

Seton Hall University

eRepository @ Seton Hall

Law School Student Scholarship

Seton Hall Law

2021

Traffic Collision Reconstruction and Its Place in Trial

Leighton Cohen

Follow this and additional works at: https://scholarship.shu.edu/student_scholarship



Part of the Law Commons

Motor crashes happen every day in the United States. According to the National Highway Traffic Safety Administration, there were over 7 million crashes in 2016 alone.¹ Of these crashes, .05% caused fatalities, almost 30% caused injuries, and the remaining 70% caused property damage only.² The estimated cost of motor crashes in 2010 was \$242 billion.³ This figure includes but is not limited to lost productivity, legal expenses, medical costs, insurance administration costs, property damage, and congestion costs.⁴ The report also mentions that if they were to try to factor in the “quality-of-life” valuations from the loss of life, the cost would rise to over \$834 billion for the same year.⁵

After the crash occurs, it can be difficult to piece together what happened exactly. Police and private agencies use specialized training and equipment to determine the chain of events that led to the crash and the effect of any contributing factors such as the drivers, vehicles, and environment. Experts, usually with backgrounds in engineering and physics, testify for both parties, and are a common sight in suits involving crashes. The case-law on accident reconstruction testimony in civil cases is “luminous”,⁶ and it is “well settled” that these experts are allowed in criminal cases as well.⁷

History: The National Highway Traffic Safety Administration created the first national guidelines for the standardization training in the field of traffic collision reconstruction in 1985.⁸

¹ National Highway Traffic Safety Administration, 2016 Data Summary

² Id.

³ Id.

⁴ Id.

⁵ Id.

⁶ Badger, *Reconstruction Of Traffic Accidents*, 9 am. Jur. 3d Proof of Facts 115, 130 (1990).

⁷ *Wiison v. State*, 574 So. 2d 1324, 1335 (Miss. 1990) (“the testimony of accident reconstruction specialists is allowed in criminal cases in this State”).

⁸ The History of ACTAR Archived 2011-02-22 at the Wayback Machine

This led to the creation of "Accreditation Commission for Traffic Accident Reconstruction" (ACTAR), an industry accreditation group.⁹ Specifically, motorcycle collision research was pioneered by Hugh H. Hurt Jr in the 1970's when he performed 900 on-scene motorcycle crash investigations and compiled data from 3,600 police reports.¹⁰ "His meticulous collision reconstructions of motorcycle collisions helped to explain that proper helmets reduce head injuries, most motorcyclists needed more driver training to control skids, and a large percentage of motorcycle collisions involved left-turning automobiles turning in front of the oncoming motorcycle."¹¹ Even so, the courts were sceptical of allowing experts to opine in this field.¹² They viewed the field of accident reconstruction as "more art than science."¹³ Today the courts have shifted their views, and allow most expert testimony on the subject, so long as it follows Article VII of the Federal Rules of Evidence.

Qualifying a Witness as an Expert

Under the Federal Rules of Evidence, a witness must qualify as an expert though the Daubert Standard, from the case *Daubert v. Merrell Dow Pharmaceuticals, Inc.*¹⁴ The qualification process was codified after the case in FRE Rule 702. Under the rule, a witness may qualify "as an expert by knowledge, skill, experience, training, or education".¹⁵ Today most accident reconstructionists have backgrounds in physics, have spent years with police forces or other similar agencies, have viewed dozens if not hundreds of crashes and get accredited from

⁹ Id.

¹⁰ Hugh Hurt Jr., Engineer Who Studied Motorcycle Accidents, Dies at 81, Martin, Douglas, *The New York Times*, 2009-12-03.

¹¹ Id.

¹² *McFall v. Shelley*, 374 P.2d 141 (N.M. 1962).

¹³ *Tokio Marine & Fire Ins. Co. v. Grove Mtg. Co.*, 958 F.2d 1169, 1174-75 (1st Cir. 1992).

¹⁴ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993)

¹⁵ USCS Fed Rules Evid R 702

certified institutions. However, in the event of an auto crash, other experts may be needed. Mechanics, engineers, human factor experts, or biomechanics experts could all be relevant depending on the nature of the particular crash in question. ¹⁶ If the vehicle is a large truck or other such vehicle, other specialists might be required. ¹⁷

The normal testimony will start with the witness stating the credentials that should qualify them as an expert. If the witness has formal training “in such highly pertinent subjects as physics, mechanics, and the laws of motion” they qualify as an expert in those fields. ¹⁸ However, if the accident in question has particular circumstances such as involving a particular type of vehicle, or a question about a particular mechanical part, then the expert must be qualified for that particular factor. ¹⁹ Courts have qualified experts for part of their testimony, but have chosen to find them not qualified to opine on others, an example being an expert opinion on how a change in the facts could change or affect the injury of the occupant of the car. ²⁰ The Judge is “judge” of whether or not to accept the experts qualifications and the methods that they employed to reach their conclusions, and it does happen where both parties have called in experts to testify about the same event and come up with different conclusions.

Validity of Scientific Methods

The expert will usually be called in to opine about a cause of an accident, environmental effects, or other factors. To back up their general theory, they will have some sort of general

¹⁶ *Monell v. Scooter Store, Ltd.*, 895 F. Supp. 2d 389, 407-10 (N.D.N.Y. 2012)

¹⁷ Harvey-Lee, *The Nuts and Bolts of Bus Crash Cases*, 55 *Trial*, Feb. 2019, at 36, 41.

