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Experimental Evidence

Donald L. Guarnieri*

THE PURPOSE OF THIS ARTICLE is to explain the concepts basic to the admissibility of experimental evidence in civil jury cases. The article will examine the prerequisites to the admissibility of experimental evidence, will give illustrations of various experiments, and will comment on the trend of court decisions since the latter part of the nineteenth century. The article deals primarily with experiments conducted outside of the court room as opposed to experiments conducted in the courtroom in the presence of a jury.

Academically, the history of the introduction of experimental evidence conducted outside the courtroom in civil jury cases dates from the decision in *Washington A. & G. Steam Packet Co. v. Sickles*, decided in the year 1850.¹ The plaintiff, in an action in *quantum meruit* for the use of a machine placed in defendant's boat for the purpose of saving fuel, introduced evidence of experiments in the use of the machine, made by practical engineers, as tending to prove the amount of fuel saved.

Since the decision in the *Washington Steam Packet* case, the courts have found it necessary to pass on admissibility of various experiments in civil cases in ever-increasing numbers. The railroads at the close of the nineteenth century contributed the majority of these cases. Not until the latter part of the first quarter of the twentieth century did the automobile contribute to this number of outstanding cases.

There was resistance exhibited in some earlier cases to the admissibility of experiments, but it is now generally held that experiments may be performed in the presence of the jury, or evidence of experiments performed out of the court may be admitted in the discretion of the trial judge.²

The growing use of scientific evidence (the testing of the truth by hypotheses with the use of controlled experiments) has become one of the most important techniques in modern trial practice. Personal injury lawyers as well as lawyers for the de-

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¹ 10 How. 419; 13 L. Ed. 479 (1850).

² 21 Ohio Jur. 2d., Evidence, Sec. 521, at 544.

fense make extensive use of this technique. The task of a lawyer is to recognize and understand the opportunities for the use of such evidence and to employ them inventively.³ The results that are derived from the introduction of experiments through the conduct of the experiment in the courtroom, or through the testimony of the expert who conducted the experiment outside of the courtroom, will be convincing to both judge and jury.

There is an unlimited source of factual situations which present opportunities for the introduction of experimental evidence. Some of the types of experiments most frequently introduced, and which will be discussed later in this work include: tests of the visibility of objects or persons at a given distance; tests of speeds of locomotives and motor vehicles, and tests of the effectiveness of their brakes and headlights.

Prerequisites to the Admissibility of Experimental Evidence Conducted Outside the Courtroom.

Legal doctrine on the introduction of out-of-court experiments is not difficult and should be understood by all practitioners as well as by the judiciary.

The chief concept concerning the admissibility of experimental evidence is the rule of "substantial similarity." Under the rule of "substantial similarity," evidence of the results of an analysis or experiments made prior or subsequent to the fact at issue, where conditions are substantially similar, is admitted into evidence. If there is no similarity of conditions such evidence is inadmissible, but if there are some conditions of similarity, the weight of evidence is in proportion to the evidence's similarity. Greater weight is to be given where there is greater similarity. Hence, where there are valid points of similarity, such evidence is admissible, but its weight is for the jury.⁴

The probative value of experiments will depend upon the correspondence of conditions under which they are performed to those of the occurrence being investigated.⁵ If there be exact correspondence of such conditions the experiment will amount to a demonstration and be conclusive on the issue. Dissimilarity

³ McCormick, *Evidence*, Sec. 169, at 359 (1954).

⁴ *Beaver Bros. Co. v. Atlas Insurance Co.*, 131 Fed. 2d 770 (C. C. A. Ind., 1943); *Briggs v. United Fruit & Produce*, 11 Wash. 2d 446, 119 P. 2d 687 (1942).

⁵ *City of Fort Worth v. Lee*, 143 Tex., 551, 186 S. W. 2d 954 (1945); *Odell v. Frueh*, 146 Cal. App. 2d 504, 304 P. 2d 45 (1957).

of conditions and experiments may affect not merely the weight of the evidence but its admissibility.⁶

If the requirement of similarity is not satisfied, the experimental evidence will be excluded, within the discretion of the trial judge. The measure of the permissible variation of the conditions surrounding the experiment from those of the occurrence in question is measured by whether such variation is liable to confuse the jury or be prejudicial to either the plaintiff or the defendant.⁷

Counsel, in planning the experiments, must attempt to reproduce conditions as nearly as possible identical to the fact situation presented in the case. In presenting his evidence he must prepare to lay the foundation by preliminary proof of similarity of conditions.

In *Tuite v. Union Pacific Stages, Inc.*,⁸ Justice Tooze stated, "Indeed, it is often that such experiments may afford evidence more satisfactory and reliable than oral testimony. Yet, before the results of any such experiment may be introduced in evidence, it is necessary to prove that the experiment was made under conditions and circumstances similar to those prevailing at the time and place of the occurrence involved in the controversy. It is not necessary that the conditions and circumstances under which the experiment was made shall be identical with those existing at the time and place of the occurrence in controversy, but it is necessary that there be a substantial similarity . . . Evidence of experiments should always be received with caution, and only when it is clear that the jury will be enlightened thereby."⁹

Experiments concerning irrelevant or immaterial points in issue in the trial of the lawsuit should be excluded and not allowed to confuse the jury in its deliberation.¹⁰

⁶ 21 Ohio Jur. 2d., Evidence, Sec. 522, at 545.

⁷ 20 Am. Jur., Evidence, Sec. 756.

⁸ 284 P. 2d 333 (Ore., 1955); *Birmingham Electric Co. v. Woodward*, 33 Ala. App. 526, 35 S. 2d 869 (1948); *Glowacki v. A. J. Bayles*, 76 Ariz. 259, 263 P. 2d 799 (1953); *Beresford v. Pacific Gas & Electric Co.*, 45 Cal. 2d 738, 290 P. 2d 498 (1955); *Cashman v. Terminal Taxi Co.*, 131 Conn. 31, 37 A. 2d 613 (1944); *Sinclair Oil and Gas Co. v. Albright*, 161 Okla. 272, 18 P. 2d 540 (1934); *Washington v. City of Seattle*, 170 Wash. 371, 16 P. 2d 597 (1933); *Tassin v. New Orleans Public Service*, 19 La. App. 456, 139 S. 695 (1932).

⁹ *Great Atlantic & Pacific Tea Co. v. Donaldson*, 26 Ala. App. 179, 156 S. 859, cert. den., 229 Ala. 276, 156 S. 865 (1934).

¹⁰ *McCormack, op. cit. supra*, n. 3; *Ragan v. MacGill*, 134 Ore. 408, 292 P.

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Experiments in the Court Room

Although this article deals primarily with experiments conducted outside of the court room and out of the presence of the jury, it is now generally held that experiments may be performed in the presence of the jury.¹¹

In *Osborne v. the City of Detroit*,¹² for example, where plaintiff claimed to be paralyzed by a fall, it was not error to permit her medical attendant, who had not been sworn, to demonstrate her loss of feeling to the jury by thrusting a pin into the side of the claimant who claimed to be paralyzed.

