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FAST & FURIOUS: THE MISREGULATION OF DRIVERLESS CARS

TRACY HRESKO PEARL*

[I]nasmuch as nature abhors a vacuum, lawmakers might hate vacuums more. If there is an unlegislated topical issue, legislators will fill that empty space.

—John Frank Weaver¹

TABLE OF CONTENTS

I.	Driverless Cars in the United States	24
A.	Impending Release	25
B.	SAE International Levels of Automation	27
C.	Two Roads to Automotive Autonomy	29
1.	The Gradualist Approach	30
2.	The All-In Approach	31
II.	The Likely Impacts of Driverless Cars	35
A.	Safety	35
B.	Traffic Reduction	39
C.	Increased Productivity	40
D.	Accessibility	41
III.	The State of the Law	43
A.	State Laws & Legislation	44
B.	Federal Involvement	45
C.	Common State Law Provisions	47
IV.	“Operator” Provisions	48
A.	Levels 2 and 3 Cars	50
B.	Levels 4 and 5 Cars	53
C.	The Twisted Logic of Operator Provisions	54
V.	Override Provisions	57

* Associate Professor of Law, Texas Tech University School of Law. J.D., Boston College Law School, 2006; M.Sc., Comparative Social Policy, Oxford University, 2003; A.B., Public Policy, Duke University, 2002. Many thanks to Professors Arnold Loewy, M. Alexander Pearl, Brie Sherwin, Robert Sherwin, and Victoria Sutton. I am also extremely grateful to my research assistants, Amanda Kraynok and Kristyn Urban Sorensen, for their amazing work. Thanks also to Michele Thaetig, Professor Marin Dell, and the excellent editorial staff at the N.Y.U. Annual Survey of American Law. This paper was presented at the We Robot 2017 conference at Yale Law School.

1. JOHN FRANK WEAVER, ROBOTS ARE PEOPLE TOO: HOW SIRI, GOOGLE CAR, AND ARTIFICIAL INTELLIGENCE WILL FORCE US TO CHANGE OUR LAWS 45 (2014).

A. The Untested Assumptions of Override	
Provisions	58
B. Levels 2 and 3 Vehicles	62
C. Levels 4 and 5 Vehicles	64
VI. Legislative Best Practices	67
VII. Conclusion	71

On May 7, 2016, the United States suffered its first fatality in a car accident involving a partially self-driving vehicle.² Joshua Brown, a forty-year-old business owner and former Navy SEAL, was driving his 2015 Tesla Model S down a highway in Williston, Florida, when the vehicle drove under the trailer of an eighteen-wheel truck that had turned left in front of his vehicle moments before.³ The impact sheared the roof off the Tesla.⁴ Mr. Brown was pronounced dead at the scene.⁵

Use of the phrase “the vehicle drove” is a correct description of the accident. At the time of his death, Mr. Brown had the vehicle’s “Autopilot” engaged.⁶ This feature allowed the vehicle “to steer itself within a lane, change lanes, and speed up or slow down based on surrounding traffic or the driver’s set speed.”⁷ In Autopilot mode, the vehicle could also “automatically apply brakes and slow the vehicle,” as well as scan for parking spaces and parallel park on its own.⁸ Prior to May 7, 2016, Tesla’s Autopilot feature “managed to log a combined 130 million miles without a single crash involving a fatality.”⁹ The technology involved seemed so reliable, in fact, that Elon Musk, Tesla’s famous and sometimes controversial CEO, went on record earlier in the year saying that the probability of having an

2. Tom Krisher & Joan Lowy, *Tesla Driver Killed in Crash While Using Car’s ‘Autopilot’*, ASSOCIATED PRESS (June 30, 2016, 10:26 PM), <http://bigstory.ap.org/article/ee71bd075fb948308727b4bbff7b3ad8/self-driving-car-driver-died-after-crash-florida-first>.

3. *Id.*; Mike Spector & Ianthe Jeanne Dugan, *Tesla Draws Scrutiny After Autopilot Feature Linked to a Death*, WALL ST. J. (June 30, 2016), <http://www.wsj.com/articles/tesla-draws-scrutiny-from-regulators-after-autopilot-feature-is-linked-to-a-death-1467319355>.

4. Krisher & Lowy, *supra* note 2.

5. *Id.*

6. Spector & Dugan, *supra* note 3.

7. Krisher & Lowy, *supra* note 2.

8. *Id.*

9. Zach Epstein, *Man Who Died in Fatal Crash with Model S on Autopilot Was Allegedly Watching a Movie*, BGR (July 1, 2016, 6:44 AM), <http://bgr.com/2016/07/01/model-s-autopilot-accident-movie/>.

accident in a Tesla Model S with Autopilot engaged was “50 percent lower” than it would be with a human driver in total control.¹⁰

Somewhat ironically, Mr. Brown was also a champion of Tesla’s Autopilot technology. He was known in the Tesla community for “testing the limits of the Autopilot function, documenting how the vehicle would react in blind spots, going around curves and other more challenging situations,” and posting numerous videos online that showed how the feature worked.¹¹ Merely a month before his untimely death, moreover, Mr. Brown posted a video in which he credited the Autopilot system for saving his life by avoiding a crash when a truck swerved into his lane on an interstate.¹² “Hands down the best car I have ever owned and used to its full extent,” he wrote in the caption to his video.¹³ Tragically, a glitch in the Autopilot system appears to have been at least a partial factor in his death weeks later: “his car’s cameras failed to distinguish the white side of [the] turning tractor-trailer from a brightly lit sky and didn’t automatically activate its brakes.”¹⁴

In the weeks after the crash, driverless vehicle technologies faced increased—and often hostile—scrutiny from both the media and industry insiders who voiced reservations about “the progress of automated cars,” and significant concerns about their safety.¹⁵ The *New York Times* asserted that the Tesla accident brought “the belief that computers can operate a vehicle more safely than human drivers” into question.¹⁶ *Fortune* worried that Mr. Brown’s death could “cast a shadow on the emerging world of self-driving cars, which are under development by some of the world’s biggest auto and tech companies”¹⁷ Karl Brauer, an analyst for *Kelley*

10. Anthony Cuthbertson, *Elon Musk: Tesla’s Autopilot Reduces Crashes by 50%*, NEWSWEEK (Apr. 25, 2016), <http://www.newsweek.com/elon-musk-teslas-autopilot-reduces-crashes-50-451929>.

11. Rachel Abrams & Annalen Kurtz, *Joshua Brown, Who Died in Self-Driving Accident, Tested Limits of His Tesla*, N.Y. TIMES (July 1, 2016), <http://www.nytimes.com/2016/07/02/business/joshua-brown-technology-enthusiast-tested-the-limits-of-his-tesla.html>.

12. Joshua Brown, *Autopilot Saves Model S*, YOUTUBE (Apr. 5, 2016), <https://www.youtube.com/watch?v=9I5rraWJq6E>.

13. *Id.*

14. Krisher & Lowy, *supra* note 2.

15. Spector & Dugan, *supra* note 3.

16. Neal E. Boudette & Bill Vlasic, *Self-Driving Tesla Was Involved in Fatal Crash, U.S. Says*, N.Y. TIMES (June 30, 2016), http://www.nytimes.com/2016/07/01/business/self-driving-tesla-fatal-crash-investigation.html?_r=0.

17. Katie Fehrenbacher, *Regulators Examine a Fatal Crash with Tesla’s Autopilot*, FORTUNE (June 30, 2016, 2:54 PM), <http://fortune.com/2016/06/30/regulators-examine-a-fatal-crash-with-teslas-autopilot/>.

Blue Book, said that the accident was “a bit of a wake-up call” and that perhaps industry insiders needed to “reassess” their view that driverless technologies would be ready for the market soon.¹⁸ A Florida news affiliate said that the crash was “raising safety concerns” for everyone in the entire state.¹⁹ Perhaps the strongest reaction, however, came from Clarence Ditlow, Executive Director of the Center for Auto Safety, who said that “[t]he Tesla vehicles with Autopilots are vehicles waiting for a crash to happen,” and asserted that they ought to be recalled so that Tesla could disable the feature until the federal government could issue safety guidelines.²⁰

While this single car accident yielded seemingly hundreds of pages of news coverage and online discussion, behind every article, blog post, and social media comment lurked two fundamental questions: (1) who should be held responsible for autonomous vehicle crashes and (2) what should the consequences be? With regard to the first, opinions varied. The initial accident report from the Florida Highway Patrol noted that the truck driver “failed to yield right-of-way” before turning in front of Mr. Brown’s Tesla.²¹ Subsequent reports were more damning of Mr. Brown’s behavior, revealing that a DVD player was found at the scene of the accident and that Mr. Brown may have been watching a Harry Potter movie at the time of his death, despite the fact that Tesla had explicitly warned customers that its Autopilot feature was “not reliable enough for a driver to stop paying attention [to the road]” while the feature was engaged.²² Finally, other commentators suggested that perhaps Tesla itself should be held responsible for the crash for, among other things, using “human guinea pigs” to beta-test its

18. Boudette & Vlastic, *supra* note 16.

19. Nick Bolton, *How the Media Screwed Up the Fatal Tesla Accident*, VANITY FAIR (July 7, 2016), <http://www.vanityfair.com/news/2016/07/how-the-media-screwed-up-the-fatal-tesla-accident> (quoting ABC Action News, *Witnesses to Aftermath of Deadly Tesla Say Autopilot Continued to Drive Car for Hundreds of Yards*, YOUTUBE (July 1, 2016, 5:00 AM), <https://www.youtube.com/watch?v=gQNMvHbL3jU>).

20. Jim Puzanghera, *Fatal Tesla Crash Exposes Lack of Regulation over Autopilot Technology*, L.A. TIMES (July 1, 2016, 4:45 PM), <http://www.latimes.com/business/la-fi-hy-tesla-selfdriving-safety-20160701-snap-story.html>.

21. Barbara Liston & Bernie Woodall, *DVD Player Found in Tesla Car in Fatal May Crash*, REUTERS (July 1, 2016, 11:04 PM), <http://www.reuters.com/article/us-tesla-autopilot-dvd-idUSKCN0ZH5BW>.

22. Mahita Gajanan, *Tesla Driver May Have Been Watching Harry Potter Before Fatal Crash*, VANITY FAIR (July 2, 2016), <http://www.vanityfair.com/news/2016/07/tesla-driver-may-have-been-watching-harry-potter-before-fatal-crash>.

autonomous driving technologies before they had been proven safe.²³

With regard to the second question—what the larger consequences of the crash should be—there was even greater ambiguity and uncertainty in the commentary. Should this accident force car manufacturers to delay their roll-out of new autonomous technologies,²⁴ or was it merely a tragic but unavoidable (and perhaps ultimately helpful) setback on what should be a determined march towards fully driverless cars?²⁵ Had states done enough to regulate these vehicles? Might greater *federal* regulation be the answer?²⁶ No one seemed quite sure.

Coverage of this accident, along with scores of other news and scholarly articles about autonomous vehicles, suggests that there is an even more basic problem than mere uncertainty lurking behind the analysis of accidents like this one: a fundamental confusion about driverless cars among journalists, scholars, lawmakers, and the general public that (a) makes assessing responsibility in incidents like this one unduly difficult, and (b) impedes the ability of policymakers to pass sound laws and regulations pertaining to the design and use of autonomous vehicles. Most notably, individuals within all of these sectors almost constantly conflate *fully* autonomous and *semi*-autonomous cars. This distinction, this Article argues, is extremely significant from a legal perspective and offers tremendous clarity to what might otherwise be thorny questions of law and public policy. In failing to make this distinction, lawmakers risk severely and unduly hampering the development of a technology that has the potential to radically improve and transform society within the next decade. Indeed, this Article argues, while it may seem counterintuitive, drawing a *legal* distinction between fully autonomous and semi-autonomous vehicles—and regulating the former significantly less—is the best way to promote needed technological advancement while simultaneously protecting human life.

Part I of this Article describes the current state of driverless car technology in the United States, the key differences between semi-

23. Patrick Lin, *Is Tesla Responsible for Deadly Crash on Auto-Pilot? Maybe.*, FORBES (July 1, 2016, 12:55 AM), <http://www.forbes.com/sites/patricklin/2016/07/01/is-tesla-responsible-for-the-deadly-crash-on-auto-pilot-maybe/#1955a9ed5b5b>.

24. Boudette & Vlastic, *supra* note 16.

25. Bolton, *supra* note 19 (suggesting that the crash provided a learning opportunity for car manufacturers).

26. Puzzanghera, *supra* note 20.

autonomous and fully autonomous cars, and the two divergent approaches that manufacturers are taking towards the development of driverless cars. Part II analyzes the key benefits offered by fully autonomous cars: the dramatic ways in which they stand to improve highway safety, reduce traffic, increase productivity, and provide greater access to reliable transportation. Part III examines both existing state laws that pertain to driverless cars and the growing call for federal regulation. Parts IV and V examine two provisions that states commonly include in their driverless car laws: operator provisions and override provisions. These sections explore the limitations of those laws when applied to, respectively, semi-autonomous and fully autonomous vehicles, and the nonsensical and problematic legal issues that arise from each. The Article concludes in Part VI by proposing a series of “legislative best practices” that state lawmakers should follow when contemplating driverless car legislation so that any resulting laws will both promote the development of autonomous vehicle technologies and enhance, rather than undermine, highway safety.

I. DRIVERLESS CARS IN THE UNITED STATES

Driverless cars, also known as autonomous vehicles (this Article uses these terms interchangeably), are those that do not require “real-time human input to operate or navigate. Instead, these vehicles use various sensors and computer software to collect and process information about the surrounding environment.”²⁷ These sensors “collect information about both internal conditions, such as speed and direction, and external conditions, such as the environment and vehicle location.”²⁸ As discussed at greater length below, fully autonomous cars require no driver input other than (a) turning on the vehicle and (b) inputting a destination. Semi-autonomous vehicles, however, only direct “some aspects of safety-critical control function (e.g., steering, throttle, or braking) . . . without driver input,” but require supervision from a licensed driver.²⁹

27. Kyle L. Barringer, Comment, *Code Bound and Down . . . A Long Way to Go and a Short Time to Get There: Autonomous Vehicle Legislation in Illinois*, 38 S. ILL. U. L.J. 121, 122 (2013).

28. *Id.*

29. Press Release, Nat'l Highway Traffic Safety Admin., U.S. Dep't of Transp., U.S. Department of Transportation Releases Policy on Automated Vehicle Development (May 30, 2013), <https://www.transportation.gov/briefing-room/us-department-transportation-releases-policy-automated-vehicle-development>.

A. *Impending Release*

While fully driverless cars may still seem like a futuristic novelty item to members of the general public, the commercial availability and widespread use of these vehicles appears to be “an imminent reality.”³⁰ Industry experts expect such cars to be “commercially available by 2020,”³¹ with several positing that they may be in showrooms even earlier than that.³² Indeed, Nissan,³³ General Motor’s Cadillac division,³⁴ Ford,³⁵ and Toyota³⁶ have all publicly commented that they hope to have fully driverless models of their cars available by 2020, and Tesla expects to have a fully driverless model available by 2018.³⁷ Even the most conservative estimates predict that these cars are, at most, “10 to 15 years out.”³⁸

Once on the market, industry experts predict that consumer adoption of fully driverless vehicles is likely to occur quickly.³⁹ IHS Automotive, for example, predicts that there will be fifty-four million self-driving cars worldwide by 2035 and that “nearly all of the vehicles in use are likely to be self-driving cars or self-driving com-

30. Matthew DeBord, *2 Things You Really Need to Know About Self-Driving Cars*, BUS. INSIDER (Jan. 9, 2015, 12:24 PM), <http://www.businessinsider.com/2-things-you-really-need-to-know-about-self-driving-cars-2015-1>.

31. WEAVER, *supra* note 1, at 55.

32. Josh Sanburn, *Self-Driving Cars Available by 2019, Report Says*, TIME (Aug. 16, 2012), <http://business.time.com/2012/08/16/self-driving-cars-available-by-2019-report-says/>.