¹⁸ *Dilts v. United Grp. Servs., LLC*, 500 F. App'x 440 (6th Cir. 2012), *cert denied*

¹⁹ Moenssens, Henderson & Porterwood, *Scientific Evidence in Civil and Criminal Cases* § 13.10 at 836 (5th ed. 2007).

²⁰ *Behn v. State*, 621 So. 2d 534 (Fla. Dist Ct. App. 1993)

scientific theory such as the general laws of motion as found in § 27.02.²¹ Specific equations on accident reconstruction exist and are usually allowed by the judge.²² In practice the basic propositions offered by the expert and not opposed, and are so “well-settled” that the judge can take judicial notice and accept them.²³ With the Daubert standard, the major premise of the expert will probably be accepted. However, this is not the case, as we will see, for the specific tests and theories offered by the expert, which are often countered by opposing councils own experts. Under 702 however, if the expert is not basing their theory on a chosen scientific test, it could still pass muster under the vague non-scientific standard of “technical knowledge”.²⁴ Since the non-scientific testimony is not based on scientific methodology, it does not have to meet the standards of the *Daubert* test. Rule 702 makes no relevant distinction between "scientific" knowledge and "technical" or "other specialized" knowledge.²⁵ The Supreme Court ruled in *Kumho Tire Co.*,²⁶ that the judge must check the reliability of non-scientific testimony, but it doesn't have to meet all the *Daubert* standards for the above reason. We will examine *Kumho* and how it influences accident reconstruction testimony in a later section.

What separates scientific methodology from technical knowledge? The expert will either state that their opinion is based on scientific, quantifiable data and methods, or that it's based on their years of experience in a certain field. And since there are less official tests for technical knowledge, it seems that it would be easier for the expert to be qualified if they did not base their testimony on methods but rather on their experience. The lower courts have realized this and

²¹ *Wilson v. Woods*, 163 F.3d 935 (5th Cir. 1999)

²² *Badger, Reconstruction of Traffic Accidents*, 9 Am. Jur. 3d Proof of Facts 115, 140-145 (1990)

²³ *Springer v. United States*, 641 F. Supp. 913 (D.S.C 1986)

²⁴ *Lauria v. AMTRAK*, 145 F.3d 593 (3d Cir. 1998)

²⁵ *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 141 (1999)

²⁶ *Id.*

seem to largely apply a “rigorous new standard” and that a significant number of state cases involving expert testimony based on technical expertise are being excluded.²⁷

Technology Used By Accident Reconstructionists

Accident Reconstruction Experts who rely on quantifiable scientific data use a variety of tools and methods to come to their conclusion. One of the most widely utilized technologies is an onboard data recovery device known commonly as a Black Box, which comes standard in most modern cars. In technical terms they are known as Crash Data Recorders or Event Data Recorders (CDR or EDR). These Black Boxes can then be accessed after a crash using computer programs such as the Bosch CDR Tool, a “commercially available tool, allowing to image crash data directly from all supported vehicles giving a detailed report of critical data parameters leading up to and during a crash. Some of the parameters include pre-crash data, vehicle speed, brake status, throttle position, ignition cycles, delta-V, seat belt status, and others.”²⁸ Some manufacturers like Hyundai and Kia have their own proprietary software for the retrieval of data from their vehicles.²⁹ The federal government sets regulations for these data recorders with 49 CFR Part 563 of the Electronic Code of Federal Regulations (e-CFR).³⁰ The stated purpose of this regulation is to ensure that the recorders are used and record “in a readily usable manner, data valuable for effective crash investigations and for analysis of safety equipment performance.”³¹ Other sensors exist, one of the most famous being the airbag Sensing Diagnostic Module (SDM) by General Motors, which can measure airbag deployment down to

²⁷ *Howerton v. Arai Helmet, Ltd.* 581 S.E.2d 816 (N.C. App. 2003)

²⁸ Bosch CDR News and Diagnostics

²⁹ <https://skefc.com/cdr-500-flex-ray/>

³⁰ 49 CFR 563 (2006)

³¹ *Id.*

the millisecond.³² Since the data recovered from the Black Box does not require guess work or opinion, it is hard to counter in court, and is considered reliable evidence. However, it may still require an expert to interpret the data pulled from the recorder.³³

Photographs of the crash scene are invaluable to experts, and may serve as the basis for their theory if they are not able to visit the crash site themselves.³⁴ “Roadway evidence disappears, tested or wrecked vehicles are repaired, disassembled, or scrapped, and components can be tested to failure. Photographs are often the only evidence that remains of a wreck, or the only records of subjects before or during tests.”³⁵ Experts who get to the scene will take photos and use them to recreate the accident later with computers. “Photogrammetry is the science of reconstructing two or three-dimensional information using one or more two-dimensional images. One of the greatest utilities of photogrammetry is the potential to reconstruct physical evidence that no longer exists.”³⁶ Tire marks fade, debris is removed, and weather may take away evidence. With the data they collect at the scene, computer programs are used to try and recreate the accident. Using 3-D modeling software, they can do what's known as “camera matching” where they “apply the principles of spatial geometry and uses one or more two-dimensional images to reconstruct the location and orientation of a vehicle, individual, or other object of interest in a three-dimensional environment.”³⁷

³² Moenssens, Henderson & Portwood, *Scientific Evidence in Civil and Criminal Cases* § 13.08, at 822-23 (5th ed. 2007)

