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Emily Frascaroli
Ford Motor Company

John Isaac Southerland
Huie, Fernambucq & Stewart LLP

Elizabeth Davis
Huie, Fernambucq & Stewart LLP

Woods Parker
Huie, Fernambucq & Stewart LLP

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LET'S BE REASONABLE: THE CONSUMER EXPECTATIONS TEST IS SIMPLY NOT VIABLE TO DETERMINE DESIGN DEFECT FOR COMPLEX AUTONOMOUS VEHICLE TECHNOLOGY

EMILY FRASCAROLI†, JOHN ISAAC SOUTHERLAND†, ELIZABETH DAVIS†, AND WOODS PARKER†

† Emily Frascaroli is Managing Counsel of Product Litigation for Ford Motor Company. She also advises globally on automotive safety, regulatory, and product liability issues, including a focus on autonomous vehicles and mobility. She is a lecturer at the University of Michigan Law School where she teaches a class about the legal issues involved with autonomous vehicles, and is also a Contributing Editor of the Journal of Law and Mobility. In 2017, she was appointed by Governor Rick Snyder to the Michigan Council on Future Mobility, and in 2019, she was appointed by Governor John Kasich to the DriveOhio Expert Advisory Board.

† John Isaac Southerland is a partner at Huie Fernambucq & Stewart LLP in Birmingham, Alabama. Mr. Southerland's practice areas include automotive product liability, personal injury, heavy equipment product liability, trucking litigation, and towing and recovery liability. He also serves as national coordinating discovery counsel for a major automotive client. Mr. Southerland is a frequent lecturer at various industry conferences and has written and spoken about the emergence of highly automated vehicles and technology on numerous occasions. He also serves as a Barrister and the Programs Chairperson in the James Edwin Horton Inn of Court at Cumberland School of Law.

† Elizabeth Davis is an associate at Huie, Fernambucq & Stewart LLP in Birmingham, Alabama. Ms. Davis concentrates her law practice in the areas of automotive litigation, product liability and discovery practice and procedure, including serving as national coordinating discovery counsel for a major automotive client. Ms. Davis is an active member of Alabama Defense Lawyers Association, Birmingham Bar Association, and Defense Research Institute.

† Woods Parker is an associate at Huie, Fernambucq & Stewart LLP in Birmingham, Alabama. Mr. Parker concentrates his law practice in the areas of automotive litigation, product liability, trucking litigation, consumer lemon law, and discovery practice and procedure, including serving as national coordinating discovery counsel for a major automotive client. Mr. Parker is an active member of Alabama Defense Lawyers Association, Birmingham Bar Association, and Defense Research Institute.

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ABSTRACT

Although highly automated vehicles ("HAVs") have potential to reduce deaths and injuries from traffic crashes, product liability litigation for design defects in vehicles incorporating autonomous technology is inevitable. During the early stages of implementation, courts and juries will be forced to grapple with the application of traditional product liability principles to a never before experienced category of highly technical products. Recent decisions limiting the use of the consumer expectations test in cases involving complex products prompted the authors to examine more closely the history behind and the future viability of the consumer expectations test in HAV litigation.

I. INTRODUCTION

In 2016, more than 35,000 individuals died in vehicle crashes in the U.S. and the National Highway Traffic Safety Administration ("NHTSA") estimated that 94% of these deaths were attributable to human error.[1] In 2017 and 2018, in their own self-driving safety reports, General Motors and Waymo also noted that approximately 1.2 million lives are lost worldwide each year due to car crashes.[2] Each of these entities further agree that highly automated vehicle ("HAV")[3] technology has the potential to reduce or

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1. *Automated Vehicles for Safety*, NHTSA, https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety (last visited May 2, 2019).

2. WAYMO, WAYMO SAFETY REPORT: ON THE ROAD TO FULLY SELF-DRIVING 3 (2018), https://storage.googleapis.com/sdc-prod/v1/safety-report/Safety%20Report%202018.pdf; GENERAL MOTORS, 2018 SELF-DRIVING SAFETY REPORT 3 (2018), https://www.gm.com/content/dam/company/docs/us/en/gmcom/gmsafetyreport.pdf.

3. For purposes of this paper, the terms highly automated vehicle (HAV) or "self-driving" will refer to vehicles defined by SAE Levels 4–5. *See* SAE INTERNATIONAL, TAXONOMY AND DEFINITIONS FOR TERMS RELATED TO DRIVING AUTOMATION SYSTEMS FOR ON-ROAD MOTOR VEHICLES J3016 (2018), https://saemobilus.sae.org/content/j3016_201806. The SAE levels of automation are as follows: (0) No automation; the vehicle has zero autonomy, and the driver performs all tasks; (1) Driver Assistance: the vehicle is controlled by the driver, but some driver assistance features are included; (2) Partial Driving Automation: the vehicle has combined automated functions, but the driver must remain engaged with the driving task and monitor the environment constantly; (3) Conditional Driving Automation: the driver is necessary, but is not required to constantly monitor the environment—the driver must be ready to take control of the vehicle at all times; (4) High Driving Automation: the vehicle is capable of performing all driving functions under certain conditions, but the driver has the option of controlling the

remove human error from the equation.[4] Additional potential benefits include reduced traffic congestion; increased mobility options for currently underserved populations; and, increased comfort and a reduction in lost time during vehicle operation.[5] Put simply, the stage is set for HAV technology to revolutionize the mobile world.