33. *Nissan Plans to Begin Selling Self-Driving Cars by 2020*, REUTERS (Aug. 27, 2013), <http://www.reuters.com/article/us-autos-nissan-autonomous-idUSBRE97Q0VI20130827>.

34. Doug Newcomb, *You Won’t Need a Driver’s License by 2040*, WIRED (Sept. 17, 2012), <http://www.wired.com/autopia/2012/09/ieee-autonomous-2040/>.

35. Trefis Team, *General Motors Inching Closer to Self-Driving Cars*, FORBES (Mar. 16, 2016), <http://www.forbes.com/sites/greatspeculations/2016/03/16/general-motors-inching-closer-to-self-driving-cars/#725cc71116ad>.

36. *Id.*

37. *Id.* On October 19, 2016, Elon Musk, Tesla’s CEO, announced that Tesla customers will have the option of purchasing a “self-driving package,” which will allow the car to drive fully autonomously, when they purchase a new car. See Kirsten Korosec, *4 Reasons Why Tesla’s Autonomous Driving Announcement Matters*, FORTUNE (Oct. 20, 2016), <http://fortune.com/2016/10/20/tesla-self-driving-hard-ware-matters/>.

38. Lou Fancher, *Hard Drive: Self-Driving Cars Are Closer Than They Appear*, S.F. WKLY. (Feb. 19, 2014), <http://www.sfweekly.com/sanfrancisco/hard-drive-self-driving-cars-are-closer-than-they-appear/Content?oid=2829328>.

39. See Andrew R. Swanson, “*Somebody Grab the Wheel!*”: *State Autonomous Vehicle Legislation and the Road to a National Regime*, 97 MARQ. L. REV. 1085, 1094 (2014) (“In fact, it has been predicted that approximately seventy-five percent of vehicles on the road will be autonomous by 2040.”).

mercial vehicles sometime after 2050.”⁴⁰ Similarly, Boston Consulting Group estimates that fully autonomous vehicles “may capture 25% of the new car market” by 2035.⁴¹ Thus “a world of driverless vehicles” appears to be far closer than most people realize.⁴²

Even though the commercial sale of fully autonomous vehicles is currently several years away, cars that are semi-autonomous, like the Tesla Model S discussed above, are already being sold to consumers, with more set for release in the coming months.⁴³ Volvo’s XC90 sport utility vehicle, for instance, “has a semi-autonomous feature called ‘pilot assist’ intended for congested traffic” that allows the vehicle to travel “hands-free for miles at speeds up to 30 miles per hour on a properly marked road.”⁴⁴ Nissan has promised to release “the first elements of [a] suite of technology, dubbed ‘Intelligent Drive,’” which will allow their cars to “follow lines and navigate heavy traffic” without driver guidance, within the next year.⁴⁵ And Cadillac plans to release a semi-autonomous system called “Super Cruise” by 2017.⁴⁶ Super Cruise will include “hands-off lane following” and “braking and speed control” technologies.⁴⁷

40. Press Release, IHS Markit, Self-Driving Cars Moving into the Industry’s Driver’s Seat (Jan. 2, 2014), <http://press.ihs.com/press-release/automotive/self-driving-cars-moving-industrys-drivers-seat>.

41. *Autonomous Vehicle Adoption Study*, BOSTON CONSULTING GROUP, <http://www.bcg.com/expertise/industries/automotive/autonomous-vehicle-adoption-study.aspx> (last visited March 6, 2017).

42. Brad E. Haas, *Autonomous Vehicles May Impact Legal Profession*, 17 J. ALLEGHENY COUNTY B. ASS’N 1 (Oct. 2, 2015), <http://www.marshalldennehey.com/media/pdf-articles/O%20383%20by%20B.%20Haas%20%2810.02.15%29%v20Journal%20Allegheny%20County%20Bar.pdf>.

43. See Paul Ingrassia et al., *How Google Is Shaping the Rules of the Driverless Road*, REUTERS (Apr. 26, 2016), <http://www.reuters.com/investigates/special-report/autos-driverless/>.

44. Aaron M. Kessler, *Hands-Free Cars Take Wheel, and Law Isn’t Stopping Them*, N.Y. TIMES (May 2, 2015), http://www.nytimes.com/2015/05/03/business/hands-free-cars-take-wheel-and-law-isnt-stopping-them.html?_r=0.

45. John McIlroy, *Nissan IDS Concept: Japan’s Affordable Rival to the Tesla Model S?*, CNN (Nov. 3, 2015), <http://www.cnn.com/2015/11/03/autos/nissan-tokyo-motor-show/>.

46. Joe Lorio, *Cruise Slip: Cadillac’s Semi-Autonomous Super Cruise Tech Won’t Arrive Until 2017*, CAR & DRIVER (Jan. 14, 2016), <http://blog.caranddriver.com/cruise-slip-cadillacs-semi-autonomous-super-cruise-tech-wont-arrive-until-2017/>.

47. Anita Lienert, *GM Delays Super Cruise Technology on Cadillac CT6*, EDMUNDS.COM (Jan. 14, 2016), <http://www.edmunds.com/car-news/gm-delays-super-cruise-technology-on-cadillac-ct6.html>.

B. SAE International Levels of Automation

The multitude of semi-autonomous and fully autonomous vehicle technologies that (a) already co-exist and (b) are likely to multiply in coming years led SAE International, a global association of engineers, to divide vehicle automation into six levels to provide “common terminology for automated driving” as well as to provide a technical description of the differences between levels of automation.⁴⁸ These six levels are as follows:

- Level 0—No Automation: In Level 0 vehicles, a human driver is in total control of the primary vehicle controls (brake, steering, acceleration) at all times and is responsible for monitoring both the road and the vehicle.⁴⁹ For example, a car without cruise control capabilities would be considered a Level 0 vehicle.
- Level 1—Driver Assistance: Vehicles at this level have automation options for “either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the *dynamic driving task*.”⁵⁰ An example of a Level 1 vehicle would be a car with cruise control or electronic stability control. The driver has overall control of the vehicle at all times; “there is no combination of vehicle control systems working in unison that enables the driver to be disengaged from physically operating the vehicle by having his or her hands off the steering wheel AND feet off the pedals at the same time.”⁵¹ Most cars currently on the road, as of early 2017, are Level 1 vehicles.
- Level 2—Partial Automation: Level 2 vehicles have “automation of at least two primary control functions designed to work in unison to relieve the driver of control of those functions.”⁵² “[C]ombined functions” are the hallmark of Level 2 vehicles and include features like “adaptive cruise control [working] in combination with lane centering” that allow the driver to “disengage from physically operating the vehicle by having his or her hands off the steering wheel AND

48. SAE INT’L, AUTOMATED DRIVING: LEVELS OF DRIVING AUTOMATION ARE DEFINED IN NEW SAE INTERNATIONAL STANDARD J3016 1, https://www.sae.org/misc/pdfs/automated_driving.pdf.

49. *Id.*

50. *Id.*

51. NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., PRELIMINARY STATEMENT OF POLICY CONCERNING AUTOMATED VEHICLES 4 (2013).

52. *Id.* at 5.

foot off the pedal at the same time.”⁵³ The driver, however, “is still responsible for monitoring the roadway . . . and is expected to be available for control at all times and on short notice.”⁵⁴ Some cars bought within approximately the last three years are Level 2 vehicles. They only drive semi-autonomously when their drivers engage both adaptive cruise control and lane centering and they must be monitored by a human driver at all times.⁵⁵

- Level 3—Conditional Automation: Vehicles at this level “enable the driver to cede full control of all safety-critical functions under certain traffic or environmental conditions and in those conditions to rely heavily on the vehicle to monitor for changes in those conditions requiring transition back to driver control.”⁵⁶ While the driver must be available for “occasional control,” the vehicle is designed to both ensure safe operation during automated driving and to provide the driver with a “sufficiently comfortable transition time” to reassume control over the vehicle.⁵⁷ An example of a Level 3 vehicle would be a “self-driving car that can determine when the system is no longer able to support automation, such as from an oncoming construction area, and then signals to the driver to reengage in the driving task . . .”⁵⁸ The National Highway Traffic Safety Administration (NHTSA) also notes that “[t]he major distinction between level 2 and level 3 is that at level 3, the vehicle is designed so that the driver is not expected to constantly monitor the roadway while driving.”⁵⁹ There are no Level 3 vehicles currently available to consumers although, as discussed in Part I.A, this may change soon in light of Tesla’s recent announcement.
- Level 4—High Automation: Level 4 vehicles are “designed to perform all safety-critical driving functions and monitor roadway conditions for an entire trip.”⁶⁰ Unlike drivers of Level 3 vehicles, drivers of Level 4 vehicles are “not expected to be available for control at any time during the trip” other than to “provide destination or navigation in-

53. *Id.*

54. *Id.*

55. SAE INT’L, *supra* note 48, at 1.

56. NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 51, at 5.

57. *Id.*

58. *Id.*

59. *Id.*

60. *Id.*

put.”⁶¹ The entire responsibility for safe operation falls on the vehicle. However, “the automated system can operate only in certain environments and under certain conditions.”⁶² Level 4 vehicles are not yet available to consumers.

- Level 5—Full Automation: In Level 5 vehicles, “the automated system can perform all driving tasks, under all conditions that a human driver could perform them.”⁶³ A human being is not needed to supervise, monitor, or control the vehicle in any setting, and is not needed as a “fallback” option in the event of system failure.⁶⁴ Level 5 vehicles have not yet been developed.

As of mid-2016, “currently available automation technologies are . . . at Level 2, and moving into Level 3,”⁶⁵ although several companies are currently test-driving Level 4 vehicles in several American cities.⁶⁶

C. *Two Roads to Automotive Autonomy*

If few Americans realize how imminent the arrival of autonomous vehicles truly is, fewer still likely realize that companies are taking one of two approaches in their approach to these technologies—(1) a gradualist approach or (2) an “all-in” approach—and that a debate is raging between the two camps.⁶⁷ Understanding the differences between these two approaches—and their respective benefits and drawbacks—is helpful to understanding the types of laws that are needed to regulate driverless cars appropriately and effectively.

61. *Id.*

62. NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., FEDERAL AUTOMATED VEHICLES POLICY 9 (Sept. 2016), <https://www.transportation.gov/sites/dot.gov/files/docs/AV%20policy%20guidance%20PDF.pdf>.

63. *Id.*

64. SAE INTERNATIONAL, AUTOMATED DRIVING: LEVELS OF DRIVING AUTOMATION ARE DEFINED IN NEW SAE INTERNATIONAL STANDARD J3016 1 (2014), https://www.sae.org/misc/pdfs/automated_driving.pdf.

65. Dorothy J. Glancy, *Autonomous and Automated and Connected Cars—Oh My! First Generation Autonomous Cars in the Legal Ecosystem*, 16 MINN. J.L. SCI. & TECH. 619, 633 (2015).

66. Marcus E. Johnson, *The Drive for Autonomous Vehicles: Idaho’s Race to Catch Up*, 59 ADVOCATE. 28, 29 (2016).

67. See, e.g., Ingrassia, *supra* note 43; Justin Pritchard, *How Can People Safely Take Control from a Self-Driving Car?*, ASSOCIATED PRESS (Nov. 30, 2015), <http://bigstory.ap.org/article/84c6f179beb24f758a40acac1340ce78/how-can-people-safely-take-control-self-driving-car>.

1. The Gradualist Approach

Traditional automakers are gradually phasing in autonomous technologies to their models.⁶⁸ Their strategy involves adding a few more automated features each year, eventually producing a “truly self-driving car” at some point in the future.⁶⁹ Accordingly, their vehicles will slowly evolve from the Level 2 cars of today to the Level 3 cars of tomorrow before (presumably) reaching Level 4 status at a much later date.⁷⁰ This conservative approach is consistent with the slow (but steady) evolution of vehicles that has been occurring for decades: “[A]n evolution that has gone from cruise control to anti-lock brakes to electronic stability control.”⁷¹ As one journalist notes:

For automakers . . . self-driving is more about evolution than revolution—about building incrementally upon existing features like smart cruise control and parking assist to make cars that are safer and easier to drive, although the driver is still in control. Full autonomy may be the eventual goal, but the first aim is to make cars more desirable to customers.⁷²

An engineer at Volkswagen agrees, noting that “a lot of this is getting people comfortable with the technology, showing people a benefit . . . The idea is the driver is always in control—the vehicle is there to help you.”⁷³

Increasing public acceptance of autonomous vehicles is perhaps the largest benefit of the gradualist approach. Recent studies have repeatedly shown that, despite the rate at which the technology is advancing, autonomous vehicles have a major public relations hurdle to overcome.⁷⁴ Indeed, the Institute of Electrical and Electronics Engineers (IEEE) “predicts that the biggest barrier to

68. Pritchard, *supra* note 67.

69. *Id.*

70. *See id.*

71. Kessler, *supra* note 44.

72. Henry Fountain, *Yes, Driverless Cars Know the Way to San Jose*, N.Y. TIMES (Oct. 26, 2012), http://www.nytimes.com/2012/10/28/automobiles/yes-driverless-cars-know-the-way-to-san-jose.html?pagewanted=all&_r=0.

73. *Id.*

74. *See, e.g., Three-Quarters of Americans “Afraid” to Ride in a Self-Driving Vehicle*, AAA NEWSROOM (Mar. 1, 2016), <http://newsroom.aaa.com/2016/03/three-quarters-of-americans-afraid-to-ride-in-a-self-driving-vehicle/>; Mark Vallet, *Autonomous Cars: Will You Be a Co-Pilot or a Passenger*, INSURANCE.COM (Jul. 28, 2014), <http://www.insurance.com/auto-insurance/claims/autonomous-cars-self-driving.html>; Mike Masnick, *Hilarious Attack Ad in Florida Suggests That Legalizing Autonomous Vehicles Puts Old People at Risk*, TECHDIRT (Aug. 16, 2012), <http://www.techdirt.com/articles/20120816/02114020071/hilarious-attack-ad-florida-suggests-that-legalizing-autonomous-vehicles-puts-old-people-risk.shtml>.

pervasive adoption of driverless cars may have nothing to do with technology, but will be general public acceptance.”⁷⁵ A January 2016 poll by AAA, for instance, found that “three out of four U.S. drivers report feeling ‘afraid’ to ride in an autonomous car.”⁷⁶ Another poll of 2,000 licensed drivers found that 64% of those surveyed thought humans “are better at decision-making than computers,” that 61% of them believed they personally could drive better than a computer, and that 75% of them “would not trust a fully autonomous vehicle to drive their child to school.”⁷⁷ Driverless cars have also been the subject of a political attack ad in at least one state: “A local campaign ad in Florida attacked candidate Jeff Brades for [voting to] legalize ‘driverless cars.’”⁷⁸ The commercial centered on “the idea that driverless cars are going to run down little old ladies in the street.”⁷⁹ By slowly introducing consumers to greater amounts of vehicle automation, the gradualist approach aims to combat those fears and gradually increase public acceptance of fully driverless vehicles over time.⁸⁰

The gradualist approach, however, may have a major flaw: Level 2 and Level 3 vehicles, as explained below, may actually be *more* dangerous than fully driverless Level 4 vehicles.⁸¹ This is the concern motivating the second approach to driverless car development: the all-in approach.⁸²

2. The All-In Approach

The all-in approach is the far more aggressive approach to autonomous vehicle development being taken by tech companies, like Google,⁸³ and a small number of traditional automakers, like Ford.⁸⁴ This approach involves developing and testing fully driverless Level 4 vehicles immediately rather than starting with semi-au-

75. Newcomb, *supra* note 34.

76. AAA NEWSROOM, *supra* note 74.

77. Mark Vallet, *supra* note 74.

78. Mike Masnick, *supra* note 74.

79. *Id.*

80. See Fountain, *supra* note 72.

81. See Pritchard, *supra* note 67.

82. See *id.*

83. *Id.*; Alex Davies, *Google’s Self-Driving Car Hits Roads Next Month—Without a Wheel or Pedals*, WIRED (Dec. 23, 2014, 1:24 PM), <http://www.wired.com/2014/12/google-self-driving-car-prototype-2/>.