³³ *North v. Ford Motor Co.*, 505 F. Supp. 2d 1113 (D. Utah 2007), See *State v. Ziegler*, 855 N.W. 2d 551 (Minn. Ct. App. 2014) (the experts reliance on data from a black box did not violate the confrontation clause, as it is not considered a human declarant)

³⁴ *Quilez-Velar v. Ox Bodies, Inc.*, 823 F.3d 712, 716-17 (1st Cir. 2016)

³⁵ Photography for Accident Reconstruction, Product Liability, and Testing, SAE International, 3/24/2020, <https://www.sae.org/learn/content/c1729/>

³⁶ Collision Research and Analysis Inc., Detailed Imagery Evaluation, <https://www.collisionresearch.com/services/forensic-analysis-photography>

³⁷ *Id.*

Other computer programs exist that base their model off of physical data, rather than photos. Structural Analysis software is used by engineers for a variety of situations. Structural analysis is used with applied mechanics, materials science and applied mathematics to equate a structure's deformations, internal forces, stresses, accelerations, and stability.³⁸ Therefore a model of a car crash using these programs can potentially show how the crash affected the vehicle or vehicles involved. Experts also use the Finite Element Method (FEM) to generate mathematical models which can be used with a variety of fields, including structural analysis.³⁹

These models, once generated, can be shown in court. It depends however, on how the expert/attorney wishes to use them. If the team plans on using the model as merely a visual representation of the expert's testimony, then they do not have to lay much foundation, under § 25.06. If they plan on using it as substantive evidence, then they must lay a foundation of proof of the validity of the technology, and the math and data behind the model.⁴⁰

If the opposing party is using a model, and it shows a different result to the same accident, this can create a problem. Should both models be admitted and left up to the jury to decide which they accept as what really happened? If the models were created using different programs, but are based on the same underlying crash data, then how is it acceptable for them to be admitted, as it shows that the programs might not be entirely accurate? The courts do not appear to have a reliable answer to these questions.⁴¹

Training and Accreditation Process

³⁸ Structural Analysis for Every Application and Experience Level, Ansys, <https://www.ansys.com/products/structures>

³⁹ Reddy, J. N. (2006). An Introduction to the Finite Element Method (Third ed.). McGraw-Hill.

⁴⁰ § 27.10(c)

⁴¹ *Thorndike v. DaimierChrysler Corp.*, 266 F. Supp. 2d 172, 178-79 (D. Me.)

Accident Reconstructionists can go to a variety of training centers depending on if they work for private agencies or the police. These training centers do not seem to have any governing body setting standards for instruction or methods. Usually these training centers offer classes on different subjects, ranging from crash investigation and vehicle dynamics, to crash reconstruction and data recovery. Centers like the Northwestern University Center for Public Safety offer specialized courses like Heavy Vehicle Crash Reconstruction, Motorcycle Reconstruction, and Advanced Crash Reconstruction Utilizing Human Factors Research.⁴² With the field's modern shift with evolving technology, classes are offered on how to use and interpret data from event data recorders and how to use drones to perform aerial photography.⁴³ Northwestern's classes use two textbooks, Traffic Collision Investigation and its companion, Traffic Crash Reconstruction, which use real-world crash cases and mathematical formulas to help interpret how a crash occurred.⁴⁴

Students learn through these classes “to measure and photograph accident scenes and to create sketches and after-crash diagrams... addresses how collected data are used to reconstruct traffic accidents, as well as the use of electronic devices for collecting and recording at-scene data.”⁴⁵ “NUCPS courses are directed and taught by Center for Public Safety staff members. Many instructors are current or former law enforcement officers. Guest lecturers supplement the instruction staff and include public safety industry experts from law enforcement agencies, educational institutions, and national organizations.”⁴⁶ This all sounds great, but the question

⁴² Northwestern University Center for Public Safety, Traffic Crash Investigation Courses, <https://sps.northwestern.edu/center-for-public-safety/programs/crash-investigation.asp#Traffic%20Crash%20Investigation%20Courses>

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

becomes ,if someone studies with Northwestern, and passes every class, are they better or worse at accident reconstruction than say, someone who did the same at The Institute of Police Technology and Management (IPTM)? They also offer similar classes, with even more specialized courses for police officers, such as Advanced Marijuana Impaired Driving Detection for Law Enforcement.⁴⁷ We will see that Reconstructionists can disagree, and use different methods and tests to come to differing conclusions about the same accident. Is part of the reason for this the lack of a governing body with these teaching institutions?

The Accreditation Commission for Traffic Accident Reconstructionists (ACTAR) is an independent credentialing examination for Accident Reconstructionists. Completing this exam and receiving the credential is not required to be qualified as an Accident Reconstructionist by a court.⁴⁸ According to their website, “ACTAR is recognized in the United States and Canada as an independent accrediting organization for those who work in the field of Accident Investigation and Reconstruction. The weight of this credential can make it easier for an investigator to establish his suitability to present expert witness testimony in the legal system of both countries.”⁴⁹ So they are advertising it as something that will help set a foundation for being qualified as an expert by a court. No governmental body oversees this program, and there are no outside checks on the accreditation process. It appears that the ACTAR is the major testing body for this field in the US, and since they don't have any oversight or competitors, they can say whatever they want about how valuable their certificate is.