During the implementation of HAVs, most sources agree that, due to their highly complex and technical nature, consumer education about the products will be key to successful and effective implementation. For its part, in the 2017 update, *Automated Driving Systems 2.0*, NHTSA stated that "[E]ducation and training is imperative for increased safety during the deployment of [HAVs]," and encourages the development of "consumer education and training programs to address the anticipated differences in the use and operation of [automated driving systems] from those of the conventional vehicles that the public owns and operates."[6] General Motors and Waymo echoed these sentiments in their respective self-driving safety reports with Waymo, in October 2017, even helping to launch – *Let's Talk Self-Driving* - which it describes as "the world's first public education campaign about fully self-driving vehicles."[7] Taking this one-step further, in 2018, Ford provided its Voluntary Safety Self-Assessment Report – *A Matter of Trust*.[8] In it, Ford makes clear "that the central challenge in the development of self-driving vehicles" is not the technology, but, instead, it is consumer trust in the "safety, reliability and experience that the technology will enable."[9] Ford reiterates this point stating about consumer education and training that, *"[B]ringing self-driving vehicles to market will require a thoughtful and sustained effort to teach customers how they work, why they're safe and how to use them*."[10]

In light of this, questions remain, particularly with respect to liability, if, and when, an injury or death occurs in an HAV. The question of who is liable when a self-driving vehicle crashes has generated significant debate and

vehicle; and (5) Full Driving Automation: the vehicle is capable of performing all driving functions under all conditions, with the driver having the option of controlling the vehicle.

4. *See* WAYMO, *supra* note 2; GENERAL MOTORS, *supra* note 2.

5. GENERAL MOTORS, *supra* note 2.

6. NHTSA, AUTOMATED DRIVING SYSTEMS: A VISION FOR SAFETY 2.0 15 (2017), https://www.nhtsa.gov/vehicle-manufacturers/automated-driving-systems#automated-driving-systems-av-20.

7. WAYMO*, supra* note 2 at 30; GENERAL MOTORS, *supra* note 2, at 32.

8. FORD MOTOR COMPANY, A MATTER OF TRUST: FORD'S APPROACH TO DEVELOPING SELF-DRIVING VEHICLES, https://media.ford.com/content/dam/fordmedia/pdf/ Ford_AV_LLC_FINAL_HR_2.pdf.

9. *Id.*at 3.

10. *Id.* at 42 (emphasis added).

conversation. Per NHTSA, "these are among many important questions beyond the technical considerations that policymakers are working to address before automated vehicles are made available."[11] NHTSA also posits that questions of liability pertaining to HAVs are something within the purview of each state to manage.[12] In the wake of some interesting opinions in 2017, this question, and others, prompted the authors to examine the historical development of product defect theories and, in particular, whether the consumer expectations test can reasonably be applied to determine liability in cases involving complex products.

II. ADOPTION OF DESIGN DEFECT TESTS IN THE WAKE OF SECTION 402A OF THE RESTATEMENT (SECOND) OF TORTS.

In 1965, the law of torts and the field of product liability were altered dramatically by the adoption of Section 402A of the *Restatement (Second) of Torts*.[13] Section 402A sought to impose strict liability on the manufacturers or sellers of defective products, regardless of negligence, and became perhaps the most cited section of any Restatement of Law in legal jurisprudence.[14]

A. The Consumer Expectations Test

Section 402A provides that "[o]ne who sells any product in a defective condition unreasonably dangerous to the user or consumer or to his property is subject to liability for physical harm thereby caused to the ultimate user or consumer, or to his property . . . ."[15] To guide courts in determining whether a product is unreasonably dangerous, the drafters of the Second Restatement included the following comment: "The article sold must be dangerous to an extent beyond that which would be contemplated by the ordinary consumer who purchases it, with the ordinary knowledge common to the community as to its characteristics."[16] This comment provided support for the pure consumer expectations test in product defect cases. In turn, this product defect test was embraced by courts in the years following the release of the Second Restatement.[17] Over time, courts across the country recognized that

11. *Automated Vehicles for Safety, supra* note 1.

12. NHTSA, *supra* note 6, at 24.

13. *See generally* George L. Priest, *Strict Products Liability: The Original Intent*, 10 CARDOZO L. REV. 2301, 2301 (1989).

14. *See* James A. Henderson Jr. & Aaron D. Twerski, *Proposed Revision of Section 402A of the Restatement (Second) of Torts*, 77 CORNELL L. REV. 1512, 1512 n.1 (1992).

15. RESTATEMENT (SECOND) OF TORTS § 402A (AM. LAW INST. 1965).

16. *Id.* at cmt. i.

17. *See, e.g.*, Aller v. Rodgers Machinery Mfg. Co., Inc., 268 N.W. 2d 830 (Iowa 1978); Phipps v. General Motors Corp., A.2d 955 (Md. 1976); Estate of Pinkham v. Cargill, Inc., 55 A.3d 1 (Me. 2012) (citing Adams v. Buffalo Forge Co., 443 A.2d 932,

there were significant issues with the Second Restatement's pure consumer expectations approach to defective design.

For example, in the 1967 case of *Heaton v. Ford Motor Co.*, the Supreme Court of Oregon was faced with application of the consumer expectations test in the context of a design defect claim involving a motor vehicle.[18] In *Heaton*, the plaintiff's vehicle struck a rock in the roadway. After the accident, the rim of the wheel was found to have separated from the rest of the wheel assembly. The court utilized the consumer expectations test to determine design defect, stating:

> In the type of case in which there is no evidence, direct or circumstantial, available to prove exactly what sort of manufacturing flaw existed, or exactly how the design was deficient, the plaintiff may nonetheless be able to establish his right to recover, *by proving that the product did not perform in keeping with the reasonable expectations of the user.* When it is shown that a product failed to meet the reasonable expectations of the user the inference is that there was some sort of defect.[19]

However, the court recognized that in *Heaton*, the jury could not possibly state from their own experience what the expectations of the average consumer would be.[20] After all, high-speed collisions with large rocks are not so common that the average person would know from personal experience how the wheel assembly would perform in such a situation.[21] As such, "[t]he jury would therefore be unequipped, either by general background or by facts supplied in the record, to decide whether this wheel failed to perform as safely as an ordinary consumer would have expected."[22] Unfortunately, the *Heaton* court ultimately refused to acknowledge that the consumer expectations test simply did not apply in this situation, but instead seemed to suggest that expert testimony would be required to establish the consumer expectations.[23] The paradox is obvious: *if an expert is required to tell the consumer what to expect, is that truly the expectation of an ordinary consumer?*

Fortunately, courts have begun to recognize that utilizing the consumer expectations test in cases involving alleged design defects in technically

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940 (Me. 1982)); Simonetta v. Viad Corp., 197 P.3d 127 (Wash. 2008).