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1094, 72 A. L. R. 860 (1930); *Adskin v. Oregon-Washington-Laraway Navigation Co.*, 134 Ore. 574, 294 P. 605 (1931); *Raymond Syndicate v. American Radio & Research Corporation*, 263 Mass. 147, 60 N. E. 821 (1901); *City of Manchester v. Beavers*, 38 Geo. App. 337, 144 S. E. 11 (1928); *New York Life Insurance Co. v. Alman*, 22 Fed. 2d 98 (C. C. A. Ala., 1927), cert. den., 48 S. Ct. 433, 277 U. S. 586, 72 L. Ed. 1000; *Mauldin v. Auto Schwill and Co.*, 1 Tex. App. 347 (1925); *Erickson's Dairy Products Co. v. Northwest Baker Ice Machine Co.*, 165 Ore. 563, 109 P. 2d 53 (1941); *Wilson v. Chippewa Valley Elec. Railway Co.*, 135 Wis. 18, 114 N. W. 462 (1908); *St. Louis I. M. & S. Ry. Co. v. McMichael*, 115 Ark. 101, 171 S. W. 115 (1914); *St. Louis I. M. & S. R. Co. v. Kimbrell*, 117 Ark. 475, 174 S. W. 1183 (1915); *Hall v. Brown*, 102 Ore. 389, 202 P. 719 (1921) at best it is within the discretion of the court to admit any testimony whatever about experiments of similar occurrences, but in any event the condition must appear to be substantially the same, and unless this appears it is not within the discretion of the court to admit the evidence); *Eidt v. Cutter*, 127 Mass. 522 (1879) (experts may give the grounds and reasons for their opinions, including the details of experiments made by them under conditions and circumstances which are as nearly as possible like those in the case); and, *Cf.*, *Hallawell vs. Union Oil Co. of California*, 36 Cal. App. 367, 173 P. 177 (1918) (bystander at experiment, though not assisting to make it, may testify as to its results, if he had knowledge of all conditions and experiment was one involving no special technical knowledge or was such that its result could be seen and understood by persons of ordinary experience).

¹¹ *Stearns Coal & Lumber Co. v. Williams*, 177 Kan. 698, 198 S. W. 54 (1917) (in servant's action for injuries from electric shock a court properly refused to permit expert electrician to make experiment on plaintiff and to show that volume of electricity which passed through wires could be withstood by plaintiff without injury).

¹² 32 Fed. 36 (C. C. Mich., 1886); *Air Reduction Co. v. Philadelphia Storage Battery Co.*, 14 Fed. 2d 734 (C. C. A. Penn., 1926) (testimony of expert witness as to result of experiments held properly admitted in view of objection to experiments in court); *Leonard v. Southern Pacific Co.*, 21 Ore. 555, 28 P. 887, 15 L. R. A. 221 (1892) (where defendant claimed that the wreck in which plaintiff was injured was due to a rail thrown across the track by some third party, and introduced a rail in court which showed a scar which defendant claimed was made in the manner stated, it was not error to allow the plaintiff, in rebuttal, to produce a wheel and an iron rail of the same dimensions as the rail produced by defendant, and allow a witness to demonstrate to the jury that the scar on the rail was not caused in the manner contended).

Historical Development

In some early cases the courts exhibited reluctance to admit evidence of experiments; the reason assigned for such reluctance was that to admit such evidence would permit a party to manufacture evidence in his own favor, and furthermore, that if evidence of some experiments were admitted, others relating to the same subject would also have to be admitted on behalf of the opposite party, thus, raising too many collateral issues. Experiments, however, serve to put the jury in possession of certain knowledge important to the determination of the issues. Thus, often such experiments may afford evidence more satisfactory or reliable than oral testimony. The courts now very generally permit experiments to be performed in the court in the presence of the jury, or evidence to be given of experiments performed out of the court when they are made under conditions similar to those existing in the case at issue for the purpose of providing facts in issue.¹³ The selection on *Evidence* in American jurisprudence states that similarity of conditions must be shown, as a prerequisite.¹⁴

In *Libby, McNeil & Libby v. Scherman*,¹⁵ decided by the Supreme Court of Illinois, in an action caused by falling over of a pile of pork barrels shortly after the contents of one of the barrels had been removed, evidence of experiments made with similar piles of barrels and inferences drawn by witnesses in such experiments were held inadmissible as pertaining to mere collateral matters. Reluctance to admit experimental evidence was shown in the opinion, written by Chief Justice Bailey, which stated:

We are clearly of the opinion that experiments of that character and their results and the inferences drawn from them, experiments by witnesses, were mere collateral matters, which would have no legitimate bearing upon the issues before the jury. Besides the impossibility of showing that the conditions under which these experiments were made, were in all respects identical with those existing at the time the plaintiff was injured, and the multitude of collateral issues which an attempt to prove identity of conditions would raise, the fact that one experiment had been conducted to a successful issue would have little if any tendency to show that in another case precisely like it, an accident might not have happened.

¹³ 20 Am. Jur., Evidence, Sec. 755, at 627; 32 C. J. S., Evidence, Sec. 592.

¹⁴ 20 Am. Jur., *supra*, n. 13.

¹⁵ 146 Ill. 343; 34 N. E. 801 (1893).

The trend of the decisions in various American jurisdictions over the last half century has been away from the "identity of conditions" stated in Justice Bailey's decision in the *Libby, McNeil & Libby* case. Now the requirement of identical similarity has given way to the requirement of "substantial similarity." Thus, *Streit v. Kestel*,¹⁶ was an action by a passenger for injuries sustained when her automobile allegedly turned from the curb lane into the middle lane and commenced a wide right turn into an intersecting street and then was struck by defendant's following automobile traveling at the curb. There was no error prejudicial to plaintiff in admitting motion pictures into evidence. Judge Honsicker stated: "Testimony relating to experiments made out of the presence of the jury have been admitted into evidence for many years. These experiments must be made under conditions of substantial similarity to the occurrence in issue."

Illustrations of Experiments Conducted Outside the Courtroom

Railroad Cases

In a Massachusetts decision involving the *Northern Railway*, in 1856, it was held that an expert who had testified to the state of the weather at a certain time and place, and as to his opinion about the effect of such weather upon a certain substance, as deduced from many experiments, cannot be asked in his examination-in-chief about the details of each experiment.¹⁷

*Brooke v. Chicago, R. I. & T. Railway Co.*¹⁸ (distinguished from the earlier case of *Klanowski v. Grand Trunk Railway Co.*¹⁹) involved evidence as to experiments of the witness in placing his foot between the rails of a railroad track in order to see whether his foot would catch. There had been testimony that the deceased's foot had caught. The experimental evidence was admissible when the witness who made the experiment and the shoe worn by the deceased at the time of the accident, were both before the jury.

¹⁶ 108 Ohio App. 241; 161 N. E. 2d 409 (1959); *Roberts v. Permanente Corporation*, 10 Cal. Rep. 519 (Cal. App., 1961); *First National Insurance Co. v. Wichita Flour Mills Co.*, 257 Fed. 2d 983 (C. C. A. Wis., 1959).