84. Ingrassia, *supra* note 43 (“Ford Motor is developing both L3 cars and L4 cars, says Ken Washington, vice president for research and advanced engineering. But Ford prefers L4 technology because, like Google, it doesn’t think a quick handoff from machine to human is feasible.”).

tonomous cars.⁸⁵ Google's current prototype, for example, lacks a steering wheel and pedals and limits human control to "go and stop buttons."⁸⁶ Instead of relying on human supervision to ensure safe operation, these Level 4 vehicles use combinations of lasers, radar sensors, and cameras to gather highly detailed second-by-second information about the vehicle's surroundings.⁸⁷ One journalist describes Google's patented "LIDAR" system for its Level 4 cars as follows:

The laser provide[s] three-dimensional depth: its sixty-four beams spin around ten times per second, scanning 1.3 million points in concentric waves that begin eight feet from the car. It [can] spot a fourteen-inch object a hundred and sixty feet away. The radar [has] twice that range but nowhere near the precision. The camera [is] good at identifying road signs, turn signals, colors, and lights. All three views [are] combined and color-coded by a computer in the trunk, then overlaid by the digital maps and Street Views that Google had already collected. The result [is] a road atlas like no other: a simulacrum of the world.⁸⁸

In addition to these sensors, Level 4 vehicles utilize software that can "recognize objects, people, cars, road markings, signs and traffic lights, obeying the rules of the road and allowing for multiple unpredictable hazards including cyclists" and road construction sites.⁸⁹ Google is even honing its "honking algorithm" to "use different types of honks depending on the situation," much like a human driver would.⁹⁰

Companies taking the all-in approach want to skip over semi-autonomous Level 2 and 3 vehicles because these vehicles present "one of the biggest challenges with this technology: how to safely transfer control from the computer to the driver, particularly in an

85. *Id.*

86. *Id.*

87. See Fountain, *supra* note 72.

88. Burkhard Bilger, *Auto Correct: Has the Self-Driving Car at Last Arrived?*, THE NEW YORKER (Nov. 25, 2013), <http://www.newyorker.com/magazine/2013/11/25/auto-correct>.

89. Samuel Gibbs, *Google's Self-Driving Car: How Does It Work and When Can We Drive One?*, THE GUARDIAN (May 29, 2014), <https://www.theguardian.com/technology/2014/may/28/google-self-driving-car-how-does-it-work>.

90. *Google Self-Driving Car Project Monthly Report: May 2016*, GOOGLE (May 2016), <https://static.googleusercontent.com/media/www.google.com/en//self-drivingcar/files/reports/report-0516.pdf>.

emergency.”⁹¹ One writer observes that this is “a balancing act, one that requires providing drivers with the benefits of autonomy—like not having to pay attention—while ensuring they are ready to grab the wheel if the car encounters something it can’t handle.”⁹² Thus far, however, this has been a balancing act that companies have been unable to perform successfully.

Tesla, for instance, recently had to explain that its Level 2 Autopilot feature “did not mean drivers could stop paying attention” after multiple videos online showed drivers doing pretty much everything *other* than paying attention to the road when Autopilot was engaged:

Some people played games while driving. Other people pretended to sleep. One moron thought it would be a good idea to climb into the passenger seat and leave the driver’s seat empty while Autopilot drove his car down the highway at about 70MPH. The proud future Darwin Awards candidate was even interviewed by *Inside Edition*. “Yeah it’s a little dangerous but I have a lot of faith in [Tesla’s] Autopilot system,” the man said.⁹³

Google discovered that Level 2 and 3 technologies could be unsafe even earlier, in 2012, when it asked some of its employees to test-drive its semi-autonomous prototypes. Although the volunteers “agreed to watch the road at all times and be ready to retake control if needed,” Google filmed the volunteers being lulled by the technology into “silly behavior[s]” like searching for items in the backseat while the car was traveling at 65 miles an hour.⁹⁴ Audi conducted studies, moreover, that showed that humans are seemingly incapable of resuming control of a Level 3 vehicle quickly: “its tests show it takes an average of 3 to 7 seconds, and as long as 10, for a driver to snap to attention and take control, even with flashing lights and verbal warnings,” a remarkably dangerous lag time when a vehicle is traveling at a high rate of speed.⁹⁵

In light of these incidents and studies, all-in companies don’t believe that “a quick handoff from machine to human is feasible,”

91. Alex Davies, *Ford’s Skipping the Trickiest Thing About Self-Driving Cars*, WIRED (Nov. 10, 2015), <https://www.wired.com/2015/11/ford-self-driving-car-plan-google/>.

92. *Id.*

93. Zach Epstein, *A Compilation of Very Stupid People Doing Very Stupid Things with Tesla Autopilot Engaged*, BGR (July 8, 2016, 10:21 AM), <http://bgr.com/2016/07/08/tesla-autopilot-crash-reason-compilation-video/>.

94. Ingrassia, *supra* note 43.

95. Davies, *supra* note 91.

and thus have decided to focus their efforts on designing fully driverless vehicles that are safe enough to handle *all* driving scenarios and environments without human direction or intervention.⁹⁶ Google, for instance, is currently testing over fifty Level 4 autonomous vehicles and has driven “over 2 million miles with no human control on the roads in California, Texas, and Washington State.”⁹⁷

The major flaw with the all-in approach, of course, is the public relations issue discussed immediately above. Members of the general public and proponents of the gradualist approach are “not ready for humans to be completely taken out of the driver’s seat,” as Mary Cummings, director of Duke University’s Humans and Robotics Laboratory, testified before the U.S. Senate in March 2016,⁹⁸ and so all-in companies may experience a lack of market demand for their Level 4 vehicles if and when they are released.⁹⁹ Further, as discussed at length below, lawmakers in many states are in the process of passing—or have already passed—laws that require autonomous vehicles to permit human intervention, thus essentially outlawing Level 4 vehicles.¹⁰⁰ All-in companies, therefore, may have burgeoning legal battles ahead of them before they are able to sell their cars to the general public.¹⁰¹

These legal battles may be a reflection of the strange status of driverless car development in the United States: given the two competing camps of thought described above, both semi- and fully autonomous vehicles are being developed simultaneously and are likely to come to market within roughly the same period of time. More advanced Level 2 cars may be released within the same general timeframe as Level 3 *and* Level 4 cars, depending on whether their developers are all-ins or gradualists. Meanwhile, as discussed at greater length below, driverless car laws and regulations do not (as of yet) distinguish between them, creating headaches for all developers, but for all-in companies, in particular.

96. Ingrassia, *supra* note 43.

97. Johnson, *supra* note 66.

98. Ingrassia, *supra* note 43.

99. See Tom Krisher & Justin Pritchard, *Autonomous Cars Aren’t Perfect, But How Safe Must They Be?*, SALON (Mar. 17, 2016), http://www.salon.com/2016/03/17/autonomous_cars_arent_perfect_but_how_safe_must_they_be/.

100. See WEAVER, *supra* note 1, at 56–57 (analyzing District of Columbia legislation that requires that autonomous vehicles have a human being in the driver’s seat “prepared to take control of the autonomous vehicle at any moment”); Swanson, *supra* note 39, at 1139 (discussing a Nevada regulation that “requires a device that allows the autonomous vehicle to be easily overridden by the driver”).

101. See *infra* Part III.

II. THE LIKELY IMPACTS OF DRIVERLESS CARS

Any analysis of the laws and regulations that are warranted in response to automated vehicles must be grounded in an understanding of the various impacts that this form of technology will likely have on American society, as those impacts are likely to be profound:

Autonomous vehicles (AVs) are now poised to be the next great transformative transportation technology. They will comprise new market opportunities for products and services. They are predicted to have a significant impact on how we live, work, and use our time. They may play a critical role in our infrastructure, land use, and regional planning decisions. They have the potential to help address many enduring social needs (e.g., mobility for the disabled, improved safety, reduced pollution), but also present significant, complex, and uncertain social risks in terms of their potential to disrupt or displace existing social and economic systems. They will redefine and redistribute individual freedoms and responsibilities vis-à-vis those of the state and industry.¹⁰²

Rushing to pass laws without a nuanced appreciation of these impacts—as many states have already done—risks undermining many of the largest benefits of autonomous vehicles, creating nonsensical criminal and civil liabilities, and stifling further development (and improvement) of the technology.¹⁰³ Four likely impacts, in particular, are highly significant.

A. *Safety*

Autonomous vehicles stand to make their most significant impact through improvements in traffic safety.¹⁰⁴ Currently, driving and riding in motor vehicles in the United States is surprisingly dangerous. Although motor vehicle crashes have declined fairly significantly over the past decade, motor vehicle crashes are still the

102. Leili Fatehi & Frank Douma, *Autonomous Vehicles: The Legal and Policy Road Ahead*, 16 MINN. J.L. SCI. & TECH. 615, 617 (2015).

103. See WEAVER, *supra* note 1, at 61; Kyle Graham, *Of Frightened Horses and Autonomous Vehicles: Tort Law and Its Assimilation of Innovations*, 52 SANTA CLARA L. REV. 1241, 1256 (2012); Laura Putre, *Speed Up Self-Driving Regulations, Says Volvo CEO*, INDUS. WKLY. (Oct. 9, 2015), <http://www.industryweek.com/regulations/speed-self-driving-regulation-says-volvo-ceo>.

104. Adeel Lari et al., *Self-Driving Vehicles and Policy Implications: Current Status of Autonomous Vehicle Development and Minnesota Policy Implications*, 16 MINN. J.L. SCI. & TECH. 735, 750 (2015).

leading cause of death for individuals at age 11 and between the ages of 16 and 24.¹⁰⁵ Each year, car accidents kill approximately 33,000 Americans.¹⁰⁶ To give that number some context, this amounts to over 90 fatalities every day,¹⁰⁷ or “the equivalent of a Boeing 737 falling out of the sky five days a week.”¹⁰⁸ And those are just the accidents that involve fatalities. There are several *million* more non-fatal accidents each year.¹⁰⁹ In 2009, for instance, there were 10.8 million automobile accidents on American roadways, amounting to over 29,000 accidents and 6,000 injuries per day.¹¹⁰

Why do car accident fatalities and injuries remain so high despite significant improvements in automobile safety over the last several decades? The evidence overwhelmingly points to one culprit: human drivers.¹¹¹ One journalist explains:

Human beings make terrible drivers. They talk on the phone and run red lights, signal to the left and turn to the right. They drink too much beer and plow into trees or veer into traffic as they swat at their kids. They have blind spots, leg cramps, seizures, and heart attacks. They rubberneck, hotdog, and take pity on turtles, cause fender benders, pileups, and head-on collisions. They nod off at the wheel, wrestle with maps, fiddle with knobs, have marital spats, take the curve too late, take the curve too hard, spill coffee in their laps, and flip over their

105. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., TRAFFIC SAFETY FACTS: 2014 DATA: SUMMARY OF MOTOR VEHICLE CRASHES 1 (May 2016), <http://www-nrd.nhtsa.dot.gov/Pubs/812263.pdf>.

106. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., 2013 MOTOR VEHICLE CRASHES: OVERVIEW 1 (2014), <http://www-nrd.nhtsa.dot.gov/Pubs/812101.pdf>.

107. John Villasenor, *Products Liability and Driverless Cars: Issues and Guiding Principles for Legislation*, in THE BROOKINGS INSTITUTION: THE ROBOTS ARE COMING: THE PROJECT ON CIVILIAN ROBOTS 1, 3 (April 2014).

108. *Google Makes the Case for a Hands-Off Approach to Self-Driving Cars*, NPR: ALL TECH CONSIDERED (Feb. 24, 2016, 6:26 PM), <http://www.npr.org/sections/alltechconsidered/2016/02/24/467983440/google-makes-the-case-for-a-hands-off-approach-to-self-driving-cars>.

109. U.S. CENSUS BUREAU, STATISTICAL ABSTRACT OF THE UNITED STATES: 2012, at 693 (2011), <http://www.census.gov/prod/2011pubs/12statab/trans.pdf>.

110. *Id.*

111. See Carrie Schroll, *Splitting the Bill: Creating a National Car Insurance Fund to Pay for Accidents in Autonomous Vehicles*, 109 Nw. U. L. REV. 803, 804 (2015); NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., TRAFFIC SAFETY FACTS: 2014 DATA: ALCOHOL-IMPAIRED DRIVING 1 (Dec. 2015), <http://www-nrd.nhtsa.dot.gov/Pubs/812231.pdf>; *New Allstate Survey Shows Americans Think They Are Great Drivers—Habits Tell a Different Story*, ALLSTATE NEWSROOM (Nov. 3, 2011), <https://www.allstatenewsroom.com/news/new-allstate-survey-shows-americans-think-they-are-great-drivers-habits-tell-a-different-story-2/>.

cars. Of the ten million accidents that Americans are in every year, nine and a half million are their own damn fault.¹¹²

Indeed, studies have consistently shown that approximately 94% of all motor vehicle accidents are caused by human error, with less than 6% being caused by product defects or malfunctions.¹¹³ Two driving issues, in particular, account for a significant number of accidents.

First, despite large scale—and fairly successful—public health campaigns over the last twenty years, alcohol and drug-impaired driving is still an enormous problem in the United States.¹¹⁴ In 2014, for instance, alcohol-impaired traffic accidents killed 9,967 people, amounting to approximately 31% of all traffic-related fatalities and averaging one fatality every 53 minutes.¹¹⁵ Further, the annual cost of alcohol-related motor vehicle accidents typically exceeds \$59 billion.¹¹⁶

Second, distracted driving is a significant and growing problem on American roadways. In a survey of 1,000 American drivers conducted by Allstate, seven in ten respondents said that “as a result of being distracted while driving, they [had] slammed their brakes or swerved to avoid an accident, missed a traffic signal, or actually caused an accident.”¹¹⁷ Thirty-four percent of respondents admitted to having sent a text message or e-mail while driving, although the rate was significantly higher for younger drivers: 63% of respondents ages 18 to 29 and 58% of respondents ages 30 to 44 admitted to texting or e-mailing while driving.¹¹⁸

There are other human driver issues that contribute to high motor vehicle accident rates as well. Eighty-nine percent of drivers admit that they’ve driven over posted speed limits, with 40% saying they’ve driven more than twenty miles per hour over that limit.¹¹⁹ Forty-five percent of drivers “say they have driven while excessively tired—to the point of almost falling asleep.”¹²⁰ Even cautious and

112. Bilger, *supra* note 88.

113. See Schroll, *supra* note 111, at 805.

114. NAT’L HIGHWAY SAFETY TRAFFIC ADMIN., ALCOHOL-IMPAIRED DRIVING, *supra* note 118.

115. *Id.*

116. *Id.* at 2.

117. ALLSTATE, *supra* note 111.

118. *Id.*; see also Bilger, *supra* note 88 (“More than half of all eighteen-to-twenty-four-year-olds admit to texting while driving, and more than eighty per cent drive while on the phone.”).