18. *See* Heaton v. Ford Motor Co., 435 P.2d 806 (Or. 1967).
19. *Id.* at 471–72 (emphasis added).
20. *See id.* at 472–73.
21. *Id.* at 473.
22. *Id.*
23. *See id.* at 474.

complex products is simply not workable.[24] However, there are courts that have found the consumer expectations test applicable, even where the requisite knowledge is not within the purview of lay jurors.[25]

B. Risk Utility Test

As a result, many courts began to apply the test commonly referred to as risk-utility balancing. Under this test, to establish a prima facie case of design defect, the plaintiff must show that on balance, the utility of the challenged product design outweighs the risk of danger inherent in the design.[26] Traditionally, under risk-utility, courts consider a multitude of factors to determine whether a defect exists, including the following factors identified in an influential article by Dean John W. Wade in 1973:

> (1) The usefulness and desirability of the product;
> (2) the safety aspects of the product;
> (3) the availability of safer substitute products;
> (4) the possibility of elimination of dangerous characteristics of the product without impairing its usefulness;
> (5) the user's ability to avoid danger by safe use of the product;
> (6) the anticipated dangers inherent in the product due to general knowledge or the existence of warnings; and
> (7) the possibility of loss-spreading by the manufacturer through price setting or insurance.[27]

Further, "[t]he utility of the product must be evaluated from the point of view of the public as a whole, because a finding of liability for defective design could result in the removal of an entire product line from the market."[28]

In 1998, the element of a reasonable alternate design was written into the new *Restatement (Third) of Torts*.[29] Under § 2 of the Third Restatement, a product is:

> "[D]efective in design when the foreseeable risks of harm posed

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24. *See, e.g.,* Montag v. Honda Motor Co., Inc., 75 F.3d 1414 (10th Cir. 1996) (citing Camacho v. Honda Motor Corp., 741 P.2d 1240, 1246–48 (Colo. 1987)). *See also* 2 LOUIS R. FRUMER & MELVIN I. FRIEDMAN, PRODUCTS LIABILITY§ 11.03 (Matthew Bender, Rev. Ed.).

25. *See, e.g.*, Bresnahan v. Chrysler Corp., 38 Cal. Rptr. 2d 446, 451–52 (Cal. Ct. App. 1995). *See also* 2 FRUMER & FRIEDMAN, *supra* note 25.

26. *See, e.g.*, Thibault v. Sears, Roebuck & Co., 395 A.2d 843 (N.H. 1978).

27. *See* John W. Wade, *On the Nature of Strict Tort Liability for Products*, 44 MISS. L.J. 825 (1973).

28. *See* Thibault, 395 A.2d at 807.

29. *See* RESTATEMENT (THIRD) OF TORTS § 2 (AM. LAW INST., 1998).

> by the product could have been reduced or avoided by the adoption of a reasonable alternative design by the seller or other distributor, or a predecessor in the commercial chain of distribution, and the omission of the alternative design renders the product not reasonably safe.[30]

As noted in 2009, the "reasonable alternative design" standard of the Third Restatement ultimately came to embody the "risk-utility test" that is applied in the majority of United States jurisdictions today.[31]

Significant developments since 2009, some of which are discussed more fully below, further exemplify the national trend towards applying risk-utility in complex design defect cases and moving away from the consumer expectations test in this context. Indeed, in 2017, the Ninth Circuit recognized that, "when the ultimate issue of design defect calls for a careful assessment of feasibility, practicality, risk, and benefit, the case should *not* be resolved simply on the basis of ordinary consumer expectations."[32]

C. Hybrid Test

Other jurisdictions utilize a dual-approach to design defect claims. California, for example, utilizes the consumer expectations test when consumers are capable of developing expectations about the characteristics of a product from everyday use.[33] For more complex products, where the characteristics are outside the knowledge of an everyday consumer, courts apply the risk-benefit test.[34] Thus, the determinative issue in many cases in California and similar jurisdictions is whether a product is too complex or unfamiliar for average consumers to develop expectations, such that utilization of the consumer expectations test is improper.[35] Making this determination in the context of autonomous technology should not be an issue.

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30. *Id.* The Third Restatement explicitly rejects consumer expectations as an independent standard for determining design defect. *See id.* at §2 cmt. g.

31. *See* Aaron D. Twerski & James A. Henderson, Jr., *Manufacturer Liability for Defective Product Designs: The Triumph of Risk Utility*, 74 BROOK. L. REV. 1061, 1065 (2009). Notably, even courts that continue to utilize the consumer expectations test exclusively often acknowledge that evidence of an alternative design is the most appropriate and useful means of showing that a product is unreasonably dangerous. *See, e.g.*, Ford Motor Co. v. Trejo, 402 P.3d 649, 655 (Nev. 2017).

32. *See* Edwards v. Ford Motor Co., 683 Fed. App'x 610, 611 (9th Cir. 2017) (*quoting* Soule v. General Motors Corp., 882 P.2d 298, 305 (Cal. 1994)) (emphasis supplied in original).

33. *See* Soule, 882 P.2d at 310–311.

34. *See id.*

35. *See, e.g.*, Saller v. Crown Cork & Seal Co., Inc., 115 Cal. Rptr. 3d 151, 160–61 (Cal. Ct. App. 2010).

