff; (2) breach of that duty; (3) that the conduct proximately caused the injury; and (4) actual loss or damage” suffered by the defendant.³⁶ A driver owes a duty of reasonable care when operating their vehicle and breaches that duty by acting unreasonably behind the wheel.³⁷ Car accidents are a common result of a driver’s breach of that duty.³⁸ But how can plaintiffs who have been injured in an accident with a highly-autonomous vehicle (Levels 4 and 5) establish breach when the defendant human driver had no say in the vehicle’s decision to drive in such a way that caused the accident? Under these circumstances, negligence is rendered largely inapplicable due to the impossibility of establishing the element of breach on the part of the human driver.

Highly-autonomous vehicles are like pet carrier pigeons: you tie your message to it and the pigeon does the rest. But here, the “pigeon” is two tons of steel and lithium, travelling at 70 miles-per-hour down the highway only a few feet from another vehicle, and the “message” is you behind the wheel and your toddler in the back seat. Although pigeons may be docile, highly-autonomous vehicles carry the risk of catastrophic injuries with even the slightest algorithmic miscalculation.

Strict liability doctrine is a legal tool used to hold defendants accountable for injuries suffered in the absence of fault.³⁹ Courts tend to wield this doctrine sparingly but frequently apply it to cases involving harm committed by domesticated animals with vicious tendencies.⁴⁰ The general rule is that if the owner of an animal knows or should know of that animal’s potential to be violent, they are automatically liable for any harm resulting from that violence.⁴¹ Liability is found not on the control of the animal, but on the owner’s expectation of harm *from* the animal.⁴² Given that, on average, 3,700 people are killed in car accidents around the world every day, it is not unreasonable to assume that such vehicle owners should have

³⁶ *Medeiros v. Sitrin*, 984 A.2d 620, 625 (R.I. 2009).

³⁷ *Campbell v. La. Dep’t of Transp. & Dev.*, 94-1052 (La. 01/17/95); 648 So. 2d 898, 901.

³⁸ To illustrate: If the pedestrian’s family in the Uber incident was to sue the driver of the vehicle for negligence, they would most certainly establish the element of breach by pointing to the fact that the driver was watching a video on her cell phone instead of the road and was thus acting unreasonably.

³⁹ Charles E. Cantu, *Distinguishing the Concept of Strict Liability in Tort from Strict Products Liability*, 22 U. MEM. L. REV. 823, 826 (2003).

⁴⁰ *Id.* at 834.

⁴¹ *Zarek v. Fredericks*, 138 F.2d 689, 690 (3d Cir. 1943).

⁴² Cantu, *supra* note 21, at 835-36.

knowledge of the potentially dangerous tendencies of their “pet cars.”⁴³

Therefore, if our legal system continues to hold human drivers responsible for the actions of their now-highly-autonomous vehicles and seeks a remedy under existing jurisprudence, it should treat liability for injuries resulting from these vehicles like the way it treats injuries incurred by potentially vicious domesticated animals: under strict liability doctrine. Insurance companies must then create autonomous vehicle insurance products for consumers that are analogous to pet liability insurance.⁴⁴ These insurance products need not be restricted to only vehicles, however, but could theoretically apply to many other highly-autonomous products that our world’s consumers will certainly encounter soon.

III. CONCLUSION

Although highly-autonomous vehicles have the potential to be vastly safer than vehicles driven by humans, correctly assigning liability in the instance of harm is a necessary function of an orderly and just society.⁴⁵ Ultimately, vehicle manufacturing and software development firms, rather than individual consumers, are likely in a better position to bear the burden of liability due to the complex nature of their products and their access to business liability insurance coverage. Taking this route would require our legal system to label software as a product susceptible to the laws of product defects. Though this may increase the overall financial costs of highly-autonomous products and could slightly slow their adoption, using business liability insurance in strict liability product claims as the final absorbers of liability is the model our legal system and society has followed throughout every stage of modern technological advancement and it is not necessary to reconsider this model just yet. Technology firms should continue to work closely with insurance companies as artificial intelligence progresses to ensure the responsible adoption of a technology that will soon be as ubiquitous to humankind as electricity and internet.

⁴³ *Annual Global Road Crash Statistics*, ASSOCIATION FOR SAFE INTERNATIONAL ROAD TRAVEL, <https://www.asirt.org/safe-travel/road-safety-facts/#:~:text=Approximately%201.35%20million%20people%20die,resulting%20in%20long%20term%20disabilities>.

⁴⁴ *Spotlight On: Dog Bite Liability*, INSURANCE INFORMATION INSTITUTE (Oct. 16, 2020), <https://www.iii.org/article/spotlight-on-dog-bite-liability>.

⁴⁵ WAYMO, WAYMO SAFETY REPORT: SEPTEMBER 2020 4 (2020).