¹⁷ *Ingledeu v. Northern Railway*, 73 Mass. 86 (1856).

¹⁸ 81 Ia. 504, 47 N. W. 74 (1890).

¹⁹ 31 N. W. 275 (Mich., 1887); *Gilbert v. Third Ave. Railway Inc. Co.*, 54 N. Y. 270 (Supr. Ct., 1887) (evidence of experiments of a witness as to whether a person, caused to fall from the steps of a streetcar by its starting, would fall as the plaintiff testified he did, is admissible).

As it became well established that the results of experiments conducted out of court could be introduced into evidence the years approaching the twentieth century brought a deluge of cases involving railroads.²⁰ The beginning of the 20th century saw no letup in the number of cases filed, involving one aspect or another of the admissibility of expert or lay testimony concerning experiments conducted outside the courtroom.²¹

²⁰ See, *Chicago, St. L. & P. R. Co. v. Champion*, 32 N. E. 874 (Ind., 1892) (where the issue is to whether or not a car, while being pushed at about four miles an hour, with brakes set, down a slight grade, coupled with another car, did jump forward at the release of the brakes, when within six or eight inches of the car with which it was to be coupled, it is error to exclude the result of an experiment made at the same place under exactly similar conditions); *Lake Erie & W. R. Co. v. Mugg*, 132 Ind. 168, 31 N. E. 564 (1892) (in an action against a railway company for the death of plaintiff's intestate, it appeared that the deceased was injured in January, and the statements by him were introduced in evidence that at the time the injury occurred, his boot froze to the rail. Defendant offered to show when the statement was made that one who heard such statement experimented on the same day, and found that the weather had the same effect on his boot. It was not shown that the conditions of the weather, etc., were the same as when the deceased was injured. Held, that the court properly excluded such evidence); *Chicago and A. R. Co. v. Logue*, 47 Ill. App. 292 (1893) (in an action by an administrator against the railroad company for negligently killing plaintiff's intestate, the testimony of persons who placed an inanimate object on the track, as to the distance at which it could be seen, is inadmissible, if the surrounding circumstances are entirely different from those attending the accident); *Burg v. Chicago, R. I. & P. Railway Co.*, 90 Iowa, 106, 57 N. W. 680, 48 Am. St. Rep. 419 (1894) (an action against a railroad company for killing a person on its track, on the question of whether the train could have stopped after deceased could have been seen by the engineer, evidence of tests made by the defendant under similar circumstances is admissible although plaintiff was not present when tests were made); *Byers v. Nashville C. & St. L. Ry. Co.*, 94 Tenn. 345, 29 S. W. 128 (1895); *Missouri Pacific Railway Co. v. Moffatt*, 56 Kan. 664, 44 P. 607 (1896) (where it was claimed that an intervening bluff, along which a railway was built, prevented the traveler approaching the crossing from hearing the ordinary signals, it is competent to show, by a witness who has made a test in the place of injury and under substantially similar circumstances, how far the signals can be heard, and the effect of the intervening bluff in obscuring the vision, and deadening the sounds made by the passing train).

²¹ See, *Atlanta & W. D. R. Co. v. Hudson*, 2 Ga. App. 352, 58 S. W. 500 (1907) (in a suit against a railroad company for killing stock, where the issue is whether the stock could have been seen on the track by the engineer, plaintiff could prove the results of experiments made after the accident when they were made at the place of the accident and under conditions similar to those surrounding the accident); *Carolina Portland Cement Co. v. Marshall*, 9 Ga. App. 558, 71 S. E. 942 (1908); *Standard Oil Co. v. Regan*, 15 Ga. App. 571, 84 S. E. 69 (1915); *Elgin A. & S. Traction Co. v. Wilson*, 120 Ill. App. 371, affd. 217 Ill. 47, 75 N. E. 436 (1905); *Harrison v. Southern Railway Co.*, 93 Miss. 40, 46 S. 408 (1908) (in an action for the death of a child run over by the defendant's passenger train, where plaintiff's theory was that the engineer could have seen and should have seen the child in time to stop the engine, and that between the place

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The classic fact situation in many railroad cases involving experiments outside the courtroom is the distance at which an adult or a child can be seen on the railroad tracks by the person operating the engine.²²

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where the engineer blew his whistle and the place where the child was struck, the engineer could have put on emergency brakes and stopped the engine before reaching the child. Evidence of experiments made at the place at the same time of day and under similar climactic conditions tending to show the distance at which a child of the same size as the one killed could have been seen on the track, was admissible); *Houston & T. C. & R. Co. v. Ramsey*, 47 Tex. Civ. App. 603, 97 S. W. 1067 (1909) (in an action for the death of one who was run over by a train the engineer testified that he did not discover that the object on the track was a man until the train was within 750 feet of the man, and the plaintiff introduced evidence of experiments to test how far a man could be seen. One experiment having been made about 2:30 o'clock in the afternoon and the other late in the afternoon. In one case, a man about six feet high and in his shirtsleeves, wearing a white shirt, was placed on the track at about the place of the accident, and witnesses took their positions on the track at a distance of 1,000 yards, and then testified that the man could be plainly seen. The other experiment was made under same circumstances and the result was the same. There was some evidence tending to show that the time of the accident was about or after sundown. Held, that the evidence as to the experiments was admissible); *Johnson v. Chicago, R. I. and P. R. Co.*, 80 Kan. 456, 103 P. 90 (1909); *Wingfield v. McClintock*, 85 Kan. 207, 113 P. 393, *affd.* on rehearing 5 Kan. 452, 116 P. 488 (1911); *Green v. Long Island Railway Co.*, 115 N. Y. S. 509, 131 App. Div. 227 (1909) (held that the admission of evidence as to a test before the trial as to how far a red light could be seen on the track under circumstances like those on the night of the accident was error); *Nelson v. Old Colony Street Railway Co.*, 408 Mass. 159, 94 N. E. 313 (1911) (in an action for personal injuries experiments made by a surveyor at the place of the accident held competent); *Burton v. Chicago & A. Railway Co.*, 176 Mo. App. 14, 162 S. W. 1064 (1914); *Wells v. Lusk*, 188 Mo. App. 63, 173 S. W. 750 (1915); *R. A. Watson Orchards v. New York C. & St. L. R. Co.*, 250 Ill. App. 222 (1929) (in an action against a railroad company for the destruction by fire of a storage plant in which regranulated cork was used for the purpose of insulation, testimony of the results of experiments testing the inflammability of regranulated cork was admissible when it was shown that the experiments were performed under the same conditions as existed at the time of the fire, as where the witness testified that he was the superintendent of the cork manufacturing plant and that the cork products with respect to which he testified were of the same kind as were used to insulate plants such as the one destroyed); *Vandalia Railway Co. v. Duling*, 60 Ind. App. 332, 109 N. E. 70 (1915) (in an action against a railroad for killing horses that escaped onto its right-of-way, evidence as to experiments to discover how far the engine's headlights would show objects on the track, the conditions being practically similar with those at the time of the accident, was admissible); *Winters v. Minneapolis & St. L. R. Co.*, 131 Minn. 181, 154 N. W. 964 (1915) (exclusion of evidence as to experiments made with a jack and lever on the day following the injury to the plaintiff employee, held not error); *Goings's Administratrix v. Norfolk & Western Railway Co.*, 119 Va. 543, 89 S. E. 914, *affd.* 39 Cir. Ct. 22, 248 U. S., 538, 63 L. Ed. 409 (1918); *Meaney v. Portland Electric Power Co.*, 131 Ore. 140, 282 P. 113 (1929); *Kratche v. New York Central Railway Co.*, 240 N. Y. S. 443, 228 App. Div. 820 (1930).