This hybrid approach combines elements of both the consumer expectations test and the risk-utility test. One example is the "either-or" concept, which posits that:

> [A] product is defective in design either (1) if the product has failed to perform as safely as an ordinary consumer would expect when used in an intended or reasonably foreseeable manner, or (2) if, in light of the relevant factors . . . the benefits of the challenged design do not outweigh the risk of danger inherent in the design.[36]

This approach allows courts more flexibility in applying the appropriate test based upon all of the relevant circumstances. For example, in *Barker v. Lull Engineering*, the plaintiff sustained injuries while operating a loader at a construction site and alleged that his injuries were caused by a defective design of the product because it was not equipped with a roll bar or seat belts.[37] The California Supreme Court rejected a pure consumer expectations test and a pure risk-utility test, instead articulating the two-prong test allowing a plaintiff to establish a design defect through either test.[38] In so holding, the court noted the benefits of the more flexible approach stating:

> [I]t subjects a manufacturer to liability whenever there is something "wrong" with a product's design – either because the product fails to meet ordinary consumer expectations as to safety or because, on balance, the design is not as safe as it should be – while stopping short of making the manufacturer an insurer for all injuries which may result from the use of its product. This test, moreover, explicitly focuses on the trier of fact's attention to the adequacy of the product itself, rather than on the manufacturer's conduct, and places the burden on the manufacturer, rather than the plaintiff, to establish that because of the complexity of, and trade-offs implicit in, the design process, an injury-producing product should nevertheless not be found defective.[39]

Other courts have taken a different approach in formulating a hybrid consumer expectations and risk-utility test, incorporating risk-utility factors into the consumer expectation analysis, and vice versa.[40] For example, in *Potter v. Chicago Pneumatic Tool Co.*, the plaintiffs alleged that pneumatic

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36. Barker v. Lull Eng'g Co., 573 P.2d 443, 446 (Cal. 1978).

37. *Id.* at 447–48.

38. *Id.* at 455–56.

39. *Id.* at 456.

40. *See, e.g.*, Potter v. Chicago Pneumatic Tool Co., 694 A.2d 1319, 1333–34 (Conn. 1997).

hand tools manufactured by the defendant were defective in design because they exposed the plaintiffs to excessive vibration, resulting in injuries to the plaintiffs.[41] Although Connecticut courts had long applied the Second Restatement's consumer expectations test, the court recognized that "there may be instances involving complex product designs in which an ordinary consumer may not be able to form expectations of safety."[42] In recognizing this issue with the pure consumer expectations test, the Connecticut Supreme Court adopted a "modified consumer expectation test, provid[ing] the jury with the product's risks and utility and then inquir[ing] whether a reasonable consumer would consider the product unreasonably dangerous."[43] In determining a consumer's reasonable expectations, the jury should consider various factors, including but not limited to the "relative cost of the product, the gravity of the potential harm from the claimed defect and the cost and feasibility of eliminating or minimizing the risk."[44] In sum, under this approach, "the consumer expectation test would establish the product's risks and utility, and the inquiry would then be whether a reasonable consumer would consider the product design unreasonably dangerous."[45] The Connecticut Supreme Court's approach was based, in part, on early drafts of the Restatement (Third) of Torts on Product Liability.[46]

III. MORE AND MORE COURTS ARE RECOGNIZING THE LIMITATIONS OF THE CONSUMER EXPECTATIONS TEST IN COMPLEX DESIGN DEFECT CASES.

In March 2017, the United States Court of Appeals for the Ninth Circuit examined the question of whether the consumer expectations test or risk-utility balancing test should be applied to determine whether a design defect existed in a product liability case involving vehicle roof deformation.[47] In *Edwards v. Ford Motor Co.*, the plaintiffs claimed that the roof of their vehicle was defectively designed because it deformed inward eight inches into the passenger compartment during a multiple rollover event. The plaintiffs alleged that a properly designed roof should have resulted in less than three inches of deformation in the subject crash.

The *Edwards* plaintiffs sought to prove design defect by showing that the roof did not perform as the average consumer would have expected. Ford filed a motion contending that the jury should be instructed on the risk-utility

41. *Id.* at 1325.
42. *Id.* at 1333.
43. *Id.*
44. *Id.*
45. *Id.*
46. *Id.* at 1331.
47. *See* Edwards v. Ford Motor Co., 683 Fed. App'x 610 (9th Cir. 2017).

test alone. Ford's motion was granted and plaintiffs appealed. The Ninth Circuit held that the risk-utility test was the proper test to be applied, specifically recognizing the "lack of consumer expectations regarding the extent to which the [vehicle]'s roof would crush in a multiple rollover accident."[48] The Ninth Circuit went on to note that "[d]rivers' everyday experiences do not allow for the formulation of reasonable expectations as to the degree that a vehicle's roof should crush during a rollover."[49] The Ninth Circuit did not feel it necessary to state whether or not this product was too complex for the consumer expectations test to govern; instead, it was enough to know that consumers simply would not have expectations related to roof performance in a rollover.[50] Thus, the risk-utility test was the appropriate test.[51]

Another recent case decided by the Court of Appeal of California also limited the applicability of the consumer expectations test. The plaintiff in *Trejo v. Johnson & Johnson* contracted a rare condition known as SJS/TEN as a reaction to taking over-the-counter ibuprofen produced by Johnson & Johnson. Plaintiff sought to show that the drug was defectively designed through utilization of the consumer expectations test.

The Court of Appeal found the consumer expectations had no place in proving design defect under these facts, noting that "'[t]he consumer expectations test is reserved for cases in which the *everyday experience* of the product's users permits a conclusion that the product's design violated *minimum* safety assumptions, and is thus defective *regardless of expert opinion about the merits of the design*.'"[52] The plaintiff essentially attempted to use consumer expectations to avoid having to confront the more difficult risk-utility standard or any showing of a reasonable alternative design, but also wished to introduce expert testimony to establish that the ibuprofen did not meet consumer expectations. The court found this fact alone sufficient to demonstrate the consumer expectations test was inappropriate for that case.[53]

Succinctly explaining the problem with applying consumer expectations in the case of complex products or products with which consumers are unfamiliar, the court stated: "*[I]t could be said that any injury* from the intended or foreseeable use of a product *is not expected by the ordinary*

48. *Id.* at 611.

49. *Id.*

50. *See id.*; *See also* Branham v. Ford Motor Co., 701 S.E. 2d 5, 13–14 (S.C. 2010) (finding that the consumer expectations test was not appropriate in design defect case after examining the issue in the context of an automotive rollover case involving an allegedly defective seatbelt design).

51. *See id.*

52. Trejo v. Johnson & Johnson, 220 Cal. Rptr. 3d 127, 165 (Cal. Ct. App. 2017) (quoting Soule v. General Motors Corp., 882 P.2d 298, 308 (Cal. 1994).

