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BIG BROTHER AND A LITTLE BLACK BOX: THE EFFECT OF SCIENTIFIC EVIDENCE ON PRIVACY RIGHTS

David Uris*

I. INTRODUCTION

Imagine driving alone down a barren roadway late at night. You think that you are the only car on the road, when suddenly another vehicle comes roaring across the intersection. Before you have time to apply the brakes, the opposing car smashes into your side, spiraling both you and the other driver into a frenzied tailspin. Unfortunately, there are no eyewitnesses at the scene to verify that the other driver ran a red light. Without a bystander present, the most incriminating evidence against the other driver has been eliminated, and the disposition of your case will ultimately rest with the subjectivity of jurors whom you have never laid eyes on. In a court of law, it would be your word against his, and the ultimate judgment would depend upon whomever the jury felt told a more convincing story. As you enter the discovery phase of litigation, you learn that the other driver is planning to call an eyewitness on his behalf, one declaring that you were going 20 miles per hour over the speed limit. How could this be, you ask yourself, when you were the only two drivers within ten miles of the accident? Even more unbelievable is the fact that the alleged eyewitness about to be called to the stand was a passenger in your own car! Obviously there must be some kind of mistake.

The jury listens as you explain to the court how the other driver ran a red light. Your case consists only of a detailed recollection of the night's events from your point of view. The

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other driver begins to present his case. He declares that it was you who ran the red light, and it was impossible to avoid the collision due to the fact you were driving at a speed of fifty miles-per-hour in a thirty mile-per-hour zone. He calls his witness, and in immaculate detail, it describes the velocity of your car during the last five seconds before impact, whether the brakes were applied, how the airbag fared, the angle of the steering wheel, and even whether you were wearing your seatbelt.1 Unbelievable, you think to yourself, how another person could have such impressive knowledge about the intricacies of your own car! After a quick jury deliberation, you are found liable for the accident and all injuries; a result directly attributable to the credibility of a voiceless “witness” stashed underneath your car’s dashboard that is about the size of a carton of cigarettes.2

The “black box,”3 otherwise known as a “Sensing and Diagnostic Module,” was one of six million that have been placed inside a variety of General Motors cars since 1990.4 What perhaps makes their emergence so mystifying is that many drivers have been kept completely in the dark as to their existence until now. The black box derives from the airlines’ use of flight data recorders, which the National Highway Traffic Safety Administration (“NHTSA”) proved were valuable in understanding and decreasing the number of airline crashes.5 In evaluating the scene of a plane crash with no survivors present, black boxes have proved instrumental

3. The term “black box,” coined in 1945, originally referred to any complicated electronic device that was incomprehensible to the user. See John H. Lienhard, Engines of our Ingenuity- No. 1482: Black Box, at http://www.uh.edu/engines/epi1482.htm (last visited Mar. 15, 2002).
in providing researchers with information as to why such crashes occurred. Finding their way into cars, black boxes continue to extrapolate often impossible to get information by yielding critical facts about crashes, especially when there are no eyewitnesses available. The advantages of having such a device, however, comes with a certain degree of caution, for since these boxes may be the only unbiased eyewitness's at the scene of an accident, the data will inevitably end up in the hands of the police and could be subpoenaed in a lawsuit. But just how reliable are these boxes, and what performance standards should the government impose upon car manufacturers?

This comment analyzes black box technology in automobiles for the purpose of determining whether their use in the courtroom, as presented by expert witnesses, should be permitted. Part II delineates the history and purpose behind black box technology, from its inauguration on airplanes to its recent automotive version. Part II also discusses the historical climate surrounding Federal Rule of Evidence 702 ("Rule 702") and its role in allowing such novel evidence into the courtroom. Part III addresses the controversy surrounding the admissibility of black box data evidence and the significance of the problem to the legal community. Part IV addresses Rule 702 in detail and presents the relevant factors for determining whether expert testimony of black box data is sufficiently reliable to be considered by the trier of fact and what privacy issues must be overcome. Part V discusses what proposals should be adopted to ensure that uniformity and justice prevail. The comment concludes that while this advanced technology does have the potential to revolutionize accident research, courts ought to be cautious about allowing

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7. See id.; Wired News, supra note 1.
8. See Ferrar, supra note 6 (discussing that how well the devices perform is at the discretion of each manufacturer).
9. See discussion infra Parts II.A-B.
11. See discussion infra Part II.C.
12. See discussion infra Part III.
13. See discussion infra Parts IV.A-C.
14. See discussion infra Part V.
its use in litigation. Expert testimony of black box data should be the product of reliable principles and methods in the community, and experts themselves should be impartial and unaffiliated with the car manufacturer. The standardization of black box technology in all automobiles should likewise be seen as a paramount goal. Without such procedural safeguards, the boxes should be used solely for safety research, for their potential to influence the jury's decision is simply too damaging to our judicial system.