²² *Owen v. Delano*, 194 S. W. 756 (Mo. App., 1917) (engineer distinguished

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Norfolk & Western Railway Co. v. Henderson,²³ in the Supreme Court of Appeals of Virginia, was an action for death of a child struck by a railroad train. The defendant's engineer testified that he saw the child in time to stop but did not recognize it as a child. Judge Kelly stated in his opinion:

One of the differences pointed out is that the engineer was on an engine, the motion and vibration of which would interfere with his clear vision . . . There were two or more of these experiments made by sundry persons. Some when the day was perfectly clear and others in dark and cloudy weather. A child of about the size of the one who was killed and similarly dressed, was placed at the same place and in substantially the same position and the witness in question then went up the track to see how far away they could recognize the object as a child. The result of the testimony was that, when the day was clear, they could recognize the object as a child. The result of the testimony was that, when the day was clear, they could recognize the child at a distance of something like 1,100 feet away, and that on a cloudy day they could identify it at a distance of 900 feet. These witnesses of course, knew from the outset what the object was, but they were very positive in their testimony that under weather conditions as above indicated, they could clearly and unquestionably recognize a child as such at the respective distance as stated. One of the differences pointed out is that the engineer was on an engine, the motion and

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a person on the track); *Gulf C. & S. F. Railway Co. v. Whitfield*, 206 S. W. 380 (Tex. Civ. App., 1918) (experiments showing the distance at which a man sitting on the end of a tie at the place of the accident could be seen by a person in the locomotive cab); *Griggs v. Dunham*, 204 S. W. 573, reversed State ex rel. *Dunham v. Ellison*, 213 S. W. 459 (Mo. App., 1919); *Ballman v. H. A. Lueking Teaming Co.*, 281 Mo. 342, 219 S. W. 603 (1920); *Alabama G. S. Ry. Co. v. Burgess*, 144 Ala. 587, 22 S. 169 (1919); *Norfolk & W. Railway Co. v. Henderson*, 132 Va. 297 (1920) (in an action for death of child playing upon a railroad track, evidence of experiments as to the distance at which a child similarly dressed and situated could have been recognized as a child was not incompetent because the experiments were made by a person standing on the track and not by the engineer from a moving train, especially where there was expert testimony that the engineer would have a better opportunity to recognize the object as a child than would the person on the track); *Baker v. Loftin*, 222 S. W. 195 (Tex., 1920) (in an action for death of a person on track at night, evidence of experiments made under similar conditions for the purpose of demonstrating that the headlight of an engine did not leave the track in darkness because of a curved track, was admissible); *Neice v. Norfolk and Western Railway Co.*, 155 Va. 211, 154 S. E. 563 (1930) (experiment tending to show that child could be seen on railroad track from 600 to 1200 feet from the crossing, held properly excluded); *Alabama Great Southern Railway Co. v. Johnson*, 140 Fed. 2d 968 (C. C. A. Miss., 1944).

²³ 132 Va. 297; 111 S. E. 277 (1922).

vibration of which would interfere with clear vision, while the witnesses who were making the test, were on the ground . . . Moreover, and perhaps even more to the point, the engineer in charge of the engine, after saying that he did not think these tests were fair, upon being asked to specify the reason why he did not think they were fair, said, "Knowing a thing is there and having your mind to help you out, makes a great deal of difference." This was a pointed, sensible, comprehensive answer; and, it is this difference, very appropriately called in the petition for the writ of error, "*the difference in the mental attitudes of the parties*," which this defendant chiefly relies upon, and in view of the testimony must solely rely upon, is the reason why the evidence should not have been admitted. (Emphasis added.)

Judge Kelly commented upon what had been called "the mental attitude of the parties." He said: "We must say, therefore, that the real question as to the admissibility of these tests is whether the fact that the witnesses making them knew from the outset the child had been placed on the tracks constitutes such difference between their situation and that of the engineer and others with him in the engine as to render the test incompetent as evidence. The position of the defendant in this respect does not seem to us to be well taken. We do not mean to say that this difference is of no consequence, but we think that its effect on the value of the test as proof was the question to be determined by the jury."

The *Norfolk & Western Railway Co.* case,²⁴ is one of the earliest decisions pointing out the very real difference between the experiment and the actual occurrence of the event as indicated by the "mental attitude" of the witness conducting the experiment.

A number of the cases involving the distance at which an object could be identified (at a railroad crossing) by the engineer in the cab of an engine, centered on the similarity of conditions as to light and the speed of the train. Few of the cases pointed out, as did counsel in the *Norfolk & Western Railway Co.* case, the attitude of the person conducting the experiment as to previous knowledge concerning the reason for the experiment.

As Judge Kelly stated,²⁵ the difference in the "mental at-

²⁴ *Ibid.*

²⁵ *Supra*, n. 23; Jones, Evidence, Sec. 455, at 64, "A court may in the exer-

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titude" of the witness conducting the experiment must go to its weight and not to its admissibility. It is impossible to reestablish complete similarity of conditions such as existed at the time of the occurrence in question.

Accordingly, since the courts have decided that substantial similarity is sufficient to render an experiment admissible, certainly substantial similarity of the mental attitude of the witness involved in the experiment is sufficient to render the experiment admissible.

In *Sherrill v. State*,²⁶ the question was whether certain witnesses could have seen the place of the accident without difficulty, on account of trees and brush between them and it. Others had, before the trial and some months after the accident, gone to the scene to experiment in order to determine that question. The court held that such evidence was not competent. The state of the foliage on the trees and the brush was a controlling condition in that respect. After four months, such foliage was so changed as to be no assurance as to its condition before.

Other cases involving rail transportation have included experiments to determine the heat in the cab of an engine in an action for a fatal heart stroke;²⁷ experiments concerning sparks emanated from the stack of an engine through an arrester;²⁸ experiments as to distances within which trains could be stopped;²⁹ experiments to demonstrate the obstruction of the engineer's view of the accident by reason of curves or cuts in

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cise of judicial discretion, allow parties within reasonable limits to conduct experiment tests in the presence of the jury in order to illustrate the testimony in the case." Annotations, 103 A. L. R. 1355; 23 A. L. R. 2d 1306; 28 A. L. R. 2d 1115; 35 A. L. R. 2d 856, 46 A. L. R. 2d 1216; and *Carpenter v. Kurm*, 348 Mo. 1132, 157 S. W. 2d 213 (1943).