119. ALLSTATE, *supra* note 111.

120. *Id.*

conscientious drivers occasionally make mistakes, misperceive their surroundings, or experience lapses in judgment.¹²¹

In light of these numbers, most autonomous vehicle researchers agree that fully autonomous vehicles can drastically improve highway safety in the United States because they take the most dangerous part of motor vehicles—human drivers—out of the proverbial equation.¹²² One scholar notes that “[a]utonomous systems do not get drunk. Nor do they get tired or suffer from such distractions as texting while driving.”¹²³ Beyond that, autonomous vehicles are likely to be safer than human-driven vehicles because they do not suffer from the limitations of human perception and have faster reaction times:

I don't care how good of a driver you are (or you think you are): your car, being for all practical purposes a robot, can digest a huge amount of data and make a decision about the best course of action to take in approximately the same amount of time it takes for you to move your foot from the gas to the brake. Our brains just don't work fast enough to keep up, and if something goes wrong, your car will be vastly better than you are at keeping you (and your passengers) from harm.¹²⁴

Indeed, unlike human drivers, automated vehicles have 360-degree perception and the ability to make driving decisions twenty times per second.¹²⁵ A poignant story told by Dmitri Dolgov, the lead programmer for Google's driverless car initiative, highlights the ways in which these vehicles can improve upon human driving:

Dolgov was riding through a wooded area one night when the [driverless] car suddenly slowed to a crawl. “I was thinking, What the hell? It must be a bug,” he told me. “Then we no-

121. See Villasenor, *supra* note 107, at 3.

122. See Barringer, *supra* note 32, at 137; Neal Katyal, *Disruptive Technologies and the Law*, 102 GEO. L.J. 1685, 1688 (2014); Lari, *supra* note 104, at 735; David Levinson, *Climbing Mount Next: The Effects of Autonomous Vehicles on Society*, 16 MINN. J.L. SCI. & TECH. 787, 795 (2015); Schroll, *supra* note 111, at 805; Evan Ackerman, *Study: Intelligent Cars Could Boost Highway Capacity by 273%*, IEEE SPECTRUM (Sept. 12, 2012), <http://spectrum.ieee.org/automaton/robotics/artificial-intelligence/intelligent-cars-could-boost-highway-capacity-by-273>; J. Lutin et al., *The Revolutionary Development of Self-Driving Vehicles and Implications for the Transportation Engineering Profession*, ITE J., July 2013, at 28.

123. Lutin, *supra* note 122, at 28.

124. Ackerman, *supra* note 122.

125. Abby Haglage, *Google, Audi, Toyota, and the Brave New World of Driverless Cars*, THE DAILY BEAST (Jan. 16, 2013), <http://www.thedailybeast.com/articles/2013/01/16/google-audi-toyota-and-the-brave-new-world-of-driverless-cars.html>.

ticed the deer walking along the shoulder.” The car, unlike its riders, could see in the dark.¹²⁶

Accordingly, researchers believe that if even just 10% of the motor vehicles used in the United States were autonomous, 1,100 fewer people would die in car accidents each year.¹²⁷ At a 50% market penetration, 9,600 lives would be saved and 2 million fewer traffic accidents would occur each year.¹²⁸ At a 90% market penetration, 21,700 lives would be saved and there would be over 4 million fewer crashes each year in the United States.¹²⁹ One scholar theorizes that “[w]e might plausibly imagine a reduction to hundreds of deaths per year in the United States as we achieve full deployment” of autonomous vehicles.¹³⁰ In fact, driverless cars are predicted to reduce accidents by so much that the automobile insurance industry is preparing for its revenues to shrink considerably and premiums to “drop as much as 60 percent in 15 years as self-driving cars hit the roads.”¹³¹

B. Traffic Reduction

Widespread use of autonomous vehicles could also drastically reduce highway congestion in the United States, an issue which currently costs the country approximately \$100 billion in wasted fuel and reduced productivity each year.¹³² The reason for this likely improvement is fairly simple:

Because they are safer, autonomous vehicles can have shorter headways. They can follow other each other at a significantly reduced distance. Because they are safer and more precise and more predictable, autonomous vehicles can stay within much narrower lanes with greater accuracy. Lateral distances can be closer; lanes can be narrower.¹³³

Human drivers, however, require fairly significant headway between cars and for a good reason: our (comparatively) slower reaction

126. Bilger, *supra* note 88.

127. Jeffrey K. Gurney, *Driving into the Unknown: Examining the Crossroads of Criminal Law and Autonomous Vehicles*, 5 WAKE FOREST J.L. & POL'Y 393, 402 (2015).

128. Adam Thierer & Ryan Hagemann, *Removing Roadblocks to Intelligent Vehicles and Driverless Cars*, 5 WAKE FOREST J.L. & POL'Y 339, 353 (2015).

129. Katyal, *supra* note 122, at 1688.

130. Levinson, *supra* note 122, at 795.

131. Noah Buhayar & Peter Robison, *Can the Insurance Industry Survive Driverless Cars?*, BLOOMBERG BUSINESSWEEK (July 30, 2015, 5:00 AM), <http://www.bloomberg.com/news/articles/2015-07-30/can-the-insurance-industry-survive-driverless-cars->

132. Lari et al., *supra* note 104, at 796–97.

133. Levinson, *supra* note 122, at 796–97.

times mean that we have to stay some distance away from the vehicle ahead of us in order to safely respond if that vehicle comes to a sudden stop.¹³⁴ Consequently, even on a highway filled to capacity by human drivers, cars currently take up only about eight percent of the available road space.¹³⁵

This number will likely change dramatically as autonomous vehicles take the road. One study, for instance, showed that replacing human-driven cars with autonomous vehicles would boost the capacity of U.S. roads by a “staggering” 273%.¹³⁶ Even the most conservative estimates suggest that widespread use of autonomous vehicles would double road capacity.¹³⁷ Other similar types of potential improvements include “fewer lanes needed due to increased throughput, narrower lanes because of accuracy and driving control of [autonomous vehicles], and a reduction in infrastructure wear and tear through fewer crashes.”¹³⁸ Fuel efficiency will likely increase significantly as well.¹³⁹

C. Increased Productivity

Fully driverless cars also allow would-be drivers to regain their commute time and channel it into activities other than monitoring the roadway and the vehicle.¹⁴⁰ If recent studies are correct, this would result in substantial time savings:

According to the [U.S.] Census, there were a little over 139 million workers commuting in 2014. At an average of 26 minutes each way to work, five days a week, 50 weeks a year, that works out to something like a total of 1.8 *trillion* minutes Americans spent commuting in 2014. Or, if you prefer, call it 29.6 billion hours, 1.2 billion days, or a collective 3.4 million years. With that amount of time, we could have built nearly 300 Wikipedias, or built the Great Pyramid of Giza 26 times—all in 2014 alone. Instead, we spent those hours sitting in cars and waiting for the bus.¹⁴¹

134. *Id.*

135. WEAVER, *supra* note 1, at 178.

136. Ackerman, *supra* note 122.

137. WEAVER, *supra* note 1, at 178.

138. Lari, *supra* note 104, at 752.

139. Barringer, *supra* note 27, at 136.

140. WEAVER, *supra* note 1, at 49.

141. Christopher Ingraham, *The Astonishing Human Potential Wasted on Commutes*, WASH. POST, Feb. 25, 2016, <https://www.washingtonpost.com/news/wonk/wp/2016/02/25/how-much-of-your-life-youre-wasting-on-your-commute/>.

During this regained time, would-be drivers will be able to work, read, sleep, watch television, or complete tasks that they would not have otherwise been able to work on had they been driving.¹⁴² Even if this time is not used to complete tasks associated with formal employment (e.g., participating in conference calls, drafting reports, contacting clients, etc.), there are still presumably significant gains for productivity as a whole:

[I]f you give a person two free hours, he's probably not going to spend that time working. He'll watch TV or play Candy Crush or drink beer with his friends, or do other things that are not necessarily productive. But over time, that person will have more time to be civically engaged. He'll have more time to take care of his kids or his health or his marriage. He'll be better-rested, and a better worker for it. The benefits are potentially limitless.¹⁴³

Additionally, to the extent that empty driverless cars could eventually be dispatched to pharmacies, restaurants, and other similar types of establishments to pick up items that human beings would otherwise have to spend time fetching, Americans could regain at least a portion of the vast amount of time they currently spend driving vehicles for "personal and family-related purposes."¹⁴⁴

D. Accessibility

One of Google's first advertisements for its driverless car initiative was a commercial featuring a blind man named Steve Mahan.¹⁴⁵ The commercial shows Mahan climbing into the "driver's" seat of a Level 4 vehicle and then piloting the vehicle around town to pick up fast food and dry cleaning.¹⁴⁶ Mahan is thrilled with the car and comments that access to driverless cars would give him a significantly greater amount of independence and flexibility given that, currently, he has to rely on family members or a transit system for disabled individuals if he wishes to go somewhere.¹⁴⁷

142. Barringer, *supra* note 27, at 134–35.

143. Ingraham, *supra* note 141.

144. See Bryant Walker Smith, *Managing Autonomous Transportation Demand*, 52 SANTA CLARA L. REV. 1401, 1410 (2012) (quoting OFFICE OF HIGHWAY POLICY INFO., U.S. DEP'T OF TRANSP. FED. HIGHWAY ADMIN., HIGHWAY FINANCE DATA COLLECTION: OUR NATION'S HIGHWAYS: 2011, <http://www.fhwa.dot.gov/policyinformation/pubs/hf/pl11028/chapter4.cfm> (last updated Nov. 7, 2014)).

145. Google, *Self-Driving Car Test: Steve Mahan*, YOUTUBE (Mar. 28, 2012), <https://www.youtube.com/watch?v=cdgQpa1pUUE>.

146. *Id.*

147. *Id.*

Greater flexibility and independence for populations of people who are unable to drive are two of the major perks of fully driverless cars that Google continues to emphasize.¹⁴⁸ In fact, one of the reasons that Google has embraced an “all-in,” rather than gradualist, approach to autonomous vehicles is that it believes that “requiring human controls makes driverless cars useless for elderly, blind and disabled people who can’t operate a vehicle,” all surprisingly large populations in the United States.¹⁴⁹ Indeed, nine percent of adults identify as blind or report vision impairment issues, thirteen percent of the population is sixty-five or older, and almost one-third of the population does not have a driver’s license.¹⁵⁰ Increased accessibility for these populations is likely to have two benefits.

First, access to Level 4 cars amounts to more than a mere convenience issue for disabled (or simply “license-impaired”) individuals:

For those who, either voluntarily or otherwise, lose the privilege to drive, lack of mobility can lead to a serious reduction in one’s quality of life and health. Social isolation due to the inability to interact with friends and family, and the inability to shop and get to health care services, can lead to depression and degradation of one’s physical and emotional well-being. While public transportation can fulfill many needs, some of the same disabilities that prevent one from driving can limit one’s ability to use transit, and for many people, especially those living in suburban and rural areas, public transportation may be limited or unavailable for many trips.¹⁵¹

Fully driverless cars can thus greatly enhance many aspects of the lives of the “license-less,” beyond those that we might expect.

Second, Level 4 cars may help ameliorate many of the growing issues presented by America’s aging population. According to the U.S. Census, the population of Americans age sixty-five and older will increase from 47.7 million to 65 million in the ten-year period between 2015 and 2025.¹⁵² Some percentage of this population may lose the ability to drive while others might actually increase danger on U.S. roads as their driving skills become compromised by de-

148. See Ingrassia, *supra* note 43.

149. *Id.*

150. Smith, *supra* note 144, at 1409.

151. Lutin et al., *supra* note 122, at 29.

152. 2012 *National Population Projections: Summary Table 2*, U.S. CENSUS BUREAU, <http://www.census.gov/population/projections/data/national/2012/summarytables.html>.

clines in vision, hearing, and/or cognitive functioning.¹⁵³ Access to fully driverless cars would allow these elderly Americans to maintain independence, ease the burden on caregivers who might otherwise have to spend significant quantities of time chauffeuring their elderly charges to doctors' appointments or other errands, and enhance roadway safety by taking weaker individuals out of the driver's seat.¹⁵⁴

III. THE STATE OF THE LAW

Given the imminent arrival of autonomous vehicles on American roads and the dramatic impact that they stand to make on society, lawmakers at both the state and federal levels have begun to pass laws and regulations designed to address this technology.¹⁵⁵ While there is already a robust body of laws pertaining to automotive and highway safety, there also seems to be a consensus that those laws must be amended because they are based on the underlying assumption that human beings are operating the vehicle.¹⁵⁶ Furthermore, given that autonomous technology innovations are "severely outpacing legislation designed to allow for [their] use," lawmakers appear to be feeling some urgency to make those amendments or at least pass some semblance of a framework of laws pertaining to driverless cars.¹⁵⁷ New York, for instance, which has not yet passed any laws pertaining to driverless cars, has an existing traffic law requiring drivers to keep one hand on the steering wheel at all times, a provision that lawmakers might want to reconsider in the context of a Level 3 or Level 4 vehicle, particularly one like Google's prototype, which lacks a steering wheel altogether.¹⁵⁸

153. See National Institute of Health, *Older Drivers: How Aging Affects Driving*, NIH SENIOR HEALTH, <http://nihseniorhealth.gov/olderdrivers/howagingaffectsd-driving/01.html> (last visited July 24, 2016).

154. See Lutin, *supra* note 122, at 30.

155. WEAVER, *supra* note 1, at 55.

156. John Markoff, *Google Cars Can Drive Themselves*, in *Traffic*, N.Y. TIMES (Oct. 9, 2010), http://www.nytimes.com/2010/10/10/science/10google.html?_r=0.

157. Johnson, *supra* note 66, at 28.

158. Bryant W. Smith, *Automated Vehicles Are Probably Legal in the United States*, 1 TEX. A&M L. REV. 411, 413 (2014) (citing N.Y. VEH. & TRAF. LAW § 375 (McKinney 2013)); see also Andrew Dalton, *A 45-Year-Old New York Law Is Holding Up Autonomous Vehicles*, ENGADGET (May 31, 2016), <https://www.engadget.com/2016/05/31/new-york-law-holding-up-autonomous-vehicles/>.

Technology companies and more traditional automobile manufacturers have also expressed a desire for a comprehensive legal scheme for driverless cars.¹⁵⁹ One scholar explains:

Although the government typically lags behind technology when it passes laws, the current application of criminal and traffic laws to autonomous vehicles will make programming the vehicles challenging. It will [also] make the enforcement of the laws difficult, and it creates anomalous results.¹⁶⁰

Driverless car manufacturers must program their vehicles to comply with the law, and customers are unlikely to buy such vehicles if they do not, so both government and industry are feeling a strong sense of urgency to pass appropriate and consistent laws nationwide.¹⁶¹

A. State Laws & Legislation

Thus far, the call to pass driverless car laws, those designed to regulate the use and liability associated with autonomous vehicles, has been answered almost entirely by states.¹⁶² The National Highway Transportation Safety Administration (NHTSA) recently released a *Federal Automated Vehicles Policy*, but intends for a significant amount of the regulation of driverless cars to continue at the state level.¹⁶³ Indeed, this new policy contains a model driverless car statute designed for states.¹⁶⁴ States, however, began tackling this issue well before NHTSA's model policy:

[S]ince the introduction of the first autonomous vehicle legislation [in Nevada] in 2011, the rate that autonomous vehicle legislation has been introduced has been growing fervently. In the two years following Nevada's initial proposed legislation in 2011, four other jurisdictions introduced and enacted autonomous vehicle legislation. In addition to California and Florida, which introduced and enacted legislation in 2012, four other states introduced autonomous vehicle legislation in 2012. Thus, legislation was introduced in seven jurisdictions (six

159. See Alex Davies, *The Feds Will Have Rules for Self-Driving Cars in the Next 6 Months*, WIRED (Jan. 14, 2016), <https://www.wired.com/2016/01/the-feds-want-rules-for-self-driving-cars-in-the-next-6-months/>; Putre, *supra* note 109.

160. Gurney, *supra* note 127, at 442.

161. See *id.*; Lari et al., *supra* note 104, at 759.

162. WEAVER, *supra* note 1, at 55.

163. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., FEDERAL AUTOMATED VEHICLES POLICY, *supra* note 62, at 37.