II. BACKGROUND

A. Origins of the "Black Box"

The British built the first jet-powered airliner, the "Comet," following the rapid expansion of jet fighter production during World War II. But it appeared as if the Comet was cursed, and in 1953 a number of them crashed unaccountably, placing skepticism in the public's mind about the safety of jets and the cause of the accidents. Unfortunately, no evidence could be found amongst all the debris. As David Warren listened to the debate of possible causes, he had the idea of producing new technology that would record the flight crew's conversation to protect the record and survive a crash. He reasoned that recording the conversation of the flight crew during the emergency might provide a mechanism for tracing the cause of the crash. After discussing his idea candidly with other chemists specializing in aircrafts and

15. See discussion infra Part VI.
16. See generally Wald, supra note 4; FED. R. EVID. 702.
18. See id.
19. Id. Many professional committees discussed the possible cause at endless meetings, knowing that the cause of the crashes had to be found or the Comet would be doomed to failure. See id.
20. David Warren was a chemist specializing in aircraft fuels at the Aeronautical Research Laboratories in Melbourne, Australia. See id.
21. See id.
22. See id.
finding that it generated little notoriety, he outlined his proposal in a report entitled "A Device for Assisting Investigation into Aircraft Accidents." The report also yielded little interest, so Warren decided that a black box demonstration unit needed to be produced.

Warren designed a unit capable of recording four hours of pilot voice and instrument readings up to the moment of any accident. Although the new technology tested successfully in the air, the criticism of countless aviation authorities was nonetheless dispiriting. The Federation of Air Pilots declared that it would be like "a spy flying alongside ... [because] no plane would take off in Australia with Big Brother listening." Opinions changed, however, when Sir Robert Hardingham arranged for Warren to take the "Flight Memory" to England for demonstrations. The British reception was so overwhelmingly favorable that authorities sought to make the recorders a permanent fixture in all British civil aircraft. Warren was given a team to update the initial

23. See Department of Defense, supra note 17. See also Kristy Forward, The Design and Use of a Black Box Recorder and Cockpit Voice Recorder, at http://www.bath.ac.uk/~en9klf/fdr.htm (last visited Mar. 15, 2002) (discussing how the report was widely disseminated throughout the aviation industry).

24. See Department of Defense, supra note 17. It was decided that "show and tell" would be more effective than "tell", so a demonstration unit was needed. Id.

25. See id.

26. See id. Australian civil authorities replied that "Dr. Warren's instrument has little immediate direct use in civil aircraft." Id. This widespread local disinterest may have been attributed to the fact that Australia had not experienced a major air accident for years and was recognized as having the world's best safety standard at that time. See id.

27. Id. It was considered that "such a device [was] not required ... the recorder would yield more expletives than explanations." Id.

28. Sir Robert Hardingham was the Secretary of the United Kingdom Air Registration Board. See id. The Air Registration Board ("ARB") is now known as the Certification Authority. United Kingdom Air Accidents Branch, Inspector's Investigations (Formal Reports), at http://www.aaib.dtlr.gov.uk/formal/garpi/garpi.htm (last visited Mar. 15, 2002).

29. "Flight Memory" is the shortened name for "The ARL Flight Memory Unit", the project name for Warren's device. See id.

30. Id. The reason for Sir Hardingham's desire to arrange for Warren to take the recorder to England was because of his unbridled enthusiasm for the device, and not because of any difficulties Britain was encountering with unsafe civil aviation. See id.

31. Id.

32. The team was comprised of Lane Sear, Ken Fraser and Walter Boswell. Id.
model to a pre-production standard that improved upon the original in a number of ways.\textsuperscript{33}

Australia eventually became a leading proponent of the technology due to the mysterious crash of an airliner in Mackay, Queensland, in 1960.\textsuperscript{34} Inquiring into the crash, the judge was told of the development of the crash recorder, who then ordered that as of January 1963, all Australian airliners carry recorders for pilot speech.\textsuperscript{35} By 1967, although the United Kingdom and other countries implemented the recording of flight instrument data, Australia became the first country to make compulsory both flight data and cockpit voice recording.\textsuperscript{36} The Federal Aviation Administration ("FAA") subsequently made flight data recorders mandatory in 1964.\textsuperscript{37} As David Warren had foreseen, what would ultimately be referred to as the black box was now a staple of the aviation industry, proving to be more invaluable than anyone had ever imagined.\textsuperscript{38}

B. Black Boxes in Automobiles

Traditional methods of investigating car crashes include measuring and documenting evidence such as tire marks, impact areas, final vehicle resting positions, driver and witness statements, and vehicle damage.\textsuperscript{39} But the conclusions derived from the investigation are obviously limited by the

\textsuperscript{33} See id. (describing how the "pre-production" prototype ARL Flight Memory Recorder had a separate crash-and-fire-proof container for mounting in the tail of the aircraft). Improvements to the original "ARL Flight Memory Unit" included a method of recording instrument readings with greater accuracy and at an increased rate of 24 readings per second. \textit{Id}.

\textsuperscript{34} See id.

\textsuperscript{35} \textit{Id}.

\textsuperscript{36} See id.

\textsuperscript{37} FAA Flight Data Recorder Rule, 14 C.F.R. §129.20 (1964). This federal regulation states that "no person may operate an aircraft under this part that is registered in the United States unless it is equipped with one or more approved flight recorders that use a digital method of recording and storing data and a method of readily retrieving that data from the storage medium." \textit{Id}.

\textsuperscript{38} Department of Defense, \textit{supra} note 17.