²⁶ 138 Ala. 325, 35 S. 129 (1903).

²⁷ *Ruud v. Minneapolis St. Street Railway Co.*, 202 Minn. 480, 279 N. W. 224 (1938) (in proceeding to recover compensation for fatal heart strokes suffered by motorman while operating streetcar during extremely hot weather, Industrial Commission did not abuse its discretion in refusing to admit evidence of experiments made several months later to determine the amount of heat discharged in motorman's cab in course of operation of car which motorman had been operating).

²⁸ *Thomas Roberts-Stevenson Co. v. Philadelphia Railway Co.*, 256 Pa. 549, 100 A. 998 (1917) (in an action for damage by fire, it was not reversible error to permit defendant's witness to testify to the results of experiments showing that sparks from bituminous coal expanded after leaving the stack and might be larger than openings in arrester meshes).

²⁹ *Washington v. Long Island Railway Co.*, 214 N. Y. S. 2d 115 (1961).

the embankment;³⁰ and experiments to show the safest way for a traveler to negotiate a railway crossing.³¹

Trackless Trolleys

A trackless trolley and street car have provided interesting experiments which include: experiments to determine the position where a heel on a shoe would catch on a plate on a streetcar as a passenger alighted;³² tests to determine the distance at which a man could be seen lying upon the track;³³ evidence regarding a witness's time spent on a streetcar subsequent to an accident;³⁴ experiments as to the distance in which a streetcar could stop;³⁵ and experiments made to ascertain the maximum speed attainable by a streetcar.³⁶

Graza v. San Antonio Transit Co.,³⁷ was an action by a passenger for injuries allegedly sustained when a bus door closed on her hand as she was about to board, and further injuries suffered when the bus started with the passenger's hand caught in the door. It was held that testimony as to experiments by other persons, under substantially similar conditions, which indicated that the door would not cause such injuries, was admissible.

Automobiles

The fact situation that provided many illustrations of experiments in railway cases is duplicated in auto accident cases. The distance at which objects can be identified upon a road open for travel by automobiles is the subject of many automobile cases involving experiments.³⁸

³⁰ *Atlantic Coast Line Railway Co. v. Jackson*, 225 Ala. 652, 114 S. 813 (1933).

³¹ *Torgeson v. Missouri-Kansas-Texas Ry. Co.*, 124 Kan. 798, 262 P. 546, 55 A. L. R. 1535 (1928).

³² *Emerson v. Chicago City Railway Co.*, 203 Ill. App. 412 (1917).

³³ *Griggs v. Kansas City Railway Co.*, 89 Tex. Cir. Rep. 87, 228 S. W. 508 (1921).

³⁴ *Dallas Railway and Terminal Co. v. Darden*, 38 S. W. 2d 777, affg. 23 S. W. 2d 739 (Tex., 1931).

³⁵ *Long v. Galveston Electric Co.*, 59 S. W. 2d 288 (Tex. Civ. App., 1933).

³⁶ *Bughlin v. Pittsburgh County Railway Co.*, 169 Okla. 106, 36 P. 2d 32, 94 A. L. R. 1180 (1934).

³⁷ 180 S. W. 2d 1006 (Tex. Civ. App., 1944).

³⁸ *Linstroth v. Pepper*, 203 Mo. App. 278, 218 S. W. 431 (1920) (in action for death of an infant son who, while crossing the street was run over and

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Ortega v. Pacific Greyhound Lines,³⁹ was an action for death of a boy who was struck by a bus at night while he was riding on a bicycle. The question in issue was whether the reflector mirror on the rear of the bicycle was sufficient under the statute. There was admission of testimony of a witness that during an experiment he was able to see the same kind of reflector mirror on a bicycle more than 200 feet ahead of his automobile. It was held not reversible error when the bicycle used in the experiment, and the bicycle and the reflector mirrors involved in the accident, and the condition of both were observed by the jury.

*Thomas v. Central Greyhound Lines, Inc.*⁴⁰ was an action for personal injuries sustained by a passenger when the corporate defendant's bus, in which he was riding, collided with the co-defendant's approaching truck, on a straight section of highway.

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killed by defendant's automobile, one of the defenses being that the chauffeur could not by exercise of reasonable care have seen the son in time to have prevented the accident, held that there was no error in permitting an expert witness to state his conclusion from an experiment as to what obstruction a telephone pole near the curb line was to a view of the street in question); *Smith v. Grange Mutual Fire Insurance Co. of Michigan*, 234 Mich. 119, 208 N. W. 145 (1926); *Birmingham Stove and Range Co. v. Wanderford*, 217 Ala. 342, 116 S. 334 (1928) (admission of testimony as to points of visibility to and from corner which was scene of collision, based on experiments long after accident, held error); *Havecker v. Weiss*, 261 N. Y. S. 494, 237 App. Div. 856 (1933) (excluding evidence of what could be seen from a point 466 feet from where the accident happened, because photographs showing intervening crest of road were evidence, held error, notwithstanding that testimony was based on result of experiments made after accident); *Bill v. Kenney*, 181 Va. 24, 23 S. E. 2d 781 (1943) (where occupant of automobile riding in back seat testified that truck driver was on wrong side of road and that he did not dim his lights, evidence regarding experiments purporting to show that person sitting in back seat could not see things testified to by occupant was irrelevant, and absence of evidence showing that experiment was conducted under similar circumstances as existed at the time of the accident); *American Products Co. v. Villwock*, 7 Wash. 2d 246, 109 P. 2d 570, 132 A. L. R., 1010 (1941); *Hodgkins v. Christopher*, 58 N. Mex. 637, 274 P. 2d 153 (1951) (in an action for wrongful death of occupant of pick-up truck which was struck in the rear by a tank-trailer, court did not abuse its discretion in admitting into evidence testimony concerning an experiment conducted for the purpose of collaborating testimony of one who was riding in cab of pick-up truck that he was able to see the tank-trailer); *Mintz v. Atlantic Coastline Railway Co.*, 236 N. C. 109, 72 S. E. 2d 38 (1954); *Cunningham v. Court*, 82 N. W. 2d 292 (Iowa, 1957); *McGough v. Hendrikson*, 58 Cal. App. 2d 60, 136 P. 2d 110 (1943) (evidence of experiment made at place of automobile accident, showing that injured person was plainly visible to motorist, was inadmissible when experiment was made at 9:30 P. M. in October, the accident having occurred at 2:30 a. m. in May, and no foundation was laid as to whether the conditions existing in October were substantially similar to those existing in May).

³⁹ 20 Cal. App. 596, 67 P. 2d 702 (1937).

⁴⁰ 6 A. D. 2d 649; 180 N. Y. S. 2d 461 (1960).

It was held to be improper to exclude testimony of an experiment conducted with the bus involved, establishing incapacity on the part of the passengers in the bus, by reason of physical circumstances, to see a line 6 to 12 inches from and parallel with the left side of the bus. The passenger had testified that shortly before the accident he observed the center line of the highway 6 to 12 inches left of the left side of the bus, but that he lost sight of the center line immediately prior to the collision. Evidence as to experiments under the circumstances was relevant with regard to the bus company and its driver's steering.