164. *Id.*

states and the District of Columbia) in 2012, and nearly half of those jurisdictions enacted the proposed legislation.¹⁶⁵

Since 2012, six more states have passed laws pertaining to driverless cars,¹⁶⁶ and another eight are actively considering driverless car legislation.¹⁶⁷ While no state other than Florida has, as of yet, passed a law explicitly permitting the use of fully driverless vehicles for anything other than testing by manufacturers,¹⁶⁸ there is also an “emerging agreement” among academics that such vehicles are not *illegal* in any state (although, as discussed at length below, other provisions may have the impact of outlawing Level 4 cars).¹⁶⁹ For example, in his seminal article, *Automated Vehicles Are Probably Legal in the United States*, Professor Bryant Walker Smith makes the compelling argument that nothing in state, federal, or international law would “categorically prohibit” the use of fully automated vehicles.¹⁷⁰

B. Federal Involvement

As growing numbers of states pass “a patchwork of rules” pertaining to driverless cars, industry officials have grown concerned about inconsistencies between those rules and about their own ability to manufacture autonomous vehicles that will comply with the laws of all fifty states.¹⁷¹ Accordingly, both tech companies and car manufacturers have called for the federal government to step in

165. Swanson, *supra* note 39, at 1100–01.

166. H.B. 1143, 2016 Leg., 42d Reg. Sess. (La. 2016); S.B. 600, 2015 Gen. Assemb., Reg. Sess. (N.C. 2016); H.B. 1065, 2015 Leg., 64th Leg. Reg. Sess. (N.D. 2015); MICH. COMP. LAWS ANN. §§ 257.1–.923 (West 2015); MICH. COMP. LAWS ANN. § 600.2949(b) (West 2015); TENN. CODE ANN. § 55-8-202 (2015); TENN. CODE ANN. § 55-9-105(c) (2015); S.B. 1561, 109th Gen. Assemb., 2nd Reg. Sess. (Tenn. 2016); H.B. 1564, 2016 Leg. 109th Reg. Sess. (Tenn. 2016); UTAH CODE ANN. §§ 41-26-101 to 102 (LexisNexis 2016).

167. S.B. 1841, 2015 Gen. Ct., 189th Sess. (Mass. 2015); H.B. 4321, 189th Gen. Ct. Sess. (Mass. 2015); H.B. 2977, 2015 Gen. Ct., 189th Sess. (Mass. 2015); S. Files 2569, 89th Leg. Reg. Sess. (Minn. 2015); H. Files 3325, 89th Leg., 2nd Reg. Sess. (Minn. 2015); A.B. 3745, 2016 Gen. Assemb., 217th Leg. Sess. (N.J. 2016); Assemb. 851, 2016 Leg., 217th Sess. (N.J. 2016); Assemb. 554, 2016 Gen. Assemb., 217th Sess. (N.J. 2016); S. 343, 2016 Leg., 217th Sess. (N.J. 2016); S. 7879, 2015 Leg., 238th Sess. (N.Y. 2016); Assemb. 31, 2015 Leg., 238th Reg. Sess. (N.Y. 2015); S. 1368, 2015 Gen. Assemb., Reg. Sess. (Pa. 2015); S. 2514, 2015 Gen. Assemb., 2016 Sess. (R.I. 2016); H.D. 1372, 2016 Leg. Sess. (Va. 2016); H.R. 2106, 2015 Leg., 64th Sess. (Wash. 2015).

168. Compare Lutin, *supra* note 122, with H.R. 7027, 2016 Leg., 118th Reg. Sess. (Fl. 2016).

169. Lari, *supra* note 104, at 759.

170. Smith, *supra* note 158, at 419.

171. Davies, *The Feds Will Have Rules*, *supra* note 159.

and regulate the autonomous car industry to remedy this issue and promote innovation.¹⁷² In March 2016, for instance, representatives from Google, General Motors, Lyft, and Delphi—all key developers of autonomous technologies—appeared before a hearing of the U.S. Senate Committee on Commerce, Science and Transportation to request federal regulation of autonomous vehicles.¹⁷³ At that hearing, Chris Urmson, a leaders of Google’s driverless car initiative, testified:

If every state is left to go its own way without a unified approach, operating self-driving cars across state boundaries would be an unworkable situation and one that will significantly hinder safety innovation, interstate commerce, national competitiveness and the eventual deployment of autonomous vehicles.¹⁷⁴

Urmson’s comments echoed those made by Volvo President and CEO Hakan Samuelsson several months earlier during a speech at a Washington, D.C. seminar about the future of self-driving cars.¹⁷⁵ Samuelsson remarked that, unless the federal government acted “swiftly” to create a unified set of rules to regulate both the operation of and liability arising from autonomous vehicles, the United States “could lose its lead” in their development.¹⁷⁶

In response to these calls and concerns, the Obama administration proposed spending \$3.9 billion over the next ten years to promote the development of both self-driving cars and “vehicle-to-infrastructure communication,” which would allow driverless cars and roadway infrastructure features to transmit critical safety and operational information to one another.¹⁷⁷ Moreover, Secretary of Transportation Anthony Foxx tasked the Department of Transportation with drafting comprehensive rules governing the testing and regulation of driverless cars.¹⁷⁸ Those rules were issued on Septem-

172. Nathan Bomey, *Self-Driving Car Leaders Ask for National Laws*, U.S.A. TODAY (Mar. 15, 2016), <http://www.usatoday.com/story/money/cars/2016/03/15/google-alphabet-general-motors-lyft-senate-commerce-self-driving-cars/81818812/>.

173. *Id.*

174. *Id.*

175. Putre, *supra* note 103.

176. *Id.*; *see also* Davies, *The Feds Will Have Rules*, *supra* note 159 (“‘The technology benefits [from] uniformity from state to state and between states and the federal regulations,’ says Audi spokesperson Brad Stertz. Sean Walters, director of compliance and regulatory affairs at Daimler, which introduced an autonomous 18-wheeler last May, agrees: ‘National standards are critical to the trucking industry, especially with respect to new and innovative technologies.’”).

177. Bomey, *supra* note 172.

178. Davies, *supra* note 159.

ber 13, 2016 and require, among other things, driverless car developers to share extensive amounts of data with both the federal government and one another and to complete fifteen-point “safety assessments” for their vehicles.¹⁷⁹ They also provide model regulations that states may choose to adopt.¹⁸⁰ These model regulations, however, deal extensively with the registering and testing of Level 3 and 4 vehicles and fail to address the regulatory problems raised below.¹⁸¹

Federal involvement in the regulation of autonomous vehicles could change the traditional balance of power between states and the federal government in matters of traffic safety.¹⁸² Historically, “[t]he feds control how cars are made—they can require airbags and seat belts, for example—but it’s the states that regulate how vehicles behave, through the power of traffic laws.”¹⁸³ NHTSA is trying to maintain this balance by proposing “model policy guidance” for state lawmakers, rather than promulgating federal regulations, in furtherance of “a nationally consistent approach to autonomous vehicles.”¹⁸⁴ It remains to be seen, however, whether states will adopt NHTSA’s proposed rules or whether state-by-state inconsistency in driverless car laws will remain an issue that requires more direct federal involvement and a reconfiguration of the federal/state division of automotive regulation. Interestingly, at least one state has already signaled a willingness to yield to a federal regulatory regime in this area of the law: South Carolina’s proposed driverless car legislation states that “[f]ederal regulations promulgated by the [NHTSA] shall supersede the provisions of this chapter when found to be in conflict with any other state law or regulation.”¹⁸⁵

C. Common State Law Provisions

Two types of provisions appear repeatedly in state laws and pending legislation: (1) “operator” provisions, which define the human who engages an automated vehicle as the “operator” of that vehicle, and (2) override provisions, which require some degree of

179. NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 62 at 15–20.

180. *Id.* at 37.

181. *See id.*

182. Kessler, *supra* note 44.

183. Davies, *supra* note 159.

184. NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., “DOT/NHTSA POLICY STATEMENT CONCERNING AUTOMATED VEHICLES: 2016” UPDATE TO “PRELIMINARY STATEMENT OF POLICY CONCERNING AUTOMATED VEHICLES” (2016).

185. H.R. 4015, 120th Gen. Assemb., 1st Reg. Sess. §1 (S.C. 2013).

supervision and/or intervention on the part of the human occupants of automated vehicles in given scenarios.¹⁸⁶ Neither of these provisions, nor the overall driverless car laws in which they appear, however, differentiate between Levels 2, 3, 4, or 5 autonomous vehicles.¹⁸⁷ Instead, these provisions create blanket requirements for all driverless cars regardless of how manufacturers either (a) design those cars or (b) intend for them to be used. Indeed, as discussed at length below, some of these provisions, which are appropriate in the context of Level 2 or even Level 3 vehicles, implicitly outlaw the use of Level 4 and 5 vehicles and create criminal and civil liability that is highly problematic or nonsensical. This, in turn, may actually undermine the underlying public policy objectives of these laws and outright prohibit the “all-in” approach, discussed above, that is being taken by certain companies. A more thorough analysis of both types of provisions reveals why.

IV. “OPERATOR” PROVISIONS

Historically, both criminal and civil liability for automobile accidents or traffic law infractions attached to the operator of a vehicle.¹⁸⁸ Traditional motor vehicle laws defined the term “operator” to mean the individual actively controlling the vehicle—typically from the driver’s seat.¹⁸⁹ Professor Bryant Walker Smith elaborates:

“Actual physical control” can be broader than operation but probably does involve physical presence. Under the classic definition first proffered by Montana’s high court, a person is in actual physical control of a motor vehicle if she “has existing or present bodily restraint, directing influence, domination or regulation, of” it. Florida juries are told that “[a]ctual physical control” of a motor vehicle means the defendant must be physically in or on the vehicle and have the capability to operate the vehicle, regardless of whether [he or she] is actually operating the vehicle at the time.” Where the phrase is used in

186. See WEAVER, *supra* note 1, at 58; GURNEY, *supra* note 127, at 446.

187. See, e.g., MICH. COMP. LAWS ANN. §§ 257.1–.923 (West 2015) (drawing no distinction between Level 3 and Level 4 cars); H.B. 1143, 2016 Leg., 42d Reg. Sess. (La. 2016) (same); S.B. 600, 2015 Gen. Assemb., Reg. Sess. (N.C. 2016) (same); H.B. 1065, 64th Leg. Reg. Sess. (N.D. 2015) (same); TENN. CODE ANN. § 55-8-202 (2015) (same); TENN. CODE ANN. § 55-9-105(c) (2015) (same); UTAH CODE ANN. §§ 41-26-101 to 102 (LexisNexis 2016) (same).

188. See WEAVER, *supra* note 1, at 58.

189. Frank Douma & Sarah Aue Palodichuk, *Criminal Liability Issues Created by Autonomous Vehicles*, 52 SANTA CLARA L. REV. 1157, 1162 (2012).

drunk-driving statutes, some states provide a precise definition, while others ask juries to consider the “totality of the circumstances” with a view toward establishing whether the defendant “actually posed a threat to the public by the exercise of actual control over it while impaired.”¹⁹⁰

A critical question in both civil and criminal cases involving automobiles, therefore, has been *who*, specifically, was in control of the vehicle at the time of the incident in question.¹⁹¹

Both fully and semi-autonomous vehicles, however, complicate that inquiry significantly.¹⁹² These vehicles may have a human being in only partial or intermittent control or may lack a human driver altogether. Are human beings in all of these situations the “operators” of these vehicles? Thus far, states have answered that question with a resounding “yes.”¹⁹³ Nevada’s Department of Motor Vehicle’s autonomous vehicle regulations state that whoever engages a driverless car (i.e., turns on the engine) is considered the “operator,” even if that operator is not in the vehicle while it is engaged.¹⁹⁴ Similarly, Florida’s law states that “a person shall be deemed to be the operator of an autonomous vehicle operating in autonomous mode when the person causes the vehicle’s autonomous technology to engage, regardless of whether the person is physically present in the vehicle while the vehicle is operating in autonomous mode.”¹⁹⁵ California’s law states that the operator of an autonomous vehicle “is the person who is seated in the driver’s seat, or if there is no person in the driver’s seat, causes the autonomous technology to engage.”¹⁹⁶ Oregon, Nevada, Texas, New York, and the District of Columbia have all passed similar provisions.¹⁹⁷ These laws seem to be “based on the belief that the person who presses the ‘start button’ should accept the consequences of what that entails. Thus, the captain should be responsible for her ship.”¹⁹⁸

190. Smith, *supra* note 158, at 473 (internal citations omitted).

191. See Schroll, *supra* note 111, at 810.

192. Smith, *supra* note 158, at 413.

193. See *infra* notes 201–04 and accompanying text.

194. NEV. ADMIN. CODE § 482A.020 (2014).

195. FLA. STAT. ANN. § 316.85 (West 2016).

196. CAL. VEH. CODE § 38750(a)(4) (West 2015).

197. D.C. Code § 50-2351(2) (2013); NEV. ADMIN CODE § 482A.020 (2012); S. 7879, 2015 Leg., 238th Sess. (N.Y. 2016); Assemb. 31, 2015 Leg., 238th Reg. Sess. (N.Y. 2015); S.B. 620, 78th Oregon Legis. Assemb., 2015 Reg. Sess. (Or. 2015); H.R. 2932, 2013 Leg., 83d Reg. Sess. (Tex. 2013).

198. Gurney, *supra* note 127, at 414.

These types of provisions, however, raise two questions: (1) can human beings be held legally responsible—either civilly or criminally—for actions of autonomous vehicles driving in autonomous mode, and (2) if so, is this form of liability fair? With regard to the first question, under current laws, the answer seems to be “yes.” California’s law explicitly states as much: the operator of an autonomous vehicle is also considered the “driver” for purposes of the enforcement of traffic laws, meaning that they can be held legally responsible if the car exceeds the speed limit, makes an illegal turn, etc.¹⁹⁹ Nevada’s law is also explicit about this.²⁰⁰ Additionally, the “operator” provisions in the states that do not explicitly address liability are likely to be interpreted in a way that holds human drivers liable, as discussed at length below.²⁰¹

The second question—whether such liability is fair—is more complicated. The answer to that question, this Article argues, depends on (a) the type of autonomous car being driven and (b) the nature of any traffic infraction or injury that occurs.

A. *Level 2 and 3 Cars*

Level 2 and 3 cars (1) “can handle themselves in limited situations (like highway driving) but “need a human [driver] at the helm the rest of the time,” and (2) need monitoring while they are driving in autonomous mode.²⁰² Because the autonomous capabilities of these vehicles are intended to *supplement* rather than entirely replace human driving, manufacturers of these vehicles intend for a human driver either to remain in the driver’s seat monitoring the road when the car is driving itself (in the case of Level 2 vehicles), or to be available to retake control of the vehicle quickly if signaled to do so (in the case of Level 3 vehicles).²⁰³ In some cases, therefore, holding human operators either criminally or civilly liable for injuries or traffic infractions caused by their autonomous vehicles while driving in autonomous mode makes sense. Take, for instance, the following scenarios:

199. NEV. ADMIN. CODE § 482A.030 (2012).

200. Rachael Roseman, *When Autonomous Vehicles Take over the Road: Rethinking the Expansion of the Fourth Amendment in a Technology-Driven World*, 20 RICH. J.L. & TECH. 1, 13 (2014).

201. See discussion *infra* Part III.A–C.

202. Alex Davies, *California’s New Self-Driving Car Rules Are Great for Texas*, WIRED (Dec. 17, 2015), <https://www.wired.com/2015/12/californias-new-self-driving-car-rules-are-great-for-texas/>.

203. See NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 51, at 5.

SITUATION A: A Level 2 vehicle operating in autonomous mode comes upon a construction zone with a speed limit significantly lower than what is normally posted. The vehicle does not detect this change. The human in the driver's seat is reading a book rather than paying attention to the road and thus fails to retake control of the vehicle and slow the vehicle's speed down to the construction zone limit. The vehicle travels through the site at twenty miles per hour over the posted speed limit.

SITUATION B: A Level 3 vehicle operating in autonomous mode encounters a storm. The rain impedes the ability of the car's laser system to detect the vehicle's surroundings. An alarm goes off inside the vehicle, signaling that a human needs to retake control. The human, however, is listening to loud music while wearing headphones and does not hear the alarm. The car subsequently hits another vehicle.