\textsuperscript{39} See Timothy Staab, "Black Box" Technology and GM Vehicles, Delta Analysis, at http://www.deltacrash.com/article.htm (last visited Mar. 16, 2002). Delta Analysis is dedicated to providing professional traffic accident reconstruction services in an impartial, honest, fair and ethical manner. \textit{See id}. (This explanation comes from the web page of Delta Analysis at http://www.deltacrash.com/aboutus.htm).
amount and quality of available information.\textsuperscript{40} Time and again, accident investigators are forced to deal with less-than-ideal conditions and inadequate time and resources to gather evidence.\textsuperscript{41} And since traffic collisions occur instantaneously, witness statements (if there are any) may or may not be accurate.\textsuperscript{42}

In aircraft, black boxes tell what happens behind the scenes: what the pilot was doing and saying, and the condition of the plane in the moments before the crash.\textsuperscript{43} And now, given advancements in technology, they are finding their way into automobiles.\textsuperscript{44} Technically named Event Data Retrieval Units ("ERUDs"), they are constantly "on," but only record data occurring in the last five seconds before a crash.\textsuperscript{45} At impact, the device also records the velocity of the crash itself.\textsuperscript{46} The National Transportation Safety Board ("NTSB") has suggested that the NHTSA and automobile manufacturers work together to collect data on automobile accidents by using the black boxes, and proposed that they be required in all vehicles.\textsuperscript{47} Many individuals, however, oppose these de-

\begin{itemize}
  \item \textsuperscript{40} See id.
  \item \textsuperscript{41} See id.
  \item \textsuperscript{42} See id.
  \item \textsuperscript{43} Ferrar, supra note 6.
  \item \textsuperscript{44} See id.
  \item \textsuperscript{45} Id. Within milliseconds of a collision, a vehicle's Sensing and Diagnostic Module ("SDM") senses the crash severity and determines whether to deploy the airbags, and once the airbags are deployed, the record is permanently stored. Id. Newer GM airbag modules have the added capability of recording crash data even when a vehicle's airbag doesn't deploy. Id.
  \item \textsuperscript{46} See id. In recording the "velocity of the crash," the black box is only able to record the speed of the car in which the black box is located. See id. Therefore, the black box ostensibly only tells one side of the story.
  \item \textsuperscript{47} See Augustus Chidester, John Hinch, Thomas Mercer & Keith Schultz, Recording Automotive Crash Event Data, International Symposium on Transportation Recorders, at http://www.nhtsa.dot.gov/cars/problems/studies/record/chidester.htm (May 3-5, 1999); LaEnvi, supra note 5; Michael Cicchese, NTSB Likely to Recommend Black Boxes on All Highway Vehicles, Inside ATA (American Trucking Associations), at http://www.truckline.com/insideata/2000mce/coverage/blackbox.html (Oct. 29, 2000). The recommendation that data recorders be required on all highway vehicles came from an NTSB official, Joseph Osterman, during an educational session at the Management Conference and Exhibition. See id. (The Management Conference and Exhibition is an annual event for the trucking industry that focuses on national issues affecting the trucking industry.). Opposing Osterman's view was Donald Massey, a partner with the law firm of Adams and Reese in New Orleans, who proclaimed that "if data recorders are going to be a primary tool in accident investigations, then information needs to come
vices because they are concerned about the possible legal implications, invasion of privacy, and increased cost to consumers. 48

General Motors ("GM") has installed these devices in many of its cars to collect information when the cars are involved in accidents. 49 Since 1974, GM automobiles equipped with airbags have recorded crash data for impacts that caused the airbag to deploy. 50 Design engineers have likewise utilized this information to enhance the operation of airbag sensing systems, and NHTSA researchers have used it to familiarize themselves with the field performance of alternative airbag system designs. 51 Commencing with the 1999 model year, some GM automobiles have the added ability of recording the speed at which the vehicle was traveling before the crash, the RPMs of the engine, and even how much pressure was being applied to the gas or if the driver attempted to brake. 52 A recently developed model of the box being installed in hundreds of thousands of GM cars can ascertain, for example, exactly when the driver applied the brakes: five seconds, three seconds, or just one second before impact. 53 It can even tell whether the driver was wearing his or her seat belt. 54 The data boxes assure a treasure chest of never before obtainable information, not only serving to re-construct accident scenes, but enabling designers to build safer and more efficient automobiles. 55

In 1998, GM contracted with Vetronix 56 Corporation of

from all vehicles involved in the collision." Id.

48. David Barnes, Commentary: The Debate on "Black Boxes", Transport Topics, at http://www.ttnews.com/members/printEdition/0003883.html (Mar. 1, 2000) (This statement was in direct reference to the installation of black boxes on trucks to monitor compliance with hours-of-service laws. Unionized carriers say their records show they comply with federal limits on driving hours, making the recorders unnecessary.).

49. See Drivers.com Staff, Black Boxes are Already in Automobiles, and Your Car May Have One!, Drivers.com, at http://www.drivers.com/cgi-bin/go.cgi?type=ART&id=00000248&static=1 (Nov. 2, 1999).

50. See Chidester, supra note 47. See also LaEnvi, supra note 5.

51. See Chidester, supra note 47. See also LaEnvi, supra note 5.

52. Chidester, supra note 47. See also LaEnvi, supra note 5.

53. Wald, supra note 4.

54. Id.

55. See id.

56. Vetronix is a leading proponent and manufacturer of vehicle diagnostic equipment. See Staab, supra note 39. Injury Sciences LLC is also trying to decode data during an automobile crash. See Joe Frey, "Black Boxes" Will Aid in
Santa Barbara, California to commercially develop software and interface cables that allow investigators, researchers, and anyone else with a laptop to interrogate the box. This is made possible by use of a product called CDR, which downloads and converts data from a vehicle's black box into a decipherable format on a laptop computer or PC. The reality of this technology is that whereas traditionally, accident reconstructionists would piece together crash information, claim adjustors will now have access to such information on their laptops. While still in the production mode, an innovative software entitled WrExpert could allow claims professionals to be better equipped to evaluate conflicting stories regarding an accident or related injuries and determine what facts and circumstances are objectively supported by the vehicle black box data.