Experiments as to the distance within which automobiles can be stopped at various speeds have been the subject of numerous out of court experiments. In *Beckley v. Alexander*,⁴¹ in 1914, one of the earliest experiments concerning the stopping of an automobile was conducted out of the presence of the jury. The court held that because of dissimilarity of conditions, exclusion of the evidence was within the discretion of the trial court.

Following the *Beckley* decision, the courts were presented in the 20's and 30's, and later, with suits concerning the admissibility of experiments as to the distance at which an automobile may be stopped.⁴² In *Lemons v. Holland*,⁴³ it was held that, in

⁴¹ 77 N. H. 255, 90 A. 878 (1914).

⁴² *Truva v. Goodyear Tire & Rubber Co.*, 124 Wash. 445, 214 P. 818 (1923); *Kelly v. Troy Laundry Co.*, 46 Idaho 214, 267 P. 222 (1928); *Siegel v. Detroit Cab Co.*, 246 Mich. 620, 225 N. W. 601 (1929) (tests of whether taxicab being operated at 20 m.p.h. could be stopped within two feet, held admissible, in an action for death of pedestrian struck by similar car); *R. F. Trant, Inc. v. Upton*, 159 Va. 355, 165 S. E. 404 (1932); *Clevenger v. Kern*, 100 Ind. App. 581, 197 N. E. 731 (1935) (in death action against a motorist, admission of testimony of expert automobile mechanic regarding results of experiments made after an accident relating to ability to stop defendant's automobile, under conditions practically the same as those existing on the day of the accident, held not in error. Judge Wood stated: "... this related mostly to the ability to stop the automobile while it was being operated at a given speed, all the conditions under which the experiments were made were practically the same as those existing on the day of the accident. The court did not abuse its discretion ... Its weight in credibility were matters for the jury to determine."); *Vandalia Railway Co. v. Bulling*, 60 Ind. App. 332, 109 N. E. 70 (1915); *Boston Rubber Co. v. Kendall*, 178 Mass. 232, 59 N. E. 657, 51 L. R. A. 781 (1901); *Nelson v. Old Colony Street Railway Co.*, 208 Mass. 159, 94 N. E. 313 (1911); *Poole v. Day*, 143 Kan. 226, 53 P. 2d 912 (1936); *Crecelius v. Gamble, Skogmo Inc.*, 144 Neb. 394, 13 N. W. 2d 627 (1944) (in an action for injuries sustained by a four year old boy struck by a truck, trial court did not abuse its discretion in admitting evidence of experiment conducted by police officer at scene of accident more than two and a half years thereafter with a truck with brakes adjusted as on the truck involved in the accident); *Franks v. Kirbon*, 146 Neb. 585, 20 N. W. 2d 597 (1945); *McBrayer v. Ballenger*, 95 S. E. 2d 718 (Ga. App., 1957) (in an action for injuries sus-

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any negligence case, information in a chart purporting to set forth distances in which an automobile, with brakes in excellent condition, might be stopped when traveling at certain speeds would be of no value unless experiments were first shown to have been performed under conditions substantially similar to those present at the time and place in controversy.

*Bell v. Kroger Co.*⁴⁴ was an action for death of a motorist resulting from collision with a truck. This involved a "tactograph," which is an instrument containing a clock with a paper dial attached, which is fastened onto a motor of a truck in such a manner that a needle will indicate on the paper dial the speed of the truck at any given time, and also each truck stop. Admission of this evidence was error where there was insufficient proof of accuracy of such tactograph, which had been placed on the truck some three years prior to the collision.

The automobile mechanic also has played an important role in the introduction of out of court experiments in civil jury trials. An automobile mechanic's experiment with a cardboard window in an automobile was held inadmissible in an action for a motorist's death, where the defendant claimed that the cardboard had obstructed his view.⁴⁵

Sundry other experiments have been conducted with automobiles, including experiments tending to show how an automobile would lessen its speed on an incline approaching a bridge;⁴⁶ an experiment attempting to indicate the impossibility of placing one's hand past the magneto gear while the engine of an automobile was running;⁴⁷ an experiment designed to show

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tained by plaintiff as a result of head-on collision between automobile in which he was passenger and defendant's automobile, it was not error to admit testimony of police officer relative to certain tests he had made in relation to correlation between automobile speed, and stopping distance, where test had been conducted with automobile of same make and model as defendant's on same stretch of highway under comparable weather conditions).

⁴³ 286 Ore. 656 (1961); *Ervay-Canton Apts. v. Hatterick*, 239 S. W. 2d 150 (Tex. Civ. App., 1951); *Coon v. Utah Const. Co.*, 288 P. 2d 997 (Utah, 1957); *Cf., Lane v. Hampton*, 197 Va. 46, 87 S. E. 2d 803 (1955); *Reber v. Hanson*, 260 Wis. 362, 51 N. W. 505 (1892); *Schwartz v. Schneuriger*, 269 Wis. 535, 69 N. W. 2d 756 (1956).

⁴⁴ 323 S. W. 2d 424 (Ark., 1959); *Publix Camco v. Colorado National Bank of Denver*, 338 P. 2d 702 (Colo., 1959).

⁴⁵ *Potts v. Bird*, 93 Colo. 587, 27 P. 2d 745 (1934); *Gaillard v. Boynton*, 70 Fed. 2d 552 (C. C. A., N. H., 1934).

⁴⁶ *Collins v. Graves*, 17 Cal. App. 2d 288, 61 P. 2d 1198 (1936).

⁴⁷ *McCarthy v. Currie*, 240 Mass. 442, 134 N. E. 339 (1922).

that an automobile parked as plaintiff's automobile was parked would coast downhill onto a highway after some movement causing the automobile to start;⁴⁸ an experiment conducted to indicate the amount of time taken by a pedestrian to cross a street occupied by motor vehicles;⁴⁹ an experiment to determine the speed of a vehicle by the use of a constable's stopwatch;⁵⁰ experiments and tests conducted upon a defective steering gear of an automobile;⁵¹ and experiments conducted concerning defective brakes on a truck.⁵²

In *Chambers v. Silver*,⁵³ a collision occurred when the defendant's automobile veered onto the wrong side of the road. The sole defense was that the main leaf in the spring of the front wheel was broken when the wheel crossed a two-inch deposit of soil on the road. The vehicle had thereby been ren-

⁴⁸ *Navajo Freight Lines Inc. v. Mahaffey*, 174 Fed. 2d 503 (10th. Cir., 1949) (in an automobile accident case, exclusion of results of experiment designed to show that automobile parked as plaintiff's automobile was parked would coast downhill onto highway after some movement causing automobile to start, if emergency brake was released and automobile was not in gear, was not an abuse of discretion, where there was no showing that similar automobile was used in experiment, and that climatic conditions and wind resistance were same at the time of accident and experiment, and proffered testimony was cumulative and would serve only to prove undisputed facts. District Judge Savage stated, "The party offering evidence of out-of-court experiments must lay a proper foundation by showing a similarity of circumstances and conditions. The admission of experimental testimony is a matter resting largely with the discretion of the trial court"); *Beckley v. Alexander*, 77 N. H. 255, 90 A. 878 (1914); *National Pressure Cooker v. Stroeter*, 50 Fed. 2d 642 (7th Cir., 1931); *Collins v. Graves*, 17 Cal. App. 2d 288, 61 P. 2d 1198 (1936); *Hisler v. State*, 52 Fla. 30, 42 S. 692, 695 (1906) ("... Evidence of this kind should be received with caution and only be admitted when it is obvious to the court, from the nature of the experiments, that the jury will be enlightened, rather than confused. In many instances, a slight change in the conditions under which the experiment is made will so distort the results as to wholly destroy its value as evidence, and make it harmful rather than helpful.").