In both of these cases, criminal and civil liability would be fair. Civilly speaking, the human has acted unreasonably and has breached a clear duty in both situations: the duty to monitor the vehicle (in Situation A) and the duty to respond appropriately to the vehicle's alarm (in Situation B).²⁰⁴

Criminal liability would be appropriate, as well. Both Situation A and Situation B meet the fundamental elements of U.S. criminal law: "First, there must be culpability—a decision to risk harm for insufficient reasons [the *mens rea*]. Second, there must be an act that 'unleashes' that risk of harm [the *actus reus*]." ²⁰⁵ With regard to *mens rea*, the humans in both of these situations chose to act negligently, at a minimum, and perhaps even recklessly. By picking up a book and putting on headphones, moreover, and then failing to respond to the situation appropriately, they took actions that "unleashed" risk, the *actus reus*. Their behavior was thus morally blameworthy and punishment would be just.²⁰⁶

However, there are other situations in which holding a human "operator" of a Level 2 or Level 3 car liable would make little sense:

SITUATION C: The cruise control and lane centering features of a Level 2 car suddenly malfunction while engaged. The car accelerates abruptly and plows into the vehicle in front of it. The malfunction happens so quickly that the human in the

204. Obviously, a plaintiff in either situation would also have to demonstrate some injury from the negligence in order to recover.

205. Larry Alexander & Kimberly Kessler Ferzan, *Culpable Acts of Risk Creation*, 5 OHIO ST. J. CRIM. L. 375, 376 (2008).

206. Gurney, *supra* note 127, at 405–06.

driver's seat—who is otherwise monitoring the vehicle—does not have time to respond.

SITUATION D: A Level 3 car experiences a severe technological glitch while driving in heavy traffic. The glitch disables the car's alarm that would otherwise signal to the human passenger that she needs to retake control of the vehicle. The human, who is occupied on her computer but listening for the sound of the alarm, does not realize that the car is experiencing a malfunction. The car hits a pedestrian.

Neither criminal nor civil liability would be appropriate in either situation. With regard to civil liability, the human in both scenarios has not acted unreasonably and thus did not breach any duty of due care, so there would be no basis on which to find them negligent. Furthermore, the human was not the cause of the injuries. Indeed, there was nothing that the human could have done in either case to prevent the accidents from happening: the vehicles experienced a technological glitch that the human either did not have time to respond to or have knowledge of.

Further, there is no *mens rea* or *actus reus* in either situation that would support criminal liability. In both cases, the human did what was expected of them and what was appropriate given the level of autonomous technology: constantly monitoring the vehicle in Situation C, and being readily available to retake control of the vehicle if an alarm sounded in Situation D. Any injuries that result from the malfunctions of these vehicles would thus be the product of a lack of an opportunity to respond rather than a morally blameworthy act or omission on the part of the humans.

The problem, however, is that states with “operator” provisions make *all* autonomous vehicle-related traffic or driving infractions strict liability offenses, much like the rest of the traffic and driving violations currently on the books in most states.²⁰⁷ In these jurisdictions, human “operators” would be guilty of traffic violations in all four of the situations discussed above: the two situations in which liability is clearly warranted and also the two in which it clearly is not.²⁰⁸ These laws assume that human drivers will be “able to exercise human judgment” in all situations and do not take response time or even capability to respond into account.²⁰⁹ Instead, they create a situation in which humans drivers in semi-autonomous cars are responsible in *all* situations in which a traffic violation occurs,

207. *Id.* at 409 (discussing the strict liability nature of “most traffic or driving violations”).

208. *Id.* at 414.

209. Smith, *supra* note 158, at 413.

regardless of (a) whether their car was operating in autonomous mode at the time of the violation and (b) if it was, whether the human had the capability to have stopped that violation from occurring.²¹⁰

B. Level 4 and 5 Cars

If strict “operator” liability makes little sense in some situations involving Level 2 and 3 cars, it *never* makes sense with regard to Level 4 and 5 cars.²¹¹ These vehicles are intended to drive without the need for any human supervision or intervention and, depending on the design of the vehicle, may entirely lack the means by which a human could control, influence, or override the vehicle’s operations.²¹² Thus, liability is even less warranted with these vehicles than it is with Level 2 and 3 vehicles.²¹³ This is particularly true in scenarios in which the “operator” is not even physically present in the vehicle, a situation that many “operator” provisions explicitly contemplate.²¹⁴ Thus, under existing “operator” provisions, the human in each of the following situations would be guilty of a traffic violation:

SITUATION E: A human turns on his Level 4 vehicle, programs the vehicle to drive to a colleague’s house, puts several work documents in the backseat of the car, and then dispatches the otherwise empty vehicle to deliver them. The human returns to his house to take a nap. On the way to the colleague’s house, the car malfunctions and drives the wrong way down a one-way street, causing a head-on collision with another vehicle.

210. Gurney, *supra* note 127, at 414.

211. *See id.* at 417.

212. *Id.*

213. *See* NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 51, at 5.

214. FL. STAT. ANN. § 316.85(2) (West 2016) (“For purposes of this chapter, unless the context otherwise requires, a person shall be deemed to be the operator of an autonomous vehicle operating in autonomous mode when the person causes the vehicle’s autonomous technology to engage, regardless of whether the person is physically present in the vehicle while the vehicle is operating in autonomous mode.”); MICH. COMP. LAWS ANN. § 257.36 (2014) (“‘Operate’ or ‘Operating’ means 1 or more of the following . . . ‘Causing an automated motor vehicle to move under its own power in automatic mode upon a highway or stress regardless of whether the person is physically present in that automated motor vehicle at that time.’”); NEV. REV. STAT. ANN. § 482A.020 (West 2012) (“For purposes of this chapter, unless the context otherwise requires, a person shall be deemed the operator of an autonomous vehicle which is operated in autonomous mode when the person causes the autonomous vehicle to engage, regardless of whether the person is physically present in the vehicle while it is engaged.”) (repealed 2013).

SITUATION F: A human is riding in a Level 4 vehicle that lacks a steering wheel and pedals. While the human sits in the backseat reading a book, the car runs a stop sign and hits a pedestrian.

In neither case did the human have the ability to stop the accident from occurring, nor did the human intend for a violation to occur, and yet, in both cases, under existing laws, the human would be liable. This would clearly be a nonsensical and unjust result for the same reasons as in Situations C and D above.

C. *The Twisted Logic of Operator Provisions*

Holding human “operators” strictly liable for the actions of autonomous vehicles is extremely problematic for at least two additional reasons. First, such liability is inconsistent with some of the most basic philosophical underpinnings of criminal law: the goals of retribution, deterrence, and rehabilitation.²¹⁵ One scholar explains why in the context of Level 4 and 5 vehicles:

With an autonomous vehicle like Google’s prototype, certainly no objectives of punishment are served by holding the operator criminally liable for traffic violations . . . [T]he vehicle lacks a steering wheel, accelerator, and brake pedal. Therefore, the operator does not cause, nor has any opportunity to prevent, the violation. In such a case, the person does not have any blameworthiness to punish; no one—the operator or society—is deterred because owners of a vehicle like Google’s prototype can do nothing to prevent the violation; isolating the person will not provide any benefit to society; and no additional instruction could prevent the offense in the future.²¹⁶

The same reasoning applies to operator liability in the context of Level 2 and 3 vehicles.²¹⁷ While *some* liability might be appropriate, liability for violations that humans had no reasonable capacity to stop serves no traditional criminal law purposes.²¹⁸

Second, holding human operators strictly liable for the actions of their autonomous vehicles may strongly deter people from using autonomous cars at all.²¹⁹ If humans are concerned that they may be charged for an accident or violation caused by a vehicle that (a) they do not have the ability to control and (b) they may not have

215. See Stephen J. Morse, *The Inevitable Mens Rea*, 27 HARV. J.L. & PUB. POL’Y 51, 61 (2003).

216. Gurney, *supra* note 127, at 417.

217. See *id.*

218. *Id.*

219. *Id.*

even been present in at the time of the incident, owning and operating a driverless car is likely to be viewed as too risky by all but the most courageous (and amply insured) of us. This would be a net loss for society because we would lose the extraordinary benefits that can come from greater use of autonomous vehicles.²²⁰

While one might attempt to allay concerns about “operator” provisions by theorizing that courts will interpret those laws in a manner that would preclude a finding of liability in scenarios like Situations C, D, E, and F, even a brief foray into traffic violation case law shows that this is unlikely to be the case. Indeed, courts throughout the United States have a long history of ignoring the traditional criminal law elements of *mens rea*, *actus reus*, and causation in vehicle automation cases and finding human drivers liable in situations in which they were not in control of a vehicle.²²¹ In *State v. Packin*, for instance, a 1969 New Jersey case, the defendant was convicted of driving sixty-nine miles per hour in a fifty-miles-per-hour zone.²²² The defendant argued that he was not “driving” the vehicle at the time of the infraction because the cruise control was engaged.²²³ He also argued that the cruise control—which had been repaired earlier that day—had malfunctioned and accelerated the vehicle beyond the fifty-miles-per-hour speed that he had set.²²⁴ Thus, he asserted, “his guilt was negated by his intention, as evidenced by his setting of the cruise control . . . to keep within the speed limit.”²²⁵ The court in *Packin* disagreed, saying that it did not matter whether the vehicle’s cruise control was engaged:

We find [the defendant’s] contentions to be devoid of merit. A motorist who entrusts his car to the control of an automatic device is “driving” the vehicle and is no less responsible for its operation if the device fails to perform a function which under the law he is required to perform. The safety of the public requires that the obligation of a motorist to operate his vehicle in accordance with the Traffic Act may not be avoided by delegating a task he normally would perform to a mechanical device.²²⁶

The reasoning in this case appears to be the same reasoning underlying the passage of the “operator” provisions being discussed: “the

220. See *Lari*, *supra* note 104, at 750.

221. See *State v. Packin*, 257 A.2d 120, 120 (N.J. Super. Ct. App. Div. 1969).

222. *Id.*

223. *Id.*

224. *Id.* at 120–21.

225. *Id.* at 121.

226. *Id.*

captain should be responsible for her ship.”²²⁷ The court seems to be implying that the setting of the cruise control, rather than the speeding itself, was a sufficient *actus reus* for criminal culpability and that drivers use automation features at their own risk.²²⁸

The court in *State v. Baker*, a 1977 cruise control case, adopted this theory more explicitly.²²⁹ In that case, the defendant was convicted of driving his vehicle at a speed of seventy-seven miles per hour in a fifty-five-miles-per-hour zone.²³⁰ The defendant argued that he had set the cruise control at the posted speed limit, that the cruise control had malfunctioned, and that he unsuccessfully attempted to deactivate the cruise control “by hitting the off button, and the coast button and tapping the brakes.”²³¹ The court upheld the conviction, reasoning:

We believe it must be said that the defendant assumed the full operation of his motor vehicle and when he did so and activated the cruise control attached to that automobile, he clearly was the agent in causing the act of speeding. The safety and welfare of the public require that the motorist operate his vehicle in accordance with the maximum speed limits . . . and other rules of the road, and such libations may not be avoided by delegating a task which he normally would perform to a mechanical device such as cruise control.²³²

Interestingly, the court distinguished the malfunction of a cruise control system from “unexpected brake failure and unexpected malfunction of the throttle on an automobile” because, in the court’s mind, brakes and throttles are “essential components to the operation of the vehicle,” whereas cruise control is a voluntary option and thus need not be utilized.²³³

Cases like these reveal a deep and historic mistrust of vehicle automation on the part of courts and a strong preference for human control of vehicles, even with regard to cruise control, which offers fairly little automation and requires drivers to be ac-

227. Gurney, *supra* note 127, at 414.

228. See *Packin*, 257 A.2d at 121. As a seeming afterthought, the court points out that the defendant also could have resumed control of the vehicle and brought it back down to a lawful speed by touching the brakes to disengage the cruise control, ignoring the fact that it noted several paragraphs above that the defendant stated he was in the process of doing so when he was “flagged by the state trooper.” *Id.*

229. See *State v. Baker*, 571 P.2d 65, 69 (Kan. Ct. App. 1977).

230. *Id.* at 66.

231. *Id.*

232. *Id.* at 69.

233. *Id.*

tively engaged with the vehicle at all times. Given this precedent and recent polling, which reveals strong reservations on the part of the general public about the safety of autonomous vehicles, it seems, if not likely, at least a distinct possibility that courts will use “operator” provisions to hold humans both criminally and civilly liable for malfunctions of Level 2, 3, 4, and 5 autonomous vehicles, despite the issues explored above.

V. OVERRIDE PROVISIONS

Override provisions are a second common type of law that states have passed or considered in preparation for autonomous cars.²³⁴ Nevada, California, Florida, and the District of Columbia all have provisions of this type in their driverless car laws,²³⁵ and a number of states are considering similar legislation.²³⁶ For example, the District of Columbia’s driverless car law requires that driverless cars have a driver “seated in the control seat of the vehicle while in operation who is prepared to take control of the autonomous vehicle at any moment.”²³⁷ Other laws require autonomous cars to have features that allow a human to override the autonomous technology and retake control of the car.²³⁸ Oregon’s bill, for instance, states that autonomous vehicles must give drivers the ability to override the car “using the brake, the accelerator or the steering wheel.”²³⁹ Colorado’s proposed legislation is similar and mandates that drivers be able to override the vehicle through the use of brakes, a steering wheel, or an “override switch.”²⁴⁰ New York’s legislation, moreover, would require autonomous vehicles to have an easily accessible means of engaging or disengaging the vehicle’s autonomous technologies.²⁴¹

Furthermore, some states that have not passed driverless car laws have existing “due care” traffic laws that may have the same

234. WEAVER, *supra* note 1, at 59.

235. CAL. VEH. CODE § 38750 (West 2015); D.C. CODE § 50-2352 (2016); FL. STAT. ANN. § 319.145 (2016); NEV. REV. STAT. § 482A.080 (2012).

236. S.B. 113, 153rd Gen Assemb., Reg. Sess. (Ga. 2015); H.R. 286-D, 28th Leg., Reg. Sess. (Haw. 2015); S. 7879, 2015 Leg., 238th Sess. (N.Y. 2016); S.B. 620, 78th Oregon Legis. Assemb., 2015 Reg. Sess. (Or. 2015); H.B. 4194, 84th Leg. (Tex. 2015).

237. D.C. CODE § 50-2352 (2016).

238. *See* S.B. 13-016, 69th Leg., 1st Reg. Sess. (Colo. 2013); 2015 Leg., 238th Reg. Sess. (N.Y. 2015); S.B. 620, 2015 Reg. Sess. (Or. 2015).

239. S.B. 620, 78th Oregon Legis. Assemb., 2015 Reg. Sess. (Or. 2015).

240. S.B. 13-016, 69th Leg., 1st Reg. Sess. (Colo. 2013).

241. A.B. 31, 2015 Reg. Sess. (N.Y. 2015).

impact as the override provisions. These laws require drivers in *every* vehicle to pay constant attention to the road.²⁴² For example:

In Georgia, “[a] driver shall exercise due care in operating a motor vehicle on the highways of this state and shall not engage in any actions which shall distract such driver from the safe operation of such vehicle. . . .” Variations of this include Tennessee’s due care statute, which requires: Every driver of a vehicle [to] exercise due care by operating the vehicle at a safe speed, by maintaining a safe look out, by keeping the vehicle under proper control and by devoting full time and attention to operating the vehicle, under the existing circumstances as necessary in order to be able to see and avoid [hitting anything or anyone].²⁴³

Since these laws do not differentiate between Level 1, 2, 3, 4, or 5 vehicles, presumably, they apply to all vehicles within their jurisdictions, although, as of yet, there has been no litigation that would clarify their boundaries.