While other automakers have purportedly equipped their vehicles with recordable airbag modules, GM is presently the only automaker to make crash data and data recovery tools accessible to researchers and investigators. "WrExpert" will enable third parties such as auto insurance companies to ascertain what the speed of a vehicle was prior to impact, what the severity of the impact was, and what injuries, if any, should be expected. This will ultimately serve to help insurers root out fraud.

Nearly all automakers are reluctant to make this capability available to others due to concern over how the information will be used in court and the prospect of increased lawsuits. GM's view is that "the potential for improvements in


57. See Staab, supra note 39. (The system GM and Vetronix have contracted for is the second generation of the original "Event Data Retrieval Unit" that Vetronix developed in 1990 exclusively for GM's internal use.).

58. Frey, supra note 56.

59. Id. This technology is allegedly the first product to allow a layperson to examine forensic science data. Id.

60. Id. "WrExpert" will purportedly interface with Vetronix's crash data technology to give claim adjusters insight into many important crash-related questions. See id.

61. Id. It is further noted that WrExpert's price will vary greatly based on the number of adjusters in an insurer's claims department. See id.

62. Staab, supra note 39.

63. Id.

64. Id.

65. Id. While an increase in litigation has not been statistically proven and
auto safety outweigh any possible increase in litigation.\textsuperscript{66}

C. "General Acceptance" and Federal Rule 702

With such advanced technology comes the need for a qualified expert to explain the evidence. Analyzing the present state of expert witness testimony in the federal court system calls for a discussion of the 1923 case of Frye \textit{v. United States} and the "general acceptance standard."\textsuperscript{67} Faced with judging the evidentiary strength of a novel scientific technique, the trial court refused to admit expert testimony based on the test results of an early polygraph.\textsuperscript{68} On review, the court of appeals affirmed, finding that the polygraph was a "new scientific technique incapable of being sufficiently established in the scientific community to justify its admissibility."\textsuperscript{69}

In \textit{Daubert v. Merrell Dow Pharmaceuticals, Inc.},\textsuperscript{70} the Supreme Court established a new test for judging the admissibility of scientific expert testimony by rejecting the exclusive use of "general acceptance."\textsuperscript{71} \textit{Daubert} thus effectively reformed the manner in which judges determine the admissibility of scientific testimony.\textsuperscript{72} The new test, as articulated by the U.S. Supreme Court, requires that reliable testimony be grounded in the "methods and procedures of science" and that the judge be given more latitude in assessing whether to allow expert testimony in the courtroom.\textsuperscript{73} In ad-

\textsuperscript{66} Id.

\textsuperscript{67} Frye \textit{v. United States}, 293 F. 1013 (D.C. Cir. 1923). The test provides that scientific expert testimony will be inadmissible unless it has "gained general acceptance in the particular field in which it belongs." Id. at 1014.

\textsuperscript{68} Id. at 1013.

\textsuperscript{69} Id. at 1014.

\textsuperscript{70} Daubert \textit{v. Merrell Dow Pharm., Inc.}, 509 U.S. 579 (1993).


\textsuperscript{73} \textit{See Daubert}, 509 U.S. at 590. Justice Blackmun asserts that he is "confident that federal judges possess the capacity to undertake [the] review" of allowing expert testimony in the courtroom. Id. at 593. The "trial judge must determine at the outset . . . whether the expert is proposing to testify to (1)
dation, evidence must relate directly to an issue in the case.\textsuperscript{74} Consequently, when the trial court evaluates the admissibility of expert testimony, it must determine whether the evidence is reliable and helpful. The proponent has the burden of establishing that the pertinent admissibility requirements are met by a preponderance of the evidence.\textsuperscript{75}

III. IDENTIFICATION OF THE LEGAL PROBLEM

In comparison to black box recorders on planes, whose existence is supported by federal regulation, black boxes in cars are manifesting themselves in a completely untested area of law.\textsuperscript{76} While the NTSB recommended that auto manufacturers work together with the NHTSA to gather information on traffic collisions using onboard crash recording devices, no law requires the installation of these recorders.\textsuperscript{77}

GM has been using the information by and large to perfect its on-board safety systems, and wants the information from the newer boxes to have the ability to show the conduct of a typical driver seconds before a crash.\textsuperscript{78} The opportunity to have information that previously was not available, however, will inevitably lead to its use in the courtroom.\textsuperscript{79} But interpretation of a device with no standard for accuracy will only create ambiguity in the law and unwarranted confusion in the legal system. A program that produces reliable conversion of the data is analogous to bringing in the best eyewitness available, but the role an expert plays in explaining the data from a recovered black box to a jury must be scrutinized

\textsuperscript{74} Id. at 592.

\textsuperscript{75} See FED. R. EVID. 702 (Advisory Committee's Note to 2000 Amendment). See also FED. R. EVID. 104(a) (describing that "preliminary questions concerning the qualification of a person to be a witness, the existence of a privilege, or the admissibility of evidence shall be determined by the court . . ."); Bourjaily v. United States, 483 U.S. 171 (1987).

\textsuperscript{76} Wald, supra note 4.

\textsuperscript{77} Staab, supra note 39.

\textsuperscript{78} Wald, supra note 4.

\textsuperscript{79} See id.
closely. Analysis of both Federal Rule 702 and the general acceptance standard will thus play an instrumental role in determining whether black box data may be used as evidence in a lawsuit.