⁴⁷ Institute of Police Technology and Management, Course Catalog, <https://iptm.unf.edu/catalog.aspx#lmNhdGFsb2ciIDogIkNhdGFsb2ciLCAiZ3JvdXAiIDogIkFsbClslCjYXRlZ29yeSlgOiAiTkVXIENvdXJzZXMi>

⁴⁸ *Commonwealth v. Cruz*, 29 Mass. L. Rep. 291 (2011)

⁴⁹ ACTAR, <https://actar.org/accreditation/about>

Since there is no government oversight, we see multiple standards and methodologies being used for the same issue. This leads to confusion and opens up the possibility that a mistake will be made. Odds are the Judge is not an expert in physics and applied kinetics. They take what the experts tell them and apply legal standards such as *Daubert*, but if both parties have experts using different methods, both legally valid, then the jury has to choose who they like best, leading to possible mistakes.

Issues with Qualifying Experts

We have touched on how Accident Reconstructionists can qualify to become expert witnesses in a trial. The issue doesn't arise out of the experts main premise (usually what caused the accident). The issue usually comes about when the expert begins to opine about minute details and minor issues, such as what part in particular failed, was a part improperly designed, or how was the occupant positioned at the time of the crash. ⁵⁰

After *Daubert* created the general rule for qualifying experts, the Supreme Court clarified the issue of 'scientific' vs 'technical' knowledge with *Kumho Tire Co.* ⁵¹ In this case a car crash results from a blown tire, and the plaintiff's argument rested on the depositions of a tire failure analyst, Dennis Carlson, Jr., who intended to testify that, in his expert opinion, a defect in the tire's manufacture or design caused the blow out and subsequent crash. The District Court ruled that he was not able to opine on this factor, despite the fact that he had an extensive background in tire production, it did not cover tire blowouts, or the ability to pinpoint the cause of the blowout. The Supreme Court found that the *Daubert* standard covered all expert testimony, not

⁵⁰ *Withrow v. Spears*, 967 F. Supp. 2d 982 (D. Del. 2013) (Expert could not qualify to say if the driver of a car had an arm out the window at the time of the crash.)

⁵¹ *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999)

just scientific testimony. As a result, the District Court can make the call if a witness has enough expertise and training to opine on a particular factor of an accident. In *Kumho*, the expert was qualified in tire construction, but that did not extend to tire blowouts.⁵²

In *Withrow v. Spears* a tractor trailer hit a car, and a portion of the Plaintiff's left hand was injured, severing two fingers and a thumb.⁵³ Both parties brought in accident reconstructionists to try and disprove each other's theories. Plaintiff's expert first argued that the defendant's expert lacked "the requisite qualifications to opine as to Withrow's hand position or body position at the time of the accident, or as to the cause of Withrow's hand injuries, due to his lack of expertise in the field of biomechanics."⁵⁴ The Defendant's expert had a background in municipal traffic and accident reconstruction, and Plaintiff argued that did not qualify him in the field of injuries and biomechanics.⁵⁵

In post-Daubert opinions, courts have been fairly consistent in discussing the type of testimony that a biomechanical engineer or an accident reconstructionist is qualified to put forward pursuant to Rule 702.⁵⁶ In automotive accidents, the types of biomechanical engineers that are called in to testify usually work exclusively in the fields of applying "principles of mechanics to the facts of a specific accident."⁵⁷ How the body reacts to outside forces is a specialized field, and courts realize this. Just because you know how physics applies to a car hitting a wall, doesn't mean you are automatically qualified to know how those same forces act on the human body inside that car.⁵⁸ In litigation and as experts, biomechanical engineers are

⁵² *Id.*

⁵³ *Withrow v. Spears*, 967 F. Supp. 2d 982, 988 (D. Del. 2013)

⁵⁴ *Id.* at 993

⁵⁵ *Id.* at 993

⁵⁶ *Id.* at 993

⁵⁷ *Id.* at 993

⁵⁸ See *Bowers v. Norfolk S. Corp.* 537 F. Supp. 2d 1343, 1377 (M.D. Ga. 2007)

usually able to "render an opinion as to the forces generated in a particular accident and the general types of injuries those forces may generate." ⁵⁹

So here, the Plaintiff alleges that being an expert in automatic reconstruction alone is not enough for the opinion they are trying to proffer (how the Plaintiff sustained his injuries). An expert may be allowed to give testimony as to how an accident happens, but not the effects of injuries. ⁶⁰ "In their briefing, in support of the assertion that Mr. Desch is sufficiently qualified to offer an opinion on these matters, Defendants point only to Mr. Desch's own deposition statement in which he asserted that he is so qualified."⁶¹ Even the expert himself testified that he had no medical training and was not qualified to give an opinion on the injuries, but he did so anyway. ⁶² As a result the court found that the expert was not qualified to testify on the injury or its cause. ⁶³

Mr. Desch, by his own admission, was not qualified to opine about the Plaintiffs injuries, yet he did so anyway. We cannot ask him why he did so, so we must speculate. And if this expert was willing to testify about an area that he knew that he was not qualified in, how many others are there? It is left to the judge to ensure that each expert is qualified in every area that they testify too. Hence the *Daubert* and *Kumho* standards, giving great difference to the District Court's decision on whether the expert is indeed qualified on a particular subject.