53. *See id. at 168.*

consumer. If this were the end of the inquiry, *the consumer expectations test always would apply and every product would be found to have a design defect*."[54]

As to a non-complex product, the Tenth Circuit's examination of consumer expectations in *Kokins v. Teleflex, Inc.* is instructive.[55] *Kokins* involved the determination of what design defect test should be used under Colorado law in the context of a claim involving a metal marine cable, a seemingly simple product. The court initially noted that, under Colorado law, the risk-utility test and consumer expectations test are not mutually exclusive of each other and can sometimes even be applied in the same case.[56] However, the Tenth Circuit held that in the context of this particular product, *only* the risk-utility test was proper, due to the technical and specific information related to metallic corrosion.[57] Quite simply, in cases where technical and scientific issues predominate, use of the consumer expectations test, alone or in conjunction with the risk-utility test, is inappropriate.[58]

Finally, as recently as November, 2017, the Colorado Supreme Court determined that the "risk-benefit test is the appropriate test to assess whether a product was unreasonably dangerous due to a design defect when . . . the dangerousness of the design is 'defined primarily by technical, scientific information.'"[59] In *Walker v. Ford Motor Co.*, the plaintiff proceeded to trial against Ford for injuries sustained in a rear-end impact.[60] The plaintiff alleged the seat in his vehicle was defectively designed, alleging theories based in both strict liability and negligence.[61] At the end of trial, the trial court instructed the jury that it could apply either a consumer expectation test or risk-benefit test, and the jury found in favor of the plaintiff.[62] The court of appeals reversed the jury verdict.[63]

In affirming the Colorado Court of Appeals, the Colorado Supreme Court recognized that it had "stated repeatedly that the risk-benefit test, not the consumer expectation test, is the proper test to use in assessing whether a product like the car seat . . . is unreasonably dangerous due to a design

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54. *See id.* at 167 (emphasis added).

55. *See* Kokins v. Teleflex, Inc., 621 F.3d 1290 (10th Cir. 2010).

56. *See id.* at 1297.

57. *See id.*

58. *See id.*

59. *See* Walker v. Ford Motor Co., 406 P.3d 845, 850 (Colo. 2017) (quoting Ortho Paharm. Corp. v. Heath, 722 P.2d 410, 414 (Colo. 1986)).

60. *See id.* at 847–48.

61. *See id.* at 848.

62. *See id.* at 848.

63. *See id.* at 849.

defect."[64] The Court further noted:

> [P]roducts-liability law has developed in part to "encourage manufacturers to use information gleaned from testing, inspection and data analysis" to help avoid product accidents. Using the risk-benefit test . . . helps further this objective, as it directs the fact-finders to consider the manufacturer's ability to minimize or eliminate risks and the effect such an alteration would have on the product's utility, other safety aspects, or affordability.[65]

While the authors recognize the debate about whether to apply the consumer expectations test or the risk-utility test continues to this day, and that some jurisdictions still apply the consumer expectations test, even in cases of complex products, the above referenced opinions illustrate the issues and concerns with asking jurors to determine the expectations of an ordinary consumer when evaluating a highly technical products in design defect matters.

IV. THE CONSUMER EXPECTATIONS TEST IS NOT THE APPROPRIATE TEST OF DESIGN DEFECT AS APPLIED TO AUTONOMOUS VEHICLE TECHNOLOGY

The arrival of any new product technology will bring with it litigation, and along with that arguments for the legal standard that will place the lightest burden on plaintiffs in this new arena. Thus, it is likely that as lawsuits begin with autonomous vehicle technology, plaintiffs will argue that the consumer expectations test should apply to their claims for alleged design defects in autonomous vehicles. The argument will likely follow the reasoning employed by courts that refuse to adopt the Third Restatement approach, or that still strictly follow the consumer expectations test, i.e. that risk-utility balancing, especially when a reasonable alternative design is required, places too great of a burden on plaintiffs that do not have the resources to make showings that are so technical in nature.[66]

A. Highly Automated Vehicles Are Too Complex for Consumer Expectations to Govern.

The Society of Automotive Engineers lists six (6) levels of automation for

64. *Id.* at 850.

65. *Id.* at 851 (*quoting* Camacho v. Honda Motor Co., 741 P.2d 1240, 1247 (Colo. 1987)).

66. *See, e.g.*, Potter v. Chicago Pneumatic Tool Co., 694 A.2d 1319, 1332 (Conn. 1997); Vautour v. Body Masters Sports Indus., 784 A.2d 1178, 1183 (N.H. 2001).

HAVs.[67] Currently, *all* vehicles on roadways are levels one and two, with Audi unveiling the world's first production Level 3 vehicle in July 2017.[68] Further, even if *fully autonomous vehicles* were on the road today, the vast majority of consumers will remain unfamiliar with the technology for the foreseeable future. Drivers keep their vehicles on the road for over eleven years on average,[69] so vehicles of lower automation levels will continue to be the predominant means of automotive transportation for years to come.[70]

Further, NHTSA acknowledges the lack of consumer experience with autonomous vehicle technology, as well as how different these vehicles are from conventional vehicles on the roads today. In 2017, in *Automated Driving Systems 2.0: A Vision for Safety*, NHTSA pronounced that:

> Proper education and training is imperative to ensure safe deployment of automated vehicles. Therefore, manufacturers and other entities should develop document, and maintain employee, dealer, distributor, and consumer education and training programs to address *the anticipated differences* in the use and operation of HAVs [highly automated vehicles] *from those of conventional vehicles that the public owns and operates today*. Such programs should be designed to provide the target users the necessary level of understanding to use these technologies properly, efficiently, and in the safest manner possible.[71]

Essentially, NHTSA is recommending a completely new dimension of consumer education on how to *use* these products. Likewise, this education will be aimed at and received primarily by consumers who actually purchase and use autonomous vehicle technology and not automotive consumers generally.

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67. *See* SAE INTERNATIONAL, supra note 3.