The black box system also raises sensitive privacy questions. Pervasive "Big Brother-like" issues exist, including what law enforcement or insurance companies will do with this information, who actually owns this information and who has the right to access it. Does the auto manufacturer own the rights because they were the ones to install it? Do these rights transfer to the consumer once the car has been signed over? Or is there a more pressing need for the government to obtain control in order to effectuate a uniform standard of safety akin to the airline industry? While GM claims the devices are to be used solely for safety research, skeptics can only hope that these devices do not turn out to be Pandora's boxes, for "the loss of personal civil liberties always begins with the best intentions of our government."

IV. ANALYSIS

A. Black Box Evidence and "General Acceptance": Why Frye Doesn't Apply

The Frye test has garnered its fair share of popular support and criticism. Proponents of the general acceptance standard value the idea that scientists in a particular field are guaranteed the power to determine whether to allow novel evidence into the courtroom, for they are the ones most able to ascertain a process' reliability. By also minimizing the latitude given to individual judges, proponents argue that consistency will be promoted in the judicial process. However, challengers of Frye are quick to condemn its propensity

80. Staab, supra note 39.
to deprive juries of relevant evidence. They argue that *Frye* rewards science that is old and antiquated, leaving no room for the novel scientific techniques being discovered at the moment. Whether *Frye* compels the judge to observe general acceptance in the testimony’s scientific basis or simply in the method applying that foundation remains uncertain.

The *Frye* court would not be expected to support the admissibility of black box evidence, even though the historical origins of the black box date back to the early 1960s. The FAA has crafted a federal regulation enforcing the use of black box recorders on all aircraft, yet the same cannot be said of methods that apply for automobile usage. The devices are designed to measure completely different things, given the varying complexities of the airplane versus the automobile. Black boxes in airplanes are designed to trace accidents to a single cause, and the NTSB investigates its contents for the purpose of improving safety in all commercial aircraft. But black boxes in automobiles, while designed for equally noble purposes, record different things. Just as polygraph evidence was deemed inadmissible in *Frye* for being a novel scientific technique not “sufficiently established to have gained general acceptance in the particular field in which it

87. See United States v. Williams, 583 F.2d 1194, 1198 (2d Cir. 1978) (“A determination of reliability cannot rest solely on a process of ‘counting (scientific) noses.’”). In the *Williams* case:
Williams presents a list of 10 scientists classified as favoring use of spectrographic analysis in the courtroom and 17 scientists classified as opposed. Williams admits, however, that there are differing shades of opinion within each classification, and that many names could be added to each. Selection of the “relevant scientific community,” appears to influence the result . . . . [Therefore,] [i]n testing for admissibility of a particular type of scientific evidence, whatever the scientific “voting” pattern may be, the courts cannot in any event surrender to scientists the responsibility for determining the reliability of that evidence.

Id.
89. See *supra* Part II.B. Some vehicle black boxes record the speed at which the vehicle was traveling before the crash, the RPMs of the engine, and even how much pressure was being applied to the gas or if the driver attempted to brake. *See supra* Part II.B.
belongs, black box data in automobiles presents the same problems in that it is technology that has only recently been implemented in automobiles. Therefore, while black box technology has existed since the 1960s, Frye would likely treat its usage in automobiles as novel and not an extension of the historically rooted flight data recorders.

Likewise, the promotion of consistency in the judicial process, seen as a paramount objective of Frye, would lose its commanding authority. With the automobile manufacturer being the exclusive interpreter of its own data, the notion of fairness and impartiality would compromise the judicial process. For example, in a current suit against GM brought by the family of a former professional football player who was killed in his Corvette in a car accident in 1992, it was argued that the recorder in the car proved that the crash was caused by the airbag deploying when the car hit a pothole. But GM disagreed, and because most lawyers and crash specialists knew little about the recorders, it was difficult to question GM's own assessment of the accident. It is true, however, that Vetronix has been instrumental in lessening the degree of ignorance considerably by allowing independent researchers an opportunity to study the results. But a GM specialist will nevertheless continue to be the only true expert regarding GM black boxes. The concept of general acceptance in the scientific community, as articulated by Frye, could hardly have envisioned GM specialists being called into court to interpret data in a lawsuit filed against themselves, for the inherent conflict of interest would be insurmountable. Therefore, something other than the Frye test must be used to allow black box evidence into the courtroom.

B. Black Box Evidence and “Reliability”: The Daubert Dilemma

Rule 702 has been amended in recognition of Daubert,
which charged trial judges with the responsibility of acting as gatekeepers to exclude unreliable expert testimony. In assessing the reliability of scientific expert testimony, future trial courts were thus given a number of factors to consider. The factors listed by the Daubert Court were (1) whether the expert's technique or theory can be or has been tested— that is, whether the expert's theory can be challenged in some objective sense, or whether it is instead simply a subjective, conclusory approach that cannot reasonably be assessed for reliability; (2) whether the technique or theory has been subject to peer review and publication; (3) the known or potential rate of error of the technique or theory when applied; (4) the existence and maintenance of standards and controls; and (5) whether the technique or theory has been generally accepted in the scientific community. This last factor (5) is essentially the Frye rule, although in Daubert it is only a factor to be subjectively considered by the judge. As a result, it is important to examine these factors judiciously in order to understand how Rule 702 applies to the current state of GM's black box data.