⁴⁹ *Sewell v. MacRae*, 323 P. 2d 236 (Wash., 1950) (in an action by pedestrian against automobile driver for injuries sustained when he was struck by automobile at intersection controlled by traffic signals, experiment used to establish that pedestrian started to cross the street after light had turned amber toward him, by requiring pedestrian to walk 20 ft. in presence of jury, during which time two stop watches were used to clock his travel time, was too inconclusive, inaccurate and speculative to be of any probative value); *Barnes v. Labor Hall Association*, 319 Fed. 2d 554 (Wash., 1958); *Complete Auto Transit Inc. v. Floyd*, 249 Fed. 2d 396 (C. C. A. Ga., 1958).

⁵⁰ *Pittman v. Baladez*, 304 S. W. 2d 601 (Tex. Civ. App., 1958).

⁵¹ *Bona v. X. R. Thomas Auto Co.*, 137 Ark. 217, 208 S. W. 306 (1918).

⁵² *Slury v. Beesku*, 139 Cal. App. 398, 33 P. 2d 1033 (1934).

⁵³ 103 Cal. App. 2d 633, 230 P. 2d 143 (1951); *Larramendy v. Myres*, 126 Cal. App. 2d 636, 272 P. 2d 824 (1954); *Alvarez v. Los Angeles County*, 132 Cal. App. 2d 525, 282 P. 2d 531 (1955).

dered impossible to control. A mechanic testified for the defendant that it was physically impossible to drive an automobile with this type of suspension in such condition. It was prejudicial error to refuse the plaintiff's rebuttal evidence as to an experiment in which an automobile with the same suspension system was driven without loss of control over 2 x 2 boards at a speed of about 45-50 mph.

Handley v. Erb,⁵⁴ was an action for death of a bicyclist who was struck and thrown by a barrier rope which the defendant's automobile broke, and on which rope there were three warning flags. Testimony was given as to results of experiments conducted six years after the accident and under different conditions, by a witness who knew that the flags were there and was specifically looking for them. This was inadmissible, and its admission constituted prejudicial error, notwithstanding a statement to the jury that the testimony was not admitted to show negligence of the defendant, but solely to show no neglect on the part of the defendant city.

Justice Dove, commenting upon what has been previously been referred to as "the mental attitude" of the witness in the experiment, stated in the *Handley* case:

The testimony permitted the jury to infer that if the witness, who knew the flags were there and was specifically looking for them, saw them at the points mentioned, then appellant, who had no knowledge of the barrier, could have seen the flags from the same point, regardless of whether there were other conditions that might have obstructed his view. The court statement to the jury as to the purpose of the testimony would not erase that difference from their minds. The testimony was highly prejudicial to the appellant and was improperly admitted.

Airlines

Lobal v. American Airlines,⁵⁵ was an action by a passenger in defendant's airplane, for an injury sustained in a crash, apparently as a result of engine trouble. Judge Clark stated in his opinion: "The admissibility of the results of experiments conducted by defendant's pilots showing the effect of a piece of paper in the poppet valve in the fuel line was properly within the trial court's discretion under the conditions of similarity, if not of perfect identity, with that of the airplane in the accident."

⁵⁴ 314 Ill. App. 207, 41 N. E. 2d 222 (1942).

⁵⁵ 205 Fed. 2d 927 (2d Cir., 1953).

Northwest Airlines, Inc. v. Glenn L. Martin Co.,⁵⁶ was an airline's action against the aircraft manufacturer for alleged negligence in design and manufacture of airplane, whereby the wing splice was vulnerable to metal fatigue. Judge Stewart stated:

The court was correct in excluding a report of certain experiments conducted by the Aluminum Co. of America Research Laboratory, after the faulty wing joint was discovered. Northwest contends that this report should have been admitted in rebuttal to show the relative merits of various types of wing splice design. In view, however, of the voluminous evidence of record showing the complicated interplay of stresses in a wing structure, the Aluminum Company experiments with isolated joints were of doubtful probative value. Report of the experiments was at fault, and the trial court did not abuse its discretion in ruling that the danger of the reports confusing the jury outweighed its materiality and relevance.

Scientific Experiments

Otey v. Hoyt,⁵⁷ is the earliest known decision in the United States concerning the use of some type of scientific experiment the results of which were to be introduced to the jury. Since that time the admissibility of out of court experiments conducted on a scientific plane has been well settled.

A most interesting case in this classification is *Coca Cola Bottling Co. of Arkansas v. Breckenridge*,⁵⁸ an action to recover judgment to compensate for illness, pain and suffering occasioned by the swallowing of a spider which was contained in a bottle of Coca Cola manufactured by the appellant. Judge Frank G. Smith of the Supreme Court of Arkansas stated:

Two physicians testifying as experts in behalf of appellant, expressed the opinion that appellee's condition had not and could not have been caused by swallowing a spider. Dr. Jilbury testified that he had specialized in bacteriological work dealing with microcosms and bacteriae and was consulting bacteriologist with several hospitals in Little Rock, and that he had made certain experiments for the purpose of testifying in this case. He had placed spiders in bottles of Coca Cola, and put them in a warm place to stimulate the decomposition-in an incubator kept at body temperature for

⁵⁶ 224 Fed. 2d 120 (6th Cir., 1955), 350 U. S. 937; 2 Wigmore, Evidence, Sec. 444 (3rd. ed., 1940).

⁵⁷ 47 N. C. 70 (1854).

⁵⁸ 196 Ark. 1177; 114 S. W. 2d 7 (1938).

about 5 days and had thereafter injected some of the Coca Cola into rabbits to see if any toxin developed, but none did, and that he also made cultures from the bottles in sterile culture media used for developing bacteria and found that there was no bacterial growth. He further testified that insects do not decompose in Coca Cola, as it has a preservative effect, and that he drank one bottle of Coca Cola which had a mashed spider in it, and that he drank another bottle which had spiders in it not mashed, without harmful effects. The injection in the rabbits had no effect except a shock which any injection in the vein will cause, and the rabbits were all well the next day, and are still well, and that this is the proper method of looking for toxins.