68. As reported in an article by IEEE Spectrum, Audi claims to have achieved level 3 through its "AI Traffic Jam Pilot" feature, which can only be activated when driving at less than 37 mph. *See* Philip E. Ross, *The Audi A8: The World's First Production Car to Achieve Level 3 Autonomy*, IEEE SPECTRUM (July 11, 2017), https://spectrum.ieee.org/cars-that-think/transportation/self-driving/the-audi-a8-the-worlds-first-production-car-to-achieve-level-3-autonomy.

69. Reno Charlton, *American Drivers Keeping Cars on the Road for Longer: Average Age Now 11.4 Years*, HUFFINGTON POST (Aug. 9, 2013), https://www.huffpost.com/entry/american-drivers-keeping_b_3718301?guccounter=1.

70. *See* Brian A. Browne, *Self-Driving Cars: On the Road to a New Regulatory Era*, 8. J. L., TECH. & INTERNET 1, 3 (2017) (Giving examples of the various lower level features many OEMs have planned for the coming years).

71. NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, FEDERAL AUTOMATED VEHICLES POLICY: ACCELERATING THE NEXT REVOLUTION IN ROADWAY SAFETY 24 (2016), https://www.transportation.gov/sites/dot.gov/files/docs/AV%20policy%20guidance%20PDF.pdf (emphasis added).

On this point, in a 2014 survey conducted by researchers at the University of Michigan's Transportation Research Institute, Americans were asked, "[h]ow interested would you be in having a completely self-driving vehicle . . . as the vehicle you own or lease?" The most commonly chosen answer, comprising 33.7% of responses, was "*not at all interested*" with another 22.4% of respondents answering that they would be only "slightly interested."[72] This information suggests that not only are most Americans personally unfamiliar with HAVs, but that a majority of Americans will not become familiar with such vehicles any time soon.

Another striking result of that survey was that, of Americans with Internet access, only 70.9% of respondents *had even heard* of autonomous or self-driving vehicles.[73] If these respondents were placed on a jury in a jurisdiction applying the consumer expectations test, roughly three of twelve jurors would be deciding liability based on *the ordinary expectations of a consumer for a product about which they had never heard*.

Moreover, a study by various researchers in the MIT AgeLab suggests that naming conventions for autonomous or "advanced driver assistance systems" can influence the expectations that a consumer may have about these systems.[74] In particular, the authors of this paper observed that:

> [D]rivers' attitudes and beliefs about system capability and performance are known to influence their use of technology. Factors such as a driver's prior experience with similar technologies, predisposed trusting tendencies, and attitudes formed from exposure to media and societal opinion might all contribute to a driver's belief that a system can handle a task outside of its [operational design domain].[75]

Further, the authors found that "the name of a driver assistance system also has the potential to impact their perceptions of system capability."[76] These same perceptions or misconceptions developed by unfamiliar consumers simply from the name of a particular system are sure to carry over to these

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72. *See* BRANDON SCHOETTLE & MICHAEL SIVAK, PUBLIC OPINION ABOUT SELF-DRIVING VEHICLES IN CHINA, INDIA, JAPAN, THE U.S. AND AUSTRALIA 16 (Univ. of Mich. Trans. Res. Inst. Report No. 2014-30, 2014), https://deepblue.lib.umich.edu/handle/2027.42/109433 (emphasis added).

73. *See id.* at 5.

74. Hillary Abraham, et al., *What's in a Name: Vehicle Technology Branding & Consumer Expectations for Automation*, AUTOMOTIVEUI '17 PROCEEDINGS OF THE 9TH INTERNATIONAL CONFERENCE ON AUTOMOTIVE USER INTERFACES AND INTERACTIVE VEHICULAR APPLICATION 226-234 (2017), available at http://st.sigchi.org/publications/toc/auto-ui-2017.html.

75. *Id.*

76. *Id.*

consumers ability to judge the systems if called upon in a legal setting.

This is important because, while the consumer expectation test is intended to be an objective test that is applied based on the ordinary consumer's expectation, the gravamen of the test is that "the everyday experience of the product's users permits a conclusion that the product's design violated minimum safety assumptions . . . ."[77] At least initially, and most likely for quite a period thereafter, the average juror will simply not possess the everyday experience necessary to properly assess the product in a consumer expectations analysis. Rather, it is much more appropriate and fair to aid a jury by allowing the greater body of evidence encompassed within a risk-utility analysis.

B. Consumer Expectations of Autonomous Vehicle Technology are Inconsistent and Unrealistic at this Point.

Even when consumer expectations are drawn broadly (i.e., safe versus unsafe), instead of in terms of how a particular aspect of an autonomous vehicle should perform at a technical level, consumer expectations at this point in time have not reached any kind of meaningful consistency. For example, many consumers are highly skeptical of new HAV technology and believe that the technology is inherently unsafe.[78] On the other hand, some organizations anticipate large reductions in automotive accidents and injuries as a result of this new technology and propound this message to the general public.[79] For its part, NHTSA helped promote the narrative that the promise of self-driving vehicles will lead to a marked increase in automotive safety, noting in their 2017 update that, "in the transportation sector, where 9 out of 10 serious roadway crashes occur due to human behavior, automated vehicle technologies possess the potential to save thousands of lives, as well as reduce congestion, enhance mobility, and improve productivity."[80] Some manufacturers are no different: in GM's *2018 Self-Driving Safety Report*, the manufacturer optimistically stated that as a result of self-driving technology, they "envision a future with *zero* crashes."[81]

Further, HAV manufacturers, eager to explain the admittedly revolutionary technology their vehicles employ, may inadvertently present

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77. *See* Edwards v. Ford Motor Co., 683 Fed. App'x 610, 611 (9th Cir. 2017) (quoting Soule v. General Motors Corp., 882 P.2d 298, 305, 308 (Cal. 1994)).

78. Jeremy Hsu, *75 Percent of U.S. Drivers Fear Self-Driving Cars, But It's an Easy Fear to Get Over*, IEEE SPECTRUM (Mar. 7, 2016, 15:01 GMT), http://spectrum.ieee.org/cars-that-think/transportation/self-driving/driverless-cars-inspire-both-fear-and-hope.