A. *The Untested Assumptions of Override Provisions*

Both override provisions and due care laws appear to be rooted in a very significant assumption: that human-driven cars are safer than autonomously driven ones.²⁴⁴ Indeed, fears about driverless cars running amok seem to be driving much of the current debate surrounding the regulation of these vehicles, and human driver supervision appears to be the solution that lawmakers have chosen to allay them.²⁴⁵ Almost entirely absent from these discussions, however, is empirical data that would support the idea that human oversight and, if needed, override of driverless cars, actually enhances traffic safety. Instead, there are only the mere presumptions that: (1) human drivers will adequately supervise autonomous vehicles, (2) human drivers have the capacity to regain control of autonomous vehicles quickly and safely when necessary, and (3) human intervention is the safest option available (or at least is not more dangerous than leaving control with the automated technology) if and when autonomous vehicles malfunction or encounter difficulties on the road.

242. Gurney, *supra* note 127, at 424–25.

243. *Id.* (internal citations omitted).

244. *See* Swanson, *supra* note 39, at 1139.

245. *See, e.g., id.* at 1112 (“By including this [override provision] subsection, Oregon’s legislature provides a simple guide to manufacturers, while relieving any latent driver fears of runaway vehicles.”); Bolton, *supra* note 19.

Recent studies, however, suggest that all three presumptions are not only likely wrong but also potentially dangerous. These studies demonstrate that relying on human oversight and override of autonomous vehicles may actually *undermine* highway safety rather than enhance it. In addition to Tesla's and Google's informal findings that drivers of Level 2 and 3 vehicles have an extremely difficult time focusing on the road while autonomous technologies are activated, a number of academic studies have reached similar conclusions.²⁴⁶ A 2014 study of Level 3 cars, for example, showed that drivers "exhibited significant increases in eccentric head turns and secondary tasks during automated driving, even in the presence of a researcher," and that a shocking twenty-five percent of test subjects engaged in some form of "reading while the vehicle was in autonomous mode."²⁴⁷ These results led the researchers to conclude that while "[t]he effect of automation on a driver's attention level remains an open question . . . early research suggests that a driver cannot immediately take over control of [an autonomous] vehicle safely. Most drivers will require some type of warning time."²⁴⁸ This plainly undermines the assumption of lawmakers—and the reasoning underlying override provisions—that human drivers will be able to intervene at a moment's notice if needed.

A 2013 study generated similar results under similar circumstances. Drivers were asked to sit in the driver's seat and monitor a Level 3 vehicle driving down a test track with both adaptive cruise control (ACC) and lane centering (LAAD) features engaged for forty-five minutes to an hour.²⁴⁹ The study found that:

Overall, drivers were estimated to be looking away from the forward roadway approximately 33% of the time . . . Comparisons between ACC and LAADS head [position] data reveal a significant increase in time spent looking away from the forward roadway under semi-autonomous relative to ACC-only driving . . . [D]rivers tended to increase the percentage of time spent looking off-road by an average of 33 percent while driving under LAADS, suggesting that drivers were paying some-

246. Epstein, *supra* note 93; Ingrassia, *supra* note 43; R.E. Llaneras et al., *Human Factors Issues Associated with Limited Ability Autonomous Driving Systems: Drivers' Allocation of Visual Attention to the Forward Roadway*, in PROC. OF THE SEVENTH INT'L DRIVING SYMP. ON HUM. FACTORS IN DRIVER ASSESSMENT, TRAINING, AND VEHICLE DESIGN 92, 94 (Bolton Landing, 2013).

247. Noah J. Goodall, *Machine Ethics & Automated Vehicles*, in ROAD VEHICLE AUTOMATION 93, 96 (Gereon Meyer & Sven Beiker eds., 2014).

248. *Id.*

249. R.E. Llaneras et al., *supra* note 246, at 94.

what less attention to the forward roadway under the autonomous driving mode. This general finding is consistent with the secondary task data presented earlier suggesting that drivers engaged in more secondary activities under LAADS driving. Although this pattern was generally reliable, there were substantial individual differences in the magnitude of the effect across individuals, with some drivers showing no increase under LAADS driving relative to ACC driving. Approximately one-third of the drivers (4 out of 12) showed substantial increases in the percentage of time spent looking off-road of at least 73% when operating under LAADS.²⁵⁰

The drivers in this study did more than just look off the road. With both ACC and LAADS engaged, there were also “significant increases in . . . eating, reaching for an item in the rear compartment, dialing and talking on the cell phone, and texting/e-mailing.”²⁵¹ There were also “widespread” increases in “very risky tasks” such as watching movies and reading.²⁵² These findings led researchers to conclude that “the introduction of automation which controls vehicle speed maintenance [and] longitudinal and steering functions is likely, if not well designed or implemented, to further increase the frequency and nature of secondary task engagements as well as increase extended glances away from the forward roadway.”²⁵³

These findings undermine yet another primary assumption of override provisions: that human drivers can intervene effectively and appropriately if needed. Making appropriate blink-of-an-eye decisions in highway driving situations (as drivers often have to do) is already a fraught (and sometimes deadly) task, as traffic accident and fatality data show.²⁵⁴ Doing so while distracted might be a veritable impossibility. A literature review conducted by yet another group of researchers agrees:

Reduced awareness has been associated with a delay in an appropriate braking response when faced with failures in ACC both in a driving simulator . . . and in more naturalistic, test-track conditions Similar work has also uncovered complacency and delay when drivers are confronted by the malfunction of lane keeping systems These observations have been attributed to reduced driver workload, commonly associ-

250. *Id.* at 96.

251. *Id.*

252. *Id.*

253. *Id.* at 93.

254. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., 2013 MOTOR VEHICLE CRASHES, *supra* note 106.

ated with semi-automated driving when compared to manual driving²⁵⁵

As a result, these researchers conclude that expecting a driver to monitor the road during the automation of driving tasks can be just as risky as overloading a driver with too many driving tasks at one time.²⁵⁶

These results mirror the findings from other industries in which automation has become prevalent. Some airplane safety experts blame the deadly 2009 ocean crash of an Air France plane flying between Rio de Janeiro, Brazil, and Paris, France on the inability of the pilot to retake control quickly enough when the plane's autopilot failed.²⁵⁷ Further, studies of interactions between humans and highly-automated industrial machinery have shown that

[w]hen an operator is removed from a control loop due to allocation of system functions to an automated/computer controller, the level of human system interaction is limited and, consequently, operator awareness of system states may be reduced. This poses a serious problem during normal operations preceding system errors, malfunctions or breakdowns because operators are often slower to respond to such events when removed from a control loop versus actively controlling a system. Further, during failure modes, operators who have been removed from system control may not know what corrective actions need to be taken to stabilize the system and bring it into control.²⁵⁸

Thus, operators of any type of automated machinery can be expected to display impaired performance when called upon to operate a system manually after machine failure, especially when compared to operators of non-automated machinery.²⁵⁹

As with operator provisions, however, the overall value and wisdom of override provisions varies with the level of autonomous cars at issue. The empirical data above suggest that they may actually be

255. A.H. Jamson, et al., *Behavioural Changes in Drivers Experiencing Highly-Automated Vehicle Control in Varying Traffic Conditions*, 30 *TRANSP. RES. PART C: EMERGING TECHS* 30, 116, 117 (2013).

256. *Id.* at 117.

257. Ingrassia, *supra* note 43.

258. David B. Kaber & Mica R. Endsley, *Out-of-the-Loop Performance Problems and the Use of Intermediate Levels of Automation for Improved Control System Functioning and Safety*, 16 *PROCESS SAFETY PROGRESS* 126, 127 (1997).

259. Paula A. Desmond, *Fatigue and Automation-Induced Impairments in Simulated Driving Performance*, 1628 *TRANSP. RES. REC.* 8, 13 (1998).

a warranted—though clunky—form of regulation for Level 2 and 3 vehicles but disastrously ill-conceived and counterproductive for Level 4s and 5s.²⁶⁰

B. Level 2 and 3 Vehicles

Manufacturers and state legislators appear to be on the proverbial same page with regard to Level 2 and 3 autonomous cars in the sense that both agree that some human supervision of these vehicles is necessary. However, while there may congruence between override provisions and manufacturers' guidelines, the reasoning behind the two could not be more different. Tesla, for example, "strenuously warns customers to pay attention" when the Autopilot feature in their vehicles is engaged.²⁶¹ General Motors, moreover, is contemplating including driver "monitoring systems and steering-wheel alerts" that would remind drivers of the need to pay attention when using their Level 2 "Super Cruise" technology.²⁶² These warnings and driver alert systems make sense: Level 2 and Level 3 vehicles are not *intended* to operate fully autonomously, and thus human supervision of these vehicles (and intervention when appropriate) is a critical component of their safe operation.²⁶³ In other words, Level 2 and 3 cars may require human supervision and intervention in some situations because of the inherent technological limitations of their autonomous driving systems. In contrast, lawmakers seek to mandate human supervision and intervention because they believe that human beings are fundamentally better drivers than autonomous systems in *all* situations, an assumption that is contradicted by empirical data, as discussed above.

At first glance, therefore, override provisions or due care laws seem necessary and appropriate because they either legally mandate such supervision²⁶⁴ or require that all cars have features that allow human drivers to intervene if necessary.²⁶⁵ A Level 2 or 3 car *should* have a human driver monitoring it, along with an easy way

260. See discussion Part III.B–C.

261. Simon Parkin, *Learning to Trust a Self-Driving Car*, THE NEW YORKER (July 15, 2016), <http://www.newyorker.com/tech/elements/learning-to-trust-a-self-driving-car?ReillyBrennanFoT>.

262. Charlie White, *Almost Self-Driving Car: 'Super Cruise' Enters Real-World Testing*, MASHABLE (May 1, 2013), <http://mashable.com/2013/05/01/self-driving-super-cruise/#82ucFMStf5q7>.

263. See NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., PRELIMINARY STATEMENT OF POLICY, *supra* note 56, at 5.

264. D.C. CODE § 50-2352 (2016).

265. CAL. VEH. CODE § 38750(b)(2) (West 2015); FL. STAT. ANN. § 319.145 (West 2016); NEV. REV. STAT. ANN. § 482A.070 (2013).

for that driver to retake control if necessary. Furthermore, that human driver should be held liable in some instances in which a failure to supervise and intervene leads to injury, such as in Situations A and B above.²⁶⁶ Override provisions arguably provide a mechanism for imposing such liability and thus strongly incentivize drivers to resist becoming distracted.²⁶⁷

However, a closer analysis of override provisions, at least as they are currently written, reveals that, despite their initial “curb appeal,” they are both under-inclusive and overbroad with regard to Level 2 and 3 vehicles. To start, these laws arguably do not go far enough. Given, for example, that the autonomous technologies in Level 2 cars are often not designed to handle issues like bad weather, poor lane markings, construction sites, or even non-highway driving, mere human supervision may be insufficient to ensure safe autonomous operation in many situations.²⁶⁸ Use of autonomous technologies in these vehicles, therefore, should be subject to appropriate time, place, and manner restrictions (e.g., laws that would ban the use of Level 2 autonomous technologies in heavy rain or in construction zones). Thus far, no legislature has considered or passed such a law.

Override provisions are also overbroad, particularly with regard to Level 3 vehicles. These vehicles are designed to require only minimal driver supervision and, importantly, to signal to drivers when human intervention is needed and to provide a “sufficiently comfortable transition time” for them to retake control of the vehicle.²⁶⁹ Override provisions, like the one passed by the District of Columbia, that require constant human supervision, make little sense in this context and undermine many of the most valuable aspects of autonomous vehicles.²⁷⁰ As one scholar points out, “[i]t is the technological equivalent of having your cake and not eating it: ‘Feel free to use [Level 3] cars in Washington, D.C., but make sure you’re not enjoying the experience.’”²⁷¹

Furthermore, there may be situations in which human intervention in a Level 2 or Level 3 car is actually *less* safe, and thus less desirable, than letting the vehicle handle the situation on its own,

266. Gurney, *supra* note 127, at 425–26.

267. See CAL. VEH. CODE § 38750 (West 2015); FL. STAT. ANN. § 319.145 (West 2016); NEV. REV. STAT. ANN. § 482A.070 (2013).

268. Electric Jen, *Tesla Autopilot Limitations; Heavy Rain*, TESLARATI (Dec. 7, 2015), <http://www.teslarati.com/tesla-autopilot-limitations-heavy-rain/>.

269. *Id.*

270. See D.C. CODE § 50-2352 (2016).

271. WEAVER, *supra* note 1, at 57.

particularly because human drivers are so prone to distraction.²⁷² This may be the case, for instance, in situations in which the human does not have adequate time to assess the situation and respond appropriately.²⁷³ It may also become the case that, as autonomous technologies grow in prevalence and use, drivers become less skilled at driving and thus less able to capably respond to emergency situations, particularly as compared to the autonomous technologies themselves.²⁷⁴ Lastly, autonomous technologies in Level 2 and 3 cars may eventually become so sophisticated that they are objectively better than humans at responding to *most* roadway situations.²⁷⁵ In fact, this might already be true in some Level 2 and 3 vehicles, but the lack of empirical data on this issue means that lawmakers can only speculate.²⁷⁶ Override and due care provisions arguably incentivize humans to do the less safe thing in all of these situations: to err on the side of intervening—even hastily and poorly—out of a fear that, if they do not, they will be found guilty of breaking the law and held liable for injuries in any subsequent accident.

Override provisions are thus an inadequate way to enhance the safety of Level 2 and 3 driverless cars at best and are counterproductive and overly stringent at worst. More empirical data should be gathered in order to assess both what design and what legal measures actually enhance safety and what measures undermine it. This Article's prediction is that such data will reveal that current override provisions are woefully clumsy and ill-honed.

C. Level 4 and 5 Vehicles

If override provisions are clunky and problematic with regard to Level 2 and Level 3 cars, they are disastrous with regard to Levels 4 and 5 cars. Indeed, the two are fundamentally and intractably at odds: Level 4 and 5 vehicles neither require human supervision nor have a way for humans to take control, whereas override provisions require at least one and, in some cases, both.²⁷⁷ Thus, Google's forthcoming Level 4 cars, which lack both a steering wheel and

272. Alexander Hevelke & Julian Nida-Rumelin, *Responsibility for Crashes of Autonomous Vehicles: An Ethical Analysis*, 21 *SCI. & ENG'G ETHICS* 619, 619 (2015).

273. *See id.*

274. Douma & Palodichuk, *supra* note 189, at 1164.

275. Hevelke & Nida-Rumelin, *supra* note 272.

276. *Id.*

277. Compare NAT'L HIGHWAY TRANSP. SAFETY ADMIN., PRELIMINARY STATEMENT OF POLICY, *supra* note 56, at 5, with CAL. VEH. CODE § 38750(b)(2) (West 2015), D.C. CODE § 50-2352 (2016), FL. STAT. ANN. § 319.145 (2016), and NEV. REV. STAT. § 482A.080 (2012).

brakes,²⁷⁸ will presumably be illegal to operate in the District of Columbia, California, Florida, and Nevada,²⁷⁹ and possibly Oregon, Colorado, and New York, if pending override legislation passes.²⁸⁰

Level 4 and 5 vehicles, however, represent the apex of autonomous technology and offer many more advantages than do Level 2 and 3 cars. Banning them before the technology has been fully developed, optimized, and tested not only suppresses important technological development (in particular, the “all-in” approach to driverless car development discussed above), but also drastically minimizes the full panoply of social and economic benefits that these vehicles stand to offer the United States.²⁸¹ People with physical disabilities and visual impairments, for example, will not be able to use these vehicles independently if laws require the presence of a human capable of supervising and overriding the vehicle if necessary.²⁸² Productivity gains would also be hampered drastically and perhaps for little corresponding benefit:

To increase productivity, the operator must be able to engage in other activities. Perhaps, while some drivers may trust the technology enough so they are able to engage in other activities, others would be more reluctant to do so if they know they are responsible for traffic violations. If the reluctance outweighs the ability of someone to engage in another activity, the loss in utility may outweigh the benefit of the person watching the road. This is especially true if the vehicles are safely operating. In other words, if the vehicles are safely operating and obeying traffic laws, requiring someone to pay attention to the traffic laws would be inefficient.²⁸³

Without Level 4 and 5 cars available in the marketplace, the best that consumers can hope for by way of productivity gains is the ability to work in Level 3 (but not Level 2) vehicles, while simultaneously listening for the vehicle’s alert to sound and being prepared to intervene at a moment’s notice, a form of multitasking that does not seem particularly appealing.