The Defendant's expert also created a mock-up of a car door, to help demonstrate the accident and subsequent injury. ⁶⁴ The Third Circuit used an 8 factor test from *Meadows v. Anchor Longwall & Rebuild, Inc.* for the admissibility of tests and methods. (1) whether a

⁵⁹ *Id.*

⁶⁰ *Burgett v. Troy-Bilt LLC*, No. 12-25-ART, 2013 U.S. Dist. LEXIS 96893 (E.D. Ky. July 11, 2013)

⁶¹ *Withrow v. Spears*, 967 F. Supp. 2d 982, 994 (D. Del. 2013)

⁶² *Id.*

⁶³ *Id.*

⁶⁴ *Id.* at 995

method consists of a testable hypothesis; (2) whether the method has been subject to peer review; (3) the known or potential rate of error; (4) the existence and maintenance of standards controlling the technique's operation; (5) whether the method is generally accepted; (6) the relationship of the technique to methods which have been established to be reliable; (7) the qualifications of the expert witness testifying based on the methodology; and (8) the non-judicial uses to which the method has been put. ⁶⁵ Plaintiff contested the mock-up, stating that it did not have a testable hypothesis, had no peer review, and was not generally accepted, thus that it failed the test from *Meadows*. ⁶⁶ Defendant did not contest those points, and argued that it was merely a visual representation, and thus not held to Daubert standards. ⁶⁷ The judge found that, according to the Defendant's briefs, the mock-up was created to show how a "bow wave" theory could affect the Plaintiff's vehicle. ⁶⁸ Bow wave was being disputed by the Plaintiffs as to how it applied to this case, so the Judge held that the mock-up was being used to convince the court to accept a theory, rather than just a visual demonstration. ⁶⁹ As such, it would be held to Daubert standards, which it failed. ⁷⁰

With *Spears* we see two things. One, that experts must qualify for the indicital parts of their testimony. If they testify only about the impact of two cars, then that's all they have to qualify for. If they also decide to speak about the effect the crash would have on a body part, that is a separate qualification that must be tested, and it is up to the Judge to decide if they meet that standard. Two, it also shows us that the Judge can also decide to allow certain tests by the experts. If the test doesn't meet certain criteria, it will not be allowed in.

⁶⁵ *Meadows v. Anchor Longwall & Rebuild, Inc.*, 306 F. App'x 781, 788 (3d Cir. 2009)

⁶⁶ *Id.*

⁶⁷ *Spears at 995*

⁶⁸ *Id.*

⁶⁹ *Id.*

⁷⁰ *Id.*

Crash reconstructionists can be employed by the state, and can be police officers. Many police officers train a group of officers in reconstruction techniques, and combined with years of experience, they can qualify as experts. Problems can still arise however if the methods that the officers use are either employed incorrectly, or if the methods used by the department are disputed by other industry experts.

A good example of this is *Commonwealth v. Cruz*⁷¹ where a car hit a guardrail at speed, causing a fatality. Normally a mathematical formula called the “critical speed formula” would be used to determine how fast the car was going before it hit the object. The court found that the principles the formula was based on did not require extended discussion.⁷² However, the formula requires tire tracks from two different tires, and in this case only one track was seen and recorded. The officer who responded to the scene and took measurements was a member of the State Police Collision Analysis Reconstruction Section for three years at that time.⁷³ He had received about 240 hours of crash reconstruction training and had “shadowed” other troopers at 30 to 40 accident scenes.⁷⁴ He had not been created by the Accreditation Commission for Traffic Accident Reconstruction (ACTAR) or any other organization at that time.⁷⁵ The officer decided to use the critical speed formula anyway. The formula is measured by using a “drag sled” to measure the speed of the vehicle, as he was not able to use an accelerometer on the vehicle in its condition.⁷⁶ It's used by attaching a scale to a weight and dragging it via rope across the pavement, in a way that determines the drag factor on the weight. The drag factor is then used in

⁷¹ *Commonwealth v. Cruz*, 29 Mass. L. Rep. 291 (2011)

⁷² *Id.* at 4

⁷³ *Id.*

⁷⁴ *Id.*

⁷⁵ *Id.* at 5

⁷⁶ *Id.*

another formula to determine the critical speed factor. He saw a scuff mark from what he determined to be the front left tire, and used that as a basis for his measurement. ⁷⁷

His measurements based off of the single tire mark determined that the car was traveling at 99 mph when it hit the guardrail. ⁷⁸ The court looks to a volume of the Institute of Police Technology and Management to explain whether or not a single tire mark is enough to use the formula, which the manual says it does not. ⁷⁹ The opposing party's expert was an engineer and a certified accident reconstructionist. ⁸⁰ He used different formulae and methods to come to his conclusion. He stated that the drag sled was an unreliable method of determining critical speed, and that the officers use of the critical speed formula was unreliable to a reasonable degree of certainty. ⁸¹ In addition, he, like the manual the court relied on, stated that the critical speed formula should not have been used in this instance due to the lack of a second tire mark. ⁸² The expert noted that the officer had not calibrated the scale used in his test, and the measurements he took at the scene differed when compared to the pictures he took (a difference of 3 inches, which creates a significant difference when used in the formula). ⁸³ Since the experts' calculations were more reliable and yielded dramatically different results (64 mph vs 99 mph) the critical speed formula should not be admitted at all. ⁸⁴

The expert testified that there is a general acceptance in the profession against the use of drag sleds, but that they are not prohibited outright. ⁸⁵ This demonstrates another issue. A

⁷⁷ *Id.*

⁷⁸ *Id.* at 5

⁷⁹ Daily, Shigemura, and Daily, *Fundamentals of Traffic Crash Reconstruction* (Vol. 2, Institute of Police Technology and Management)

⁸⁰ *Cruz* at 10

⁸¹ *Id.* at 11

⁸² *Id.*

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *Id.* at 12

methodology can be accepted or not. If it is accepted, it's probably, hopefully, because it has been found to be accurate and reliable. If it is not generally accepted by a scientific community, then hopefully it is because it is not accurate or reliable. Here the drag sled method appears to be not generally accepted by the accident reconstructionist community, yet it is still used sometimes.⁸⁶ So if the drag sled method has been found to be either inaccurate or unreliable, why are some experts still allowed to use it? There is no oversight or governmental body to tell them not to, just the general standard of the industry. Under *Daubert*, expert testimony must be based on generally accepted principles.⁸⁷ So the court already realized this, yet it is still up to the judge to make that call and accept or deny a method or test.