An important element that judges use to determine the admissibility of expert testimony is whether the expert's theory can be challenged in some objective sense. Vetronix has now made it possible for researchers to evaluate the reliability of GM's data, and even though GM continues to be the only true expert for interpreting its own box, a judge will have substantial discretion in determining on a case-by-case basis whether particular expert testimony is reliable. This is in stark contrast to the Frye court, which only allowed expert testimony regarding evidence that was generally accepted in the scientific community. A novel device, such as GM's black box, can now be tested by third parties, and gen-

97. Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579 (1993); see also Kumho Tire Co. v. Carmichael, 526 U.S. 137, 156-57 (1999) (citing the Committee Note to the Proposed Amendment to Rule 702, which had been released for public comment before the date of the Kumho decision). See supra Part II.C.
98. See FED. R. EVID. 702 (Advisory Committee's Note to 2000 Amendment).
101. See FED. R. EVID. 702.
102. See supra Part IV.A.
104. See supra Part IV.A.
eral acceptance in the scientific community is no longer a con-
straint on the admissibility of black box data. In fact, Rule
702 is now broad enough to allow contradictory expert testi-
mony that is the product of competing principles or methods
in the same field of expertise. Whereas GM might call an
expert to testify to the precision of its data, a third party can
try to impeach this by testifying to the appropriateness of its
own analysis. Proponents “do not have to demonstrate to the
judge by a preponderance of the evidence that the assess-
ments of their experts are correct,” but only that their “opin-
ions are reliable . . .”

But it is this very trend of admitting the entire spectrum
of expert testimony that makes Rule 702 problematic for
black box evidence. Independent experts, unaffiliated with
GM, might testify that the methods they independently used
were reliable and accurate. Rule 702 even allows such testi-
mony when the methods are recognized by only a small num-
ber of scientists practicing in that field. This is significant
in the sense that GM will not be permitted to monopolize
black box expert testimony. However, a GM expert will be
able to testify using the same lowered evidentiary standards,
and the trier of fact in a case using such evidence will be
forced to weigh one theory over another. The GM expert will
have an advantage, for the complexities of a product designed
by GM will be perceived by the jury (or trier of fact) as only
being completely understood by an affiliated GM specialist.
Rule 702 in effect allows in expert testimony, however recog-
nized in a scientific field, and allows the trier of fact to de-
termine its legitimacy. The term “reliability” as used in Rule
702 is therefore nothing but a smokescreen, for if a method
can be recognized as reliable simply by a “minority of scien-

105. See Daubert, 509 U.S. at 594 (describing how the varying factors applied
by judges were neither exclusive nor dispositive).
106. See generally FED. R. EVID. 702 (The 2000 Amendment provides that an
expert may testify when such testimony is derived from sufficient data.). See,
e.g., Heller v. Shaw Indus., Inc., 167 F.3d 146, 160 (3d Cir. 1999) (describing
how expert testimony cannot be excluded simply because the expert uses one
test rather than another, when both tests are accepted in the field and both
reach reliable results); Ruiz-Troche v. Pepsi Cola, 161 F.3d 77, 85 (1st Cir. 1988)
(holding that “Daubert neither requires nor empowers trial courts to determine
which of several competing scientific theories has the best provenance”).
108. Daubert v. Merrell Dow Pharm., Inc., 43 F.3d 1311, 1318 (9th Cir. 1995).
109. See supra Part IV.B.
tists," the method becomes increasingly subjective. An automobile manufacturer could set completely prejudiced standards for evaluation of its black box data, thereby favoring its chances in a lawsuit where a defect in the car is alleged to be the cause of the crash. Since the "evidentiary requirement of reliability is lower than the merits standard for correctness," the manufacturer would simply need to prove by a preponderance of the evidence that its own experts' opinions are reliable.

GM is currently the only automaker to make its black box data available to researchers and investigators. If this trend continues, there will be no measuring stick by which to compare GM black boxes with those of other manufacturers. Recognizing one standard while refusing to acknowledge others does not promote fairness in the judicial system. Take the following example: the driver of a Toyota automobile accuses the driver of a GM vehicle with speeding or some other violation after a crash. It would simply be unjust for the driver of the GM car to bring in his own data to exonerate himself. Even if the Toyota driver brought in its own expert, it would have to convince a jury that its expert was more reliable than GM's expert and GM's black box. The data from black boxes is as powerful as "DNA in paternity suits and murder cases," and allowing uncontested evidence of this caliber into the courtroom offsets the balance of power of competing parties in a lawsuit.

C. The Privacy Factor

Critics and consumer advocates protest that by providing in-car surveillance systems, GM is potentially depriving individuals of their personal privacy. The information will quickly get out of the control of the vehicle owner, leading to a future in which civil liberties may be a thing of the past. The unit is menacing not because of the data it collects, but

110. See supra Part IV.B.
111. Rule 702 requires, among other things, that "the testimony is the product of reliable principles and methods." FED. R. EVID. 702.
112. See In re Paoli, 35 F.3d at 744.
113. See supra Part II.B.
114. Wald, supra note 4.
115. See supra Part II.B.
116. See id.
because of the potential uses of that information. 117

One of the main problems with GM's black box is that
they were installed without the consumer's consent. 118 Just in
the last month, a suit has been filed against GM claiming
that the company failed to tell motorists about the existence
of the recorders, saying the devices are aimed solely at help-
ing to design safer cars and to help investigators in accident
reconstruction. 119 A common complaint is that the recording
of car crash data raises "very troubling questions about in-
formed consent." 120 GM is steadfast in proclaiming that their
policy is to "get the vehicle owner's permission" before the
data is accessible, but this logic is confounding given the
number of recorders presently installed in automobiles and
the number of consumers who have been kept in the dark. 121