278. Ingrassia, *supra* note 43.

279. See CAL. VEH. CODE § 38750(c)(1)(D) (West 2015); D.C. CODE § 50-2352 (2016); FL. STAT. ANN. § 319.145 (2016); NEV. REV. STAT. § 482A.080 (2012).

280. See S.B. 620, 78th Oregon Legis. Assemb., 2015 Reg. Sess. (Or. 2015); S.B. 13-016, 69th Leg., 1st Reg. Sess. (Colo. 2013); A.B. 31 2015 Reg. Sess. (N.Y. 2015).

281. See Thierer & Hagemann, *supra* note 128, at 339.

282. Robert Sykora, *The Future of Autonomous Vehicle Technology as a Public Safety Tool*, 16 MINN. J.L. SCI. & TECH. 811, 817–18 (2015).

283. Gurney, *supra* note 127, at 415.

The greatest tragedy in tacitly banning Level 4 and 5 cars, however, is likely to lie in significantly diminished safety gains. As discussed at length above, override laws assume that human supervision of (and possibly intervention in) driverless cars is a safer prospect than allowing the technology to function on its own, though empirical studies suggest that the opposite proposition is likely true in many situations.²⁸⁴ This opposite proposition—that autonomous vehicles may actually be better at responding to risky driving situations than human drivers in many cases—is likely to be even *more* accurate with regard to Level 4 and 5 cars than it is with Level 2 and 3 cars. Remember: the safety drawbacks of Level 2 and 3 cars—the inability of human drivers to adequately supervise them—are motivating companies like Google and Ford to skip them altogether.²⁸⁵ These companies, moreover, are developing Level 4 vehicles that are capable of responding safely to *all* driving situations and that have far more advanced perception capabilities than human drivers.²⁸⁶ This development is what is fueling predictions that driverless cars could reduce accidents by several million per year.²⁸⁷

Ultimately, what may be the most troubling aspect of override provisions is their implicit overconfidence in human drivers despite decades of evidence that human beings, considered as a whole, are actually fairly terrible at driving. Indeed, given that human drivers cause over 25,000 accidents in the United States *per day*,²⁸⁸ over 303,000 traffic-related fatalities per year,²⁸⁹ and cost the country \$37 billion annually,²⁹⁰ it is surprising that legislators are not trying to *remove* human beings from the driver's seat as quickly as possible. Moreover, since human driver error is the cause of approximately 94% of all accidents, compared with only 6% caused by product defects or malfunctions, the assumption that human judgment reigns supreme to that of autonomous driving technologies is presumptuous at best and outright laughable at worst.²⁹¹ Passing laws, like override provisions, that may have the impact of stalling the full

284. See *supra* notes 275–92 and accompanying text.

285. See Davies, *supra* note 91; Ingrassia, *supra* note 43.

286. Ingrassia, *supra* note 43.

287. See Katyal, *supra* note 122, at 1688.

288. Schroll, *supra* note 111, at 807.

289. Levinson, *supra* note 122, at 795.

290. Brad Plumer, *Here's What It Would Take for Self-Driving Cars to Catch On*, WASH. POST (Oct. 23, 2013), <http://www.washingtonpost.com/blogs/wonkblog/wp/2013/10/23/heres-what-it-would-take-for-self-driving-cars-to-catch-on/>.

291. See Schroll, *supra* note 111, at 805.

development and exploitation of these technologies, therefore, is reckless and unwarranted.

VI. LEGISLATIVE BEST PRACTICES

Given the extremely rapid nature of technological development and change in this area, and the early stages of deployment of Level 3 and 4 vehicles, formulating a highly granular set of recommendations at this moment in time would arguably be both premature and highly dependent upon speculation.²⁹² A series of broader “best practices” for driverless car legislation, however, derived from the analysis of operator and override provisions discussed above, might provide helpful guidance to state lawmakers and assist them in avoiding similar mistakes in the future that could either unduly hamper the development of this technology or undermine highway safety.²⁹³

First, statutes and regulations that pertain to driverless cars should both distinguish between and be tailored to specific autonomous vehicle levels. As discussed at length above, one of the most significant problems with existing driverless car laws is that they treat all autonomous vehicles exactly the same despite the fact that variations in semi-autonomous and fully autonomous cars pose unique sets of challenges and strengths. This nuance-less treatment of driverless cars is arguably being fueled by news stories that make the exact same mistake. One journalist, for example, criticizes the *New York Times* article that ran in the wake of the Tesla Autopilot fatality discussed above as follows:

The headline of the front page piece, “A Fatality in a Self-Driving Car Forces Tesla to Confront its Limits” is misleading. While the car was in Autopilot mode — akin to advanced cruise-control — it is not accurate to say that the car was self-driving The title sensationalizes the incident, and plays into the fear factor involved when new technology is released.²⁹⁴

As demonstrated above, a regulation, like an override provision, that may be warranted in response to Level 2 vehicles may be draconian or nonsensical when applied to Level 4s, and may actually have

292. See Swanson, *supra* note 39, at 1087 (“[I]t is difficult for the law to maintain the break-neck speed at which technology is racing ahead.”).

293. See *id.* at 1094–95.

294. Hope Reese, *Tesla’s Fatal Autopilot Accident: Why the New York Times Got It Wrong*, TECHREPUBLIC.COM, (July 6, 2016), <http://www.techrepublic.com/article/teslas-fatal-autopilot-accident-why-the-new-york-times-got-it-wrong/>.

a much more severe impact on the development of autonomous technologies than intended. Until lawmakers understand the nuanced differences between the different levels of autonomous vehicles—and legislate in a manner that responds to those differences—they have little hope of drafting sensible, appropriately tailored laws.

Second, to enhance the clarity of driverless car statutes and regulations, state lawmakers should utilize the same terminology employed by federal agencies, namely the National Highway Traffic Safety Administration, to describe the type(s) of autonomous vehicle(s) to which those laws and regulations are intended to apply. For instance, if a state only intends to regulate those autonomous vehicles that require constant driver supervision when autonomous features within the vehicle are engaged, the state's law should explicitly state that the statute or regulation applies to "Level 2" vehicles, as NHTSA has termed them.²⁹⁵ Greater congruence between NHTSA's terminology and the language used in state laws will assist drivers, law enforcement officers, manufacturers, and courts in assessing which laws apply to which vehicles and, in the case of drivers and manufacturers, how to adjust their behavior or designs to comply with those laws. Currently, no state driverless car laws refer to which level of autonomy they apply.

Third, state lawmakers should rely on empirical data rather than intuition, speculation, or fear when drafting driverless car laws. This can be a particularly difficult task when attempting to regulate new technologies, as the general public has a tendency to "exaggerate the harms associated with an innovation" and demand significantly more severe laws than are warranted.²⁹⁶ A 1908 article in the *Yale Law Journal*, for instance, called for harsh restrictions on the use of motor vehicles, a new and radical innovation at the time.²⁹⁷ The author explained:

To the *insider* they exhibited only their attractive features; to the outsider, only their repulsive ones. To nearly everyone but the occupants they were an inconvenience; to many a nuisance, and to some a veritable terror In dry weather they raised a stifling cloud of dust and smoke; their engines produced a disturbing noise, and their speed frightened horses, and rendered the roads so unsafe that it became a question whether they could be tolerated at all. Under such conditions,

295. NAT'L HIGHWAY TRANSP. SAFETY ADMIN., PRELIMINARY STATEMENT OF POLICY, *supra* note 51, at 5.

296. Graham, *supra* note 103, at 1256.

297. H. B. BROWN, *The Status of the Automobile*, 17 YALE L.J. 223, 229 (1908).

it is little wonder that they became so obnoxious that they were prohibited altogether in certain localities, such as Mount Desert and Nantucket Islands, and largely in private grounds. As soon as their beauty and peculiar construction had lost their novelty, and the public had ceased to wonder at their speed, the spectacle of a dangerous and irresistible machine tearing through the streets of a village at thirty or forty miles an hour, raised a storm of indignation, and sometimes called forth a volley of stones, or of eggs which had outlived their usefulness for every other purpose.²⁹⁸

Decades later, however, that analysis seems overly hysterical and unwarranted. Lawmakers are at risk of making the same mistake now. Neither override nor operator provisions appear to be based in any empirical understanding of how driverless cars work or how human drivers or occupants are likely to interact with them.

Lawmakers should thus resist the call to regulate out of fear and uncertainty and instead engage in careful review of highway safety data, studies of autonomous technologies, and real world experience, before attempting to respond to the regulatory challenges posed by driverless cars. This data may run counter to intuition about human behavior and highway safety, but it provides significantly better guidance on the types of laws that will both promote safe operation of autonomous cars and maximize the benefits they offer. The operator and override provisions discussed above demonstrate the ways in which laws can be nonsensical, overbroad, and otherwise problematic when such data is not utilized.

Fourth, state lawmakers should create exceptions to otherwise strict liability traffic laws for Level 4 and 5 vehicles and, to a lesser extent, Level 2 and 3 vehicles, to (a) avoid conflicts between this body of law and laws created specifically for driverless cars, (b) clarify the legal obligations of the “drivers” of autonomous cars, and (c) remove opportunities for nonsensical liability to be imposed upon them. While, as discussed above, some forms of liability for the “drivers” of autonomous cars may be appropriate, such as in situations where drivers fail to monitor Level 2 vehicles, in many others, liability might be more appropriately placed on the manufacturer via a products liability or negligence suit, a possibility explored quite ably by a number of other legal scholars.²⁹⁹ Maintaining a

298. *Id.* at 225–26.

299. *See, e.g.,* Villasenor, *supra* note 107; David C. Vladeck, *Machines Without Principals: Liability Rules and Artificial Intelligence*, 89 WASH. L. REV. 117, 147–49 (2014); Kevin Funkhouser, Note, *Paving the Road Ahead: Autonomous Vehicles, Products Liability, and the Need for a New Approach*, 2013 UTAH L. REV. 437, 462 (2013);

canon of strict liability traffic laws with no carve out for autonomous cars, however, makes it difficult for courts to explore these nuances and assess where liability properly lies.³⁰⁰

Fifth, state lawmakers should be mindful that not all driverless car incidents warrant a legislative response. Inevitably, more driverless car-related fatalities and accidents will occur, but such incidents will not necessarily indicate that driverless car laws are not strict or extensive enough. Nor should lawmakers demand a perfect safety record:

Inevitably, some will insist that anything short of totally eliminating risk is a safety compromise. They might feel that humans can make mistakes, but not machines. But waiting for autonomous vehicles to operate perfectly misses opportunities to save lives by keeping far-from-perfect human drivers behind the wheel Moreover, perfection could be a standard that is unattainable or that is not economically viable for developers, putting the kibosh on the industry. This would be a classic case of the perfect being the enemy of the good.³⁰¹

Lawmakers, therefore, “may have to accept that [driverless] cars will cause a limited number of crashes, including deadly ones, if overall they save thousands of lives.”³⁰²

Sixth, when in doubt about the necessity of new driverless car laws, state lawmakers should choose not to legislate. There are “inherent danger[s] in trying to design legislation too soon for new technology.”³⁰³ Such legislation could stifle development and thus undermine the benefits that the technology has to offer.³⁰⁴ Moreover, given that the United States is still within the early stages of driverless car roll out, it is difficult to accurately assess what the biggest regulatory needs will be.³⁰⁵ As one scholar sagely observes, “To borrow from screenwriter William Goldman, when predicting how

Kyle Colonna, *Autonomous Cars and Tort Liability*, 4 CASE W. RES. J.L. TECH. & INTERNET 81, 96–97 (2012).

300. One of the more interesting possibilities explored in literature about driverless cars and products liability is the creation of a victim compensation fund that would be “funded by the collection of a small fee when each [autonomous vehicle] is purchased and that [would pay] for damages caused by the relevant [autonomous vehicles].” WEAVER, *supra* note 1, at 181.

301. Nidhi Kalra, *With Driverless Cars, How Safe Is Safe Enough?*, U.S.A. TODAY (Feb. 1, 2016), <http://www.usatoday.com/story/opinion/2016/01/31/driverless-cars-autonomous-vehicles-safety-innovation-death-accidents-column/78688584/>.

302. Krisher & Pritchard, *supra* note 99.

303. WEAVER, *supra* note 1, at 61.

304. Thierer & Hagemann, *supra* note 127, at 340; Putre, *supra* note 103.

305. Graham, *supra* note 103, at 1241.

tort law will interact with innovations, nobody knows anything — at least for a while.”³⁰⁶ State lawmakers should thus opt to take a “wait and see” approach rather than an “anticipate and legislate” one.

VII. CONCLUSION

The United States is on the cusp of a revolution in transportation. The sale and widespread use of both semi-autonomous and fully autonomous vehicles are both imminent and likely to significantly change the way in which citizens commute, interact, and travel. These cars are being developed in both Detroit and Silicon Valley and use combinations of radar, laser, camera, and software technologies to allow them to perform driving tasks that have historically been the responsibility of human drivers. In the process, they raise significant questions about appropriate regulation and liability.

While there is substantial concern amongst lawmakers and the general public about the overall safety and desirability of driverless cars, experts predict that fully autonomous cars will dramatically improve highway safety by preventing millions of accidents and saving tens of thousands of lives per year. In addition, these vehicles are likely to significantly reduce traffic, increase productivity, and greatly enhance the independence of people who lack the ability to obtain a license: the physically disabled, the visually impaired, and the elderly.

Lawmakers, however, motivated by fears of these new types of cars and by an unfounded assumption that human drivers are far superior to automated technologies, have begun passing laws that create significant liability issues while doing very little to enhance road safety. These laws ignore the differences between Level 2, 3, 4, and 5 autonomous vehicles, chill technological advancement, impose unwarranted liability on human drivers in many circumstances, and may actually incentivize human driver behavior that is less safe than letting the vehicle drive autonomously. Both “operator” and override provisions—two very common types of driverless car laws—make these mistakes.

“Operator” provisions, for example, consider human drivers the “captain” of their ships and hold them responsible for any and all malfunctions of their semi- or fully autonomous cars regardless of whether those humans had the ability to prevent or control them. While undoubtedly some liability for human drivers is appro-

306. *Id.*

priate in some driverless car contexts—for instance, in situations in which humans were not appropriately monitoring Level 2 or 3 vehicles—imposing liability in other circumstances (and in all contexts involving Level 4 and 5 cars) runs counter to the most fundamental underpinnings of both civil and criminal law.

Override provisions, which require constant human monitoring of driverless cars or the installation of mechanisms within driverless cars that would permit human intervention, are similarly problematic. Constant driver supervision may be an appropriate (though perhaps too limited) requirement for Level 2 vehicles, but it is both overly strict and unnecessary for Levels 3, 4, and 5. Moreover, these laws are based on several flawed assumptions about the likelihood and ability of human drivers to supervise and intervene appropriately and in a timely manner. A wealth of empirical studies cast significant doubt on the ability of human drivers to do either. Most troublingly, these laws outlaw fully autonomous vehicles—those that stand to offer the most benefits to both drivers and society—and pose a serious threat to companies, like Google and Ford, taking an “all-in” approach to the development of these cars.

Lawmakers who wish to pass sensible driverless car laws must carefully tailor those laws to the specific types of autonomous technologies at issue. Partially autonomous cars raise an entirely different set of regulatory challenges than fully autonomous cars and thus should be treated differently under the law. Lawmakers should also use language consistent with that being used by federal agencies when describing autonomous technologies in order to promote clarity and consistency between the states. Perhaps most importantly, however, lawmakers should use empirical data, rather than intuition or speculation to inform their decisions about whether to legislate and how to do so appropriately. Given the profound benefits that driverless cars have to offer, suppressing the development of those technologies now through legislative overreach would be a situation almost as tragic as the current rates of injuries and deaths on U.S. roads. Drivers and passengers deserve better.