Experts must prove that they are qualified for each element of their testimony under *Kumho*⁸⁸, and that can be demonstrated in *Laugelle v. Bell Helicopter Textron, Inc.*⁸⁹ A helicopter crash killing five people resulted in litigation to determine fault. Five experts were brought in, and the court had to determine if each one was qualified to testify on their separate issues.⁹⁰ The court realized that in certain fields like accident reconstruction, much of the information is not subject to peer review or publication, so the *Daubert* factors do not always apply.⁹¹ The court treats the test of reliability as flexible and factors that the field calls for “technical or other specialized knowledge but is ill-suited for a strict observance of the *Daubert* factors.”⁹² The court still must look for an “adequate fit” between the underlying data and the

⁸⁶ *Id.*

⁸⁷ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993)

⁸⁸ *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 141 (1999)

⁸⁹ *Laugelle v. Bell Helicopter Textron, Inc.*, 2014 Del. Super. LEXIS 508 (Super. Ct. Oct. 6, 2014)

⁹⁰ *Id.*

⁹¹ *Id.*

⁹² *Id.* See: *Durnan v. Butler*. 2004 Del. Super LEXIS 263, 2004 WL 1790117 (Del. Super. Ct. July 21, 2004)

opinion proffered.⁹³ If there is too great a gap between the two, the court will not allow that testimony in.⁹⁴ There are five experts in this case, due to the complexity of a helicopter crash, and the court must go through this analysis for each expert.

Expert 1: Qualified as an expert in the fields of aviation accident reconstruction, mechanical engineering, piloting, and aviation.⁹⁵ He was challenged by the Defendants on three aspects of his testimony.⁹⁶ 1) his opinion that the pilot attempted autorotation after the engine failed; 2) his opinion on how a particular part failed; 3) and his opinion on alternate design for that part.⁹⁷ The court looks at his qualifications and history in order to determine if he is qualified to testify about each point.⁹⁸ The court found that his background included a personal history with the auto rotation technique, combined with FAA rating as a commercial pilot was sufficient to be able to testify on autorotation.⁹⁹ However, the court could not find anything in his background that gave him the necessary qualifications to opine about how a particular part failed, or how that part should have been designed.¹⁰⁰

He opined that a particular part (called a PTG) was defectively designed and that an alternative existed on the market.¹⁰¹ He viewed that the part fell below “an industry standard of care” and that it was a contributing factor to the crash.¹⁰² The opposing party argued that he was not qualified to opine about the design of parts or their replacement and the court agreed.¹⁰³ In

⁹³ *Laugelle at 6*

⁹⁴ *Id.*

⁹⁵ *Id. at 8*

⁹⁶ *Id.*

⁹⁷ *Id.*

⁹⁸ *Id.*

⁹⁹ *Id. at 10*

¹⁰⁰ *Id. at 12*

¹⁰¹ *Id. at 21*

¹⁰² *Id.*

¹⁰³ *Id.*

the field of accident reconstruction, experts may feel that they are qualified or informed enough to make an opinion about a particular detail of a case. In this case the expert was a former helicopter pilot with years of exp[erience and multiple licenses, but that was not enough for the court to find him qualified in every aspect of helicopter technology.

Because there is no standardized formula for determining if a witness is an expert on a very specific aspect, it's left to the judge to make the determination based on the qualifications of the witness. However this may cause problems. Every judge is different, and it may be that one judge would find the witness qualified and another would not. It's largely discretionary, and such decisions are rarely if ever subject to appeal, since expert qualification is left entirely to the district court judges. We have seen in *Cruz* that the judge determined that an officer's testimony was inadmissible because of the methods he used in testing the speed of a car.¹⁰⁴ He came to that decision after another expert, hired by the opposing party, disputed his methods.¹⁰⁵ In *Bell Helicopter* the judge decided the expert was qualified in some aspects of helicopter use, but not others, again at the argument of opposing counsel.¹⁰⁶ The theme is that both sides will dispute the other experts and the judge makes a decision. We can't expect judges to be experts themselves in every field, so they have to make a decision based on others' information, usually the two experts that they have in front of them. They apply case law and see that backgrounds of the witness are relevant, but that's all they really have to work with.

Another issue appears to be the willingness of witnesses to opine about subjects they are not qualified for. In *Bell Helicopter*, the first expert had an extensive background as a helicopter pilot, who had even successfully performed autorotation several times.¹⁰⁷ He did not have a

¹⁰⁴ *Commonwealth v. Cruz*, 29 Mass. L. Rep. 291 (2011)

¹⁰⁵ *Id.*

¹⁰⁶ *Laugelle v. Bell Helicopter Textron, Inc.*, 2014 Del. Super. LEXIS 508 (Super. Ct. Oct. 6, 2014)

¹⁰⁷ *Id.* at 20

background in mechanical engineering, or helicopter part design, yet he was perfectly willing to testify that a particular part was not designed correctly and that other parts should have been used instead. The court was willing to allow a witness to testify as an expert in this field, they just had to have a very specialized background.