Some regulatory questions remain unanswered. For ex-
ample, should owners be told before purchasing their car
about the existence of the black box? 122 While GM cites "re-
search" and "safety" as being the predominant objectives of
the box, there are other workable devices on the market that
might provide similar results without eroding personal pri-
vacy. 123 A device called AutoWatch 124 might be one step in the
right direction. AutoWatch is a gadget that takes only sec-
onds to attach under the steering wheel, connecting to a car's
electrical system and recording speed and distance traveled. 125

117. See id. (GM has stated that its "Sensing and Diagnostic Module" is used
only for aggregate crash research, and poses no threat to consumer privacy. But
one nonetheless has to question a device that has been shrouded in so much se-
crecy.).
118. See id.
119. See Andrew Thomas, Car Black Box Privacy Threat, THE REGISTER, at
http://www.theregister.co.uk/content/2/15393.html (Dec. 12, 2000). The com-
plaint involves eight 1999 U.S. models of GM cars: the Chevrolet Corvette and
Camaro; the Pontiac Firebird; the Cadillac DeVille, El Dorado, and Seville; and
the Buick Century and Park Avenue. See id. The modules in the Cadillac De-
Ville also record speed, engine RPM, brake and throttle data. See id.
120. Id.
121. Id. This statement comes simply from an anonymous GM spokesperson
and does not represent any view specifically outlined in a GM manual, etc.
122. Wired News, supra note 1 (describing the concern of Lawrence Fried-
man, chairman of the Motor Vehicle Division of the Association of Trial Lawyers
of America).
123. See id.
124. See AutoWatch, Innovationhouse.com, at
http://www.innovationhouse.com/
125. See id.
AutoWatch could be an extremely useful tool in lowering the number of teens killed in car accidents because it enables parents to monitor just how fast their teens are driving. Additionally, when a child is being monitored, they will drive more responsibly, since monitored drivers will drive less aggressively. But while AutoWatch is an ideal device for parents wishing to check up on their kids' speeding tendencies, its application is severely limited in monitoring other safety factors. Statistics show, for example, that every hour someone dies in America simply because they did not wear a seat belt. Black box technology could record this data, and much more. Since 1994, sensors in GM cars have recorded information such as whether the driver's seat belt was latched at the time of a crash. This is critical information, for over seventeen states currently permit defendants in car crash cases to limit damages if they can show that the plaintiff failed to wear a seat belt.

Insurance companies are also playing the black box game, as Progressive Insurance, the nation's fifth-largest auto insurer, has placed hundreds of monitoring devices in customers' vehicles to measure how, when and where they drive. The device's patent describes a system of onboard sensors that could track whether a driver signals before turning, tailgates or stops so sharply that anti-lock brakes engage. This is in contrast with GM's black box, which only records the last seconds before a crash. It also is different in another important aspect: the customers of Progressive In-

126. See id. While AutoWatch has not been fully embraced by the general public, there is no mistaking its value in encouraging good driving and safety habits.
127. Autowatch: An Affordable Solution to the Problems of Vehicle Abuse and Speeding, at http://www.obd2.com/autowatch/autowatch_parents.htm (last visited Mar. 17, 2002). AutoWatch is being marketed to parents not only as an inducement to monitor children's driving habits, but to reduce wear and tear on vehicles and lower maintenance costs. See id.
129. Van Voris, supra note 81, at 1.
130. See id. (describing a statement made by the Insurance Institute for Highway Safety).
132. Id.
surance, all in Texas, volunteered for the test program.\textsuperscript{133} The primary incentive is that customers can save up to 25% on insurance rates tailored to their individual driving habits, as the company expects to benefit by getting new business from consumers who like the idea of having some control over their insurance rates and saving money.\textsuperscript{134} Progressive Insurance, however, is not installing black boxes for the utilitarian purposes GM claims to be advocating. They are simply acting as a vehicular watchdog, monitoring drivers in every aspect of their performance. While certainly advantageous for the insurance company and those fortunate few able to save money on their rates, the potential interest from the government in getting access to this type of data may be destructive to our society in the long run. As a leading opponent has pronounced, you "can't create a swimming pool of data without putting a fence around it."\textsuperscript{135} With the amount of data proffered by Progressive's black box, not even the world's largest fence would be able to keep everything intact.

GM's black box could provide more efficient, accurate resolution of car crash liability cases.\textsuperscript{136} It could also revolutionize safety and crash data, enabling manufacturers to create more dependable cars.\textsuperscript{137} Opponents of this technology question the sincerity of this endeavor, but mere speculation of privacy concerns should not inhibit the development of such a pioneering device. First, unlike the flight data recorder found on airplanes, GM's airbag module is not a voice recorder.\textsuperscript{138} Second, when information is collected and used for research, no one will be able to identify the person or vehicle that is the source of an event.\textsuperscript{139} And most important is recognition of the fact that the black box has the potential to save lives. If ambulance crews could read the recorders on the spot, they could determine whether a crash was severe enough to cause head injuries.\textsuperscript{140} This would be extremely valuable information because some head injuries become evident only hours after an accident, but with the capability of

\begin{itemize}
\item \textsuperscript{133} Id.
\item \textsuperscript{134} Id.
\item \textsuperscript{135} Id.
\item \textsuperscript{136} See Van Voris, supra note 81, at 1.
\item \textsuperscript{137} Id.
\item \textsuperscript{138} See Staab, supra note 39.
\item \textsuperscript{139} Wired News, supra note 1.
\item \textsuperscript{140} See Wald, supra note 4.
\end{itemize}
the recorders, doctors would be alerted to watch for brain swelling or other symptoms.\textsuperscript{141}