79. *See, e.g.*, MOTHERS AGAINST DRUNK DRIVING, MADD STATEMENT ON AUTONOMOUS VEHICLE TECHNOLOGY LEGISLATION, (October 4, 2017), https://www.madd.org/press-release/madd-statement-autonomous-vehicle-technology-legislation/.

80. NHTSA, *supra* note 6, at ii.

81. GENERAL MOTORS, *supra* note 2 at 3 (emphasis added).

consumers with the impression that these vehicles truly can do no wrong. Consider the following language from *Delivering Safety: Nuro's Approach*:

> Our vehicle is engineered to be safer than nearly any other – it is lighter than a passenger vehicle, narrower and more nimble, and operates at lower speeds. This approach gives us more time to react, shortens our stopping distance, and provides an additional safety buffer to the side of the vehicle. Together, these advantages help prevent accidents that standard vehicles cannot avoid, such as someone jumping out from between parked cars or swerving across the road.[82]

It is certainly true that HAV technology will revolutionize automotive safety overall. However, these types of statements may lead many consumers to believe that autonomous vehicles should perform to the point of infallibility, which is simply not possible, especially at this early stage of development.

For example, on May 7, 2016, a driver of a Tesla Model S was killed when the driver collided with a tractor-trailer who was crossing an uncontrolled intersection.[83] The vehicle's data resulted in three important findings:

(1) That the Tesla was being driven in autopilot mode at the time of the accident;
(2) the automatic emergency braking (AEB) system did not automatically brake or warn to avoid the collision, and;
(3) that the driver did not take any preventive steps, i.e. braking or steering, to avoid the collision.[84]

Because of the accident, both the National Transportation Safety Board ("NTSB") and the National Highway Traffic Safety Administration (NHTSA) through their Office of Defects Investigation ("ODI") conducted investigations.[85]

For example, the ODI investigated: (1) the AEB system design and performance; (2) human-machine interfaces related to operating in autopilot mode; (3) additional accident data regarding Tesla's autopilot and AEB

82. Nuro, *Delivering Safety: Nuro's Approach* 8 (2019), https://tonnietaller.files.wordpress.com/2019/03/d5d69-delivering_safety_nuros_approach.pdf.

83. NHTSA OFFICE OF DEFECTS INVESTIGATION REPORT, available at https://static.nhtsa.gov/odi/inv/2016/INCLA-PE16007-7876.pdf.

84. NHTSA OFFICE OF DEFECTS INVESTIGATION REPORT, *supra* note 83, at 1.

85. *See* NHTSA OFFICE OF DEFECTS INVESTIGATION REPORT, *supra* note 83; *see also* NTSB, NTSB/HAR-17/02, COLLISION BETWEEN A CAR WITH AUTOMATED VEHICLE CONTROL SYSTEMS AND A TRACTOR-SEMITRAILER TRUCK (2017), available at https://www.ntsb.gov/investigations/AccidentReports/Reports/HAR1702.pdf.

systems; and, (4) the changes if any Tesla has made to such autopilot and AEB systems.[86] The result of the investigation was that there were no defects in the design or performance of the autopilot or AEB systems in the vehicles studied – nor was there a situation to which the systems did not perform as designed.[87]

Given the situation, is it reasonable to task an "ordinary consumer" with properly determining whether the AEB and autopilot systems are in fact functioning properly or improperly? Compare the reported results of the investigations by NHTSA's ODI and the NTSB with the statements by Forbes contributor, Brad Templeton, in his article, "*Tesla Autopilot Repeats Fatal Crash; Do They Learn From Past Mistakes?"*[88] To wit, Templeton posits, "Even so, most would hope the Tesla Autopilot would have detected the truck crossing in front of it, which appeared not to happen. No braking or evasive actions were taken. The Autopilot was engaged just 10 seconds before the collision."[89] He further opines:

> As such, having already had a fatality from (the old system's) failure to identify the broad side of a transport trailer, that would have to be very high on the list of the sort of thing they would want their fleet to find and identify for them, so they can confirm it never fails to perceive a crossing truck. Somehow, it still failed. **Of all the things you would expect Tesla to identify, these few things which resulted in fatal accidents, like a truck side and a highway crash attenuator, should be at the very top of the list**.[90]

Although Templeton is likely more informed than the ordinary consumer, the opinions expressed in his article and the conclusions reached by the NHTSA and NTSB are in clear contradiction of one another. Thus, when considering the expectations of the everyday consumer, it is clear the necessary information is simply not available to conduct investigations such as the one carried out by the ODI or the NTSB, which can take months of analysis and result in sixty-three-page accident reports, and ultimately determine what actually occurred.

Similar to the California Court of Appeal's reasoning in *Trejo* that the consumer expectations test could lead to virtually unlimited liability in cases of complex products, the current climate of high expectations regarding

86. *See* NHTSA OFFICE OF DEFECTS INVESTIGATION REPORT, *supra* note 83, at 1.

87. *See id.* at 12.

88. Brad Templeton, *Tesla Autopilot Repeats Fatal Crash; Do They Learn From Past Mistakes?*, FORBES (2019), https://www.forbes.com/sites/bradtempleton/2019/05/21/tesla-autopilot-repeats-fatal-crash-do-they-learn-from-past-mistakes/#400f773f2f2e.

89. *Id.*

90. *Id.* (emphasis in original).

HAVs would likely mean that a HAV manufacturer would lose *every time* when the consumer applications test is applied. Consumers will expect that HAVs should avoid accidents one hundred percent of the time, so *any time* one of these vehicles is involved in an accident, it has already failed the consumer expectations test. This type of *res ipsa loquitur* conclusion undermines the concept of design defects in products liability law and would allow plaintiffs to completely sidestep the requirement of a showing that an HAV was in fact defective, effectively making manufacturers of HAVs insurers of those products' safety.[91] In essence, plaintiffs would no longer bear the burden of making a showing of product defect.