Plaintiffs in *Cruz* brought in another witness to try and explain the part failure and the possibility of a fuel blockage.¹⁰⁸ He had a high school education, but a background as a mechanic, and years of experience with engines, was a certified power plant mechanic, and certified by Rolls Royce as a training instructor on all model 250 engines.¹⁰⁹ The defendants argued that still did not qualify him to opine on helicopter engines, but the court allowed his testimony. Despite a limited formal education, his background was sufficient for the court.

Lessons to be learned from these cases demonstrate that each expert must be carefully monitored by both sides. The side offering his testimony must ensure that he is qualified to testify, and that his methods are sound. They must realize that if they are not on top of things, opposing counsel will tear them apart in front of the judge, who will then not qualify them to testify. A case that demonstrated both these principles, but also the appeals process of an expert witness is *Solis v. Southern Cal. Rapid Transit Dist.*.

The facts of *Solis* are simple. At around 4 PM, during a rainy afternoon, a pedestrian was struck crossing the sidewalk by a bus making a left and turn.¹¹⁰ At trial, the evidence was uncontested that Ms. Solis (the pedestrian) was crossing with the green light, which included a pedestrian “walk” sign.¹¹¹ Two companions walking with Ms. Solis testified that she was in the

¹⁰⁸ *Id.* at 24

¹⁰⁹ *Id.*

¹¹⁰ *Solis v. S. Cal. Rapid Transit Dist.*, 105 Cal. App. 3d 382, 384 (1980)

¹¹¹ *Id.*

crosswalk at the time of impact.¹¹² The bus driver stated his traffic signal turned green, and he pulled a short distance out into the intersection and yielded to some cars.¹¹³ He did not see any pedestrians and started his left turn, and did not see her until after he felt the bus collide with something.¹¹⁴ He then saw her stumble away from the left side of the bus and fall down.¹¹⁵ He did not know whether he struck her when she was inside the crosswalk or not.¹¹⁶ The exact location of the plaintiff (if she was in the crosswalk or not) during the impact was the main issue of contention for the case, and the testimony of an expert brought by the defense.

The defense brought in an accident reconstruction expert named Mr. Lent-Koop. He had bachelors and masters degrees in engineering from UCLA specializing in transportation safety, and his credentials were not the subject of the appeal.¹¹⁷ He calculated a location for the point of impact based on scene photographs, the results of speed tests he conducted post accident, the perception and reaction time of the bus driver, and the coefficient of friction between the bus tires and the roadway.¹¹⁸ His conclusion and opinion was based on an assumed maximum speed of the bus, and that it came to a stop 21 feet west of the crosswalk, therefore the point of impact must have been outside of the crosswalk when the plaintiff was struck.¹¹⁹ The defense wanted to prove that the plaintiff was struck when she was outside the crosswalk, and therefore the bus driver would not be liable. The jury came back with a verdict for the defense and the plaintiff appealed, primarily on the testimony of the defense expert.¹²⁰

¹¹² *Id.*

¹¹³ *Id. at 385 -6*

¹¹⁴ *Id. at 386*

¹¹⁵ *Id.*

¹¹⁶ *Id.*

¹¹⁷ *Id. at 387*

¹¹⁸ *Id.*

¹¹⁹ *Id.*

¹²⁰ *Id. at 388*

The court of appeals found numerous errors with the methodology of the accident expert.

1. There was no evidence of measurements being taken at the scene to determine the exact distance from the crosswalk of the bus or of plaintiff's body.¹²¹ 2. He assumed that the photographs in evidence showed the places where the bus and plaintiff's body came to rest after the accident.¹²² 3. The assumed points of rest of the bus and of the plaintiff's body were key to the expert's opinion, since they wanted to prove that she was outside the crosswalk. "However, '...after the actual impact the place the bus came to rest was still within the control of the driver to some extent....and the place plaintiff's body came to rest was also to some extent controlled by her; there being evidence that she took a few steps backward before falling.'" ¹²³ Lent-Koop used the same bus involved in the accident to conduct speed testing of the left turn movement.¹²⁴ He used the bus driver involved in the accident to perform these speed tests.¹²⁵ However, the driver testified that the bus used in the speed test experiments, "Was not capable of going as fast as on the day of the accident."¹²⁶ 4. The speed test was done when the roadway was dry, even though it was raining at the time Ms. Solis was hit.¹²⁷ 5. The expert did not know the coefficient of friction of the wet street at the time of the collision, because he did not measure it, instead using an assumed figure.¹²⁸

Based on these findings and more, the court of appeal concluded that there was not an adequate foundation for Lent-Koop's opinion and found that "Because of the relatively slow speed of the bus and the short distances involved in determining whether plaintiff was or was not

¹²¹ *Id. at 386*

¹²² *Id. at 387*

¹²³ *Id. at 390*

¹²⁴ *Id. at 389*

¹²⁵ *Id.*

¹²⁶ *Id.*

¹²⁷ *Id. at 390*

¹²⁸ *Id. at 387*

within the crosswalk, small differences in the driver's assumed perception time and reaction time and the bus's braking time crucially affected the conclusion."¹²⁹ The trial court's judgment on the jury's verdict was reversed as a result of the inadequate foundation of the expert witnesses conclusion.¹³⁰

The take away from *Solis* is to always double check your experts' work .If they start assuming facts, not double checking their work, or worse, start making things up, you could face a reversal. Another note is that counsel should work to have their expert begin work as soon after the accident as possible. In *Solis*, the defense expert was not retained until two years after the accident. When using the police and not an outside hire, this problem is less likely, as they are usually (but not always) part of the initial response to the scene.