V. COMPLETE STANDARDIZATION: A PROPOSAL FOR THE BOX

In order to make Rule 702 sympathetic to objective black box data, the current rule should be amended to accommodate standardization throughout the automotive industry.\textsuperscript{142} In addition to the current amended Rule 702,\textsuperscript{143} it is necessary to draft a subsection incorporating both "reliability" and "uniformity" into the rule. For example, the modified rule could be entitled "Standardization of Reliable Expert Testimony" and provide: Testimony concerning the result or procedure of a novel scientific technique is admissible provided: (1) the technique has been standardized throughout the entire industry, (2) the validity of such technique has been tested throughout the entire industry, and (3) the technique has been proven to be reliable and produce accurate results.

This addition to Rule 702 would allow black box evidence into the courtroom under extremely limited circumstances. First, all automakers would be required to install the box in every one of their vehicles. Second, all automakers would need to have their boxes tested and verified for reliability. Such an amended scientific testimony rule might appear even harsher than \textit{Frye}, but such safeguards are necessary in order to prevent potential abuse. As one lawyer has commented, for data recorders to be an essential instrument in accident investigations, "information needs to come from all vehicles involved in the collision."\textsuperscript{144} This amendment, while at the present time keeping out all black box evidence derived from a novel scientific technique, might very well push the NTSB into regulating the automotive industry just as the FAA has regulated airlines.\textsuperscript{145} When two cars collide researchers will then have the data from both vehicles to show possible tailgating, speeding or other signs of bad driving.\textsuperscript{146} But until that time comes, courts and legislators must be vigi-

\textsuperscript{141} \textit{Id.} Dr. Jeffrey Augenstein, a professor of surgery, has "been working with GM to develop the recorders." \textit{Id.}

\textsuperscript{142} \textit{See infra} Part IV.C.

\textsuperscript{143} \textsc{Fed. R. Evid.} 702 (As amended Apr. 17, 2000, eff. Dec. 1, 2000).

\textsuperscript{144} Cicchese, \textit{supra} note 47.

\textsuperscript{145} FAA Flight Data Recorder Rule, 14 C.F.R. §129.20 (1964).

\textsuperscript{146} Wald, \textit{supra} note 4.
lant in their effort to keep this evidence out of the courtroom until it has not only been standardized throughout the entire automotive industry, but also proven to sustain accurate and reliable results.

VI. CONCLUSION

Car crash specialists are quick to realize that the black box could reform accident research. Black boxes could also revolutionize automobile design, insurance settlements, and the way in which crash survivors are treated. Experts foresee the technology will grow to be as "standard as seat belts and air bags in just a few years." But what is not so evident about the recovery of black box data is what will happen when it is used as evidence in a lawsuit. So far, the government has not imposed any standards for accuracy, making its use as evidence in the courtroom potentially problematic.

The arrival of black boxes in cars will not eliminate the need for investigators. Individuals will still have to interpret the black box data, as the "new recorders will simply give investigators another tool to do the job more expertly." But the manner in which these devices are interpreted could be highly subjective.

For these reasons, black box technology in automobiles creates an interesting dilemma. When an airplane crash occurs, the flight data recorder tapes play a critical role in determining the cause of the accident. Experts in this area have the experience, training, and knowledge necessary to analyze the data based on the reliable principles and methods the NTSB has uniformly imposed. In automobiles, however, only the car manufacturer can download and decode data

147. Id.
148. Id.
149. Wolfson, supra note 2.
150. Ferrar, supra note 6.
151. Id.
152. Id. The following scenario is given to support this statement: "If you're on ice and skidding at 50 mph, the computer thinks you're going zero, because the wheels aren't spinning. Yet you're really sliding along the ice at 50 mph." Id.
154. FED. R. EVID. 702.
from its own boxes. This has changed somewhat with the introduction of Vetronix technology, as investigators, researchers, and anyone else with a laptop can now interrogate the box. But if other automakers create their own version of the black box, and Vetronix is unable to ascertain the results, the same problems will exist.

With no federal law regulating the use of black box recorders in automobiles, there is no uniform criterion for data evaluation. Using the "general acceptance" standard as outlined in Frye has its complications, for a new scientific method, although highly reliable, may not have a long enough track record to allow scientists in the field to accept it generally. Allowing expert testimony that is grounded in the reliable methods and procedures of science, as illustrated by Federal Rule 702, is also problematic because there is no discernable procedure a manufacturer necessarily relies upon when interpreting its own data. For example, Toyota and GM might analyze their data using different methods, thereby producing dissimilar results, depending on whose black box is presented as evidence. Therefore, until the black box has become a staple in the automotive industry, with each manufacturer subject to precise installation requirements, it should not be admissible in the courtroom. In this way, the scientific community will have an objective basis by which to verify the reliability and usefulness of black box recorders, and any specially trained expert in the automotive field will be able to present such evidence to a jury.

155. Wald, supra note 4. Due to the novelty of this device, it is anticipated that at some time in the future, any person with a laptop might be able to interrogate the box. Id.
156. See supra Part II.B.
157. Ferrar, supra note 6 (describing that "the government has so far denied petitions to make event recorders mandatory").
158. See supra Part IV.A.
159. See supra Part IV.A-B.