Further, much of an individual consumer's expectations about the way a vehicle should perform in an accident scenario are shaped by the behavior of other drivers.[92] Without the traditional feedback from other drivers to which consumers are accustomed, these expectations are wholly lacking to describe how autonomous vehicle technology will perform in an accident situation.[93] As noted in a report issued by the University of Michigan's Transportation Research Institute, "[t]he degree of importance of both driver expectations and feedback from other drivers, and the consequent effects on the safety of a traffic system containing both conventional and self-driving vehicles, *remain to be ascertained*."[94]

V. POLICY REASONS FOR NOT APPLYING THE CONSUMER EXPECTATIONS TEST TO AUTONOMOUS VEHICLE TECHNOLOGY.

As noted, autonomous vehicle technology has the potential to decrease traffic injuries and deaths.[95] By applying the consumer expectations test, in which unknowledgeable consumers are not required to take into account the utility of a product, or the possibility of a feasible alternative design, courts could expose manufacturers to significant uncertainty in product liability litigation. If the standard by which a product will be judged is on the unpredictable expectations of consumers in such a complex and changing technology, rather than by demonstration of the product's utility, the threshold for deployment by a manufacturer may change:

91. *See* Funkhouser v. Ford Motor Co., 736 S.E.2d 309, 314–15 (Va. 2013) (noting that in failure to warn cases, as well as in products liability cases, removal of the defect requirement could allow plaintiffs to attribute any generalized danger to a manufacturer without any showing of defect in that product).

92. *See* MICHAEL SIVAK & BRANDON SCHOETTLE, ROAD SAFETY WITH SELF-DRIVING VEHICLES: GENERAL LIMITATIONS AND ROAD SHARING WITH CONVENTIONAL VEHICLES 5 (Univ. of Mich. Trans. Res. Inst. Report No. 2015-2, 2015).

93. *See id.*

94. *See id.* (emphasis added).

95. *See, e.g.*, MOTHERS AGAINST DRUNK DRIVING, *supra* note 79.

> Thus, even though an autonomous vehicle may be safer overall than a conventional vehicle, it will shift the responsibility for accidents, and hence liability, from drivers to manufacturers. The shift will push the manufacturer away from the socially optimal outcome—to develop the autonomous vehicle.[96]

To the contrary, under a risk-utility analysis, particularly one that requires proof of a safer, practicable alternative design, automotive manufacturers will be able to show that the societal benefits from the use of HAV technology as opposed to other technologies outweigh the risk of individual malfunctions in individual cases.[97]

Consider the following example that illustrates the possible effect of unbridled consumer expectations on the introduction of beneficial new technology:

> Suppose . . . that a particular type of "autobrake" crash-avoidance technology works to prevent crashes 80 percent of the time. The other 20 percent of the time, however, the technology does not work and the crash occurs as it would have in the absence of the technology. Victims in those crashes may sue the manufacturer and argue that the product was defective because it failed to operate properly in their crashes. Under existing liability doctrine, they have a plausible argument: The product did not work as designed . . . . A manufacturer facing the decision whether to employ such a technology in its vehicles might very well decide not to, purely on the basis of expected liability costs.[98]

Without any balancing of the utility of these vehicles or the requirement of a reasonable alternative design, it would be possible, even reasonable, for juries applying the consumer expectations test to find defective design every time. This will be especially true in situations such as those involving self-driving vehicle technology, since consumers tend to have unrealistic expectations about the benefits of this new technology as a whole.[99]

Further, the consumer expectations test will not allow for consideration of non-safety related societal benefits that HAV technology provides, since the only consideration will be on whether the product performed as expected in

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96. *See* Gary E. Marchant & Rachel A. Lindor, *The Coming Collision Between Autonomous Vehicles and the Liability System*, 52 SANTA CLARA L. REV. 1321, 1334 (2012).

97. *See id.*

98. JAMES M. ANDERSON ET AL., RAND CORP. AUTONOMOUS VEHICLE TECHNOLOGY: A GUIDE FOR POLICYMAKERS 125 (2016).

99. *See id.* at 125.

that one instance. The average American commuter spends about one week of his or her life in traffic each year—a statistic that HAV manufacturers have set their sights on reducing.[100] The potential time saved by commuters on the whole is not a factor that would be considered under the consumer expectations test.

Another benefit of HAV technology outside of the realm of safety is the potential for added mobility for those who cannot currently drive.[101] According to a report from NHTSA, 3 million Americans are blind or suffer from poor vision.[102] Further, 79 percent of Americans over the age of 65 live in car-dependent communities.[103] The independence these communities could gain with the widespread use of HAV technology would be yet another consideration the jury could not take into account when utilizing the consumer expectations test.

VI. CONCLUSION

Courts should reject the consumer expectations test as grounds for determining design defect in cases involving autonomous vehicle technology. This technology is simply too complex and unfamiliar for consumer expectations to have developed enough to have any real meaning or reasonable application. Utilization of risk-utility balancing is a more appropriate means of establishing whether or not a design is defective and will encourage manufacturers to continue to develop and implement this important technology, which stands to have a truly revolutionary impact on automotive safety.

100. *See* GENERAL MOTORS, *supra* note 2, at 3; *see also* DAVID SCHRANK, BILL EISELE, ET AL., THE TEXAS A&M TRANSPORTATION INSTITUTE & INRIX, 2015 URBAN MOBILITY SCORECARD 1–2 (2015), https://static.tti.tamu.edu/tti.tamu.edu/documents/mobility-scorecard-2015.pdf (noting that, as of 2014, the American commuter spends an average of approximately 42 hours per years in traffic).

101. *See generally* WAYMO, *supra* note 2, at 6.

102. NHTSA, DOT HS 811 304, QUIETER CARS AND THE SAFETY OF BLIND PEDESTRIANS: PHASE I 6 (2010), https://www.nhtsa.gov/DOT/NHTSA/NVS/Crash%20Avoidance/Technical%20Publications/2010/811304rev.pdf.

103. *See* SANDRA ROSENBLOOM, THE BROOKINGS INSTITUTION, THE MOBILITY NEEDS OF OLDER AMERICANS: IMPLICATIONS FOR TRANSPORTATION REAUTHORIZATION 3 (2003), https://www.brookings.edu/wp-content/uploads/2016/06/20030807_Rosenbloom.pdf.