In footnote 2, the *Solis* opinion notes that the plaintiff conducted “a somewhat similar experiment, videotaping other buses making the turn at the intersection,” which was excluded by the trial court based on a finding that it lacked foundation as to the similarity of the bus involved. This ruling by the trial court was not analyzed by the Court of Appeal. The footnote makes the point that the exclusion of this test contributed to the prejudicial effect of the defendant's expert testimony, which the appeals court did find. This is important to show that sometimes you're just not getting something in, even if it is important. Both sides should be able to conduct tests, especially when you feel that the other side's test may have been incorrectly performed. The trial judge allowing one test but not another, without a valid reason, is unfairly prejudicial, but if not appealed there is little you can do. As with the qualification of an expert, the judge has the final say on what methods and tests may or may not be performed.

¹²⁹ *Id.* at 390

¹³⁰ *Id.* at 384

The Step By Step of Reconstruction

Let's break down the work the accident reconstructionist would have to do in *Solis*, in order to see where mistakes or errors can happen in other cases or situations. First, how did the plaintiff get from the curb to the point of impact in the street? The bus driver's testimony was that "He saw out of the corner of his eye something moving fast toward the right front of the bus."¹³¹ So, how long did it take for her to get from the sidewalk to the impact point? Adult pedestrians usually cover three to four feet per second.¹³² Specifics can be gotten from case law for gender and age of the plaintiff. In *Solis*, a bus company supervisor took photographs of where the bus came to rest.¹³³ With that photo, the expert can determine the distance traveled by the pedestrian. Here comes our first problem. If our expert was not at the scene of the crime, arrived later after things moved, or was brought into the case at a later time (like in *Solis*), then we only have the photos that someone else took to use. These photos are potentially all the evidence the expert has to work with to determine measurements. Poorly taken photos, different lighting, or a change in environmental factors are just some of the issues that can arise, all of which could affect the measurements and conclusions that the expert comes to.

The pedestrian in *Solis* had other people with her at the time of the accident. They will, if they are good friends, be witnesses for the plaintiff. Issue two. The bus driver will say whatever helps him, he doesn't want to get in trouble, or lose his job. The other two walkers will say what they saw, but will probably help their friend that they just saw get hit by a bus. The accident reconstructionist must listen to both testimonies and use them in conjunction with other evidence

¹³¹ *Solis v. S. Cal. Rapid Transit Dist.*, 105 Cal. App. 3d 382, 385 (1980)

¹³² <https://en.wikipedia.org/wiki/Walking>, 4/5/2020

¹³³ *Solis*. at 356

(photos) to draw his conclusion about what happened. Is it this experts job to determine who may have a bias, a job usually left to the jury?

Visibility analysis can be created to try and show the jury what the bus driver would have seen at the time of the accident. Taking photographs from the bus drivers viewpoint using the same bus can create that effect. The bus driver said that he was something moving fast out of the corner of his eye. If the expert can determine where that would be, while taking a left hand turn, they can possibly determine where the walker was.

Once the reconstructionist has the data, he can plug it into a computer program to create a model. Models are generally accepted as long as the expert can show they are qualified with the program and the data behind it is sound.¹³⁴ The model is to help the jury (and the judge) visualize the accienet. If you are plaintiff's counsel, it doesn't hurt to have the jury imagine themselves in the plaintiff's place, hurt or dead as a result of a crash.

Conclusion

Accident reconstructionists are not cheap. "To appear in court, experts charged an average of \$385 per hour for testimony, \$353 per hour for depositions, and \$254 for file review. On average, the hourly rate for trial testimony is 52 percent higher than for other activities." as an example of what one firm charged for their experts.¹³⁵ As such, the council should emphasise to their client the pros and cons of bringing one into the case. If done properly, with proven methodology, and done quickly (hopefully with data gathered immediately) they can be a huge help. However, they must also keep in mind the issues. Sloppy work, unproven or disputed

¹³⁴ *People v. Duenas*, 55 Cal. 4th 1 (2012) (computer model allowed during a first degree murder conviction)

¹³⁵ <https://www.injury-attorneys.com/car-accident-lawyers/how-much-does-accident-reconstruction-cost/>
How Much Does A Car Accident Reconstruction in Sacramento Cost?

methods, or experts who feel more qualified than they actually are are real risks, and can cost time and money.

These experts are usually, hopefully, highly qualified in their field. Engineering degrees, years working with vehicles, hundreds of wrecks inspected and investigated. However, even highly qualified people such as these make mistakes. Egos come into play, and they may want to sound more important, or believe that they are experienced enough to make an opinion on a specific aspect, such as a parts design and function. The attorney must make sure to keep them in check, because if they don't, it's up to the judge. The field is not monitored, there is not real oversight aside from one major accreditation firm, who wants to maintain their own image. As such, every case must provide at a snail's pace as each expert demonstrates that they are qualified enough to testify. They have to prove it, because there is no simple way, such as a standardized test, to tell if they are qualified, other than what is basically a background check.