As the field of agriculture became more scientific, actions concerning the admissibility of the results of experiments concerning types of fertilizer, germination of seeds, etc., became more numerous. Among these decisions were cases involving an experiment to determine the point of drainage of the remaining lands of a filter basin of a water work;⁵⁹ an experiment to determine whether or not seeds would germinate;⁶⁰ an experiment analyzing the borax content of fertilizer;⁶¹ an experiment concerning the planting of wheat which produced no crop;⁶² tests concerning the analysis of cottonseed shipped upon a certain date;⁶³ tests concerning the noxious qualities of an insecticide;⁶⁴

⁵⁹ *Williams v. Taunton*, 125 Mass. 34 (1878).

⁶⁰ *Western Soil Bacteria Co. v. O'Brien Bros.*, 49 Cal. App. 707, 194 P. 72 (1920) (in an action to recover purchase price of seed and a bacterial preparation where defendant set up breach of warranty that the seed would germinate, held that the court did not abuse its discretion in refusing to permit plaintiff's witness to testify that he made a test of the seed by placing 100 grains between moistened blotters and subjecting them to temperatures of 98 degrees for a specified time and that some of them germinated).

⁶¹ *Heal v. International Agrarian Corp., Buffalo Fertilizer Works*, 124 Me. 138, 126 A. 644 (1925) (in an action for damage to potato crops by reason of fertilizer sold containing borax harmful to plants, sample of fertilizer purchased from defendant by plaintiff's neighbor held sufficiently identified to warrant the admission of evidence of an analysis thereof, and fact that sample was taken from 50 pounds residue rather than from larger quantities goes only to the weight of the evidence and not to the admissibility).

⁶² *Horne v. Elgin Warehouse Co.*, 96 Ore. 403, 190 P. 151 (1920).

⁶³ *Harris Cortner & Co. v. Union Cotton Oil Co.*, 208 Ala. 535, 94 S. 559 (1922).

⁶⁴ *Simpson v. American Oil Company*, 219 N. C. 595, 14 S. E. 2d 638 (1941) (in an action against manufacturer for injuries received from poisonous effect of insecticide, test of a skin specialist on a group of five nurses and internes for the purpose of ascertaining whether insecticide had noxious qualities that were poisonous to humans was admissible).

and the results of experiments by a doctor upon water samples taken from a creek into which the city permitted untreated sewage to flow, poisoning the plaintiff's cattle.⁶⁵

Other miscellaneous experiments conducted under this general topic heading of "scientific experiments" include experiments as to the effects of vibrations on a pile of bonedust and a piece of iron pipe;⁶⁶ tests concerning burns from electric wires;⁶⁷ tests upon an electric power motor in a breach of contract action;⁶⁸ tests as to the bacteriological examination of a piece of ice;⁶⁹ tests upon appliances causing death by electrocution;⁷⁰ tests concerning measurements of depressions caused by heavy machinery upon a bridge;⁷¹ analysis of samples;⁷² an experiment concerning the inflammability of paint;⁷³ experiments concerning the mixture used by dentists in bridge casts;⁷⁴ evidence concern-

⁶⁵ *Friesland v. Litchfield*, 24 Ill. App. 2d 390, 164 N. E. 2d 606 (1960) (in an action by farmer against city for loss of livestock and other damage resulting when city permitted untreated sewage to flow into creek that flowed through farmer's pasture, poisoning his cattle, testimony by a doctor as to samples of water taken from creek some two months after farmer had moved from the farm was not objectionable on ground of remoteness, as the evidence indicated the nature of the creek water while farmer had lived on the farm and city produced no evidence of change or corrective steps taken. Presiding Justice Reynolds stated in his opinion, "taking the evidence of the plaintiff, together with that of the inspector of the Health State Department, all concerning the conditions of the water in the creek while the plaintiff was on the farm, and in the absence of any testimony of defendant, to show any change in conditions or that any steps were taken to correct the conditions prevalent in 1956 and 1957, would constitute a connected chain of evidence as to the condition of the water in the creek and was admissible for what it was worth. The jury could evaluate its weight").

⁶⁶ *Huggard v. Glucose Sugar Refining Company*, 132 Iowa 724, 109 N. W. 475 (1906).

⁶⁷ *Rasmussen v. Wisconsin Traction Light, Heat & Power Co.*, 133 Wis. 205, 113 N. W. 458 (1907).

⁶⁸ *Kimball Bros. Co. v. Citizens Gas & Electric Co.*, 141 Iowa 632, 118 N. W. 891 (1908).

⁶⁹ *Interboro Brewing Co. v. Independent Consumers Ice Co.*, 156 N. Y. S. 410, 93 Misc. Rep. 24 (1915).

⁷⁰ *Smith, Administratrix v. Middlesboro Electric Co.*, 164 Ky. 46, 174 S. W. 773 (1915); *Cf.*, *Security Cement & Lime Co. v. Bowers*, 124 Md. 11, 91 A. 834 (1914) (an experiment with a dusty sack which covered an opening in the floor through which an employee fell, held inadmissible); *Louisville East & Electric Co. v. Duncan*, 235 Ky. 613, 31 S. W. 2d 915 (1930).

⁷¹ *Smith v. Sotover Manufacturing Co.*, 205 Ill. App. 169 (1917); *Johnson v. Gustafson*, 233 Ill. App. 216 (1924); *Langham v. Chicago R. I. & P. Railway Co.*, 197 Iowa 1118, 198 N. W. 525 (1924).

⁷² Various cases on various substances.

⁷³ *Holland and Kerr v. Craven*, 5 Tenn. App. 39 (1927).

⁷⁴ *Ley v. Bishop*, 88 Cal. App. 313, 263 P. 369 (1928).

ing tests made by a chemist as to the bacteriological content of sausage;⁷⁵ tests concerning the source and manner of keeping of kerosene;⁷⁶ experiments as to methods used by a person committing suicide in firing the gun;⁷⁷ an experiment conducted by a layman concerning the evaporation of water;⁷⁸ laboratory experiments conducted by an expert breaking bottles and observing fractures;⁷⁹ analysis of contents of jars of gasoline stored for approximately two years;⁸⁰ tests concerning the tension of an inflated tire;⁸¹ and the measuring of a surgical nail in an action for misbranding surgical instruments.⁸²

Occasionally courts have refused to admit the results of experiments conducted on the scientific plane because of the lack of identity of circumstances. None of the decisions have refused to enter the result of scientific experiments because of the "mental attitude" of the witness or expert conducting the experiment. In the true scientific experiment, the human factor does not enter into consideration as it does in many of the cases involving the railroad, the trackless trolley or an automobile.

In *Depfer v. Walker*,⁸³ a physician was appointed by the court to make an examination of the injured party. It was held that he could not testify as to the extent of the injury based solely on the report of the examination made by a technician, although testimony of such examiner as to the result of the examination may be predicated for a physician's opinion or examination.

Scientific experiments which have been excluded from the trial of the civil cases before juries, for the lack of the essential element of substantial similarity, include an analysis of the water in a stream by a chemist in an action for damages alleged to have resulted from oil well operators permitting salt water to

⁷⁵ *Housand v. Armour and Co.*, 173 S. C. 268, 175 S. E. 516 (1934).

⁷⁶ *Warrichait v. Standard Oil Co.*, 213 Wis. 612, 252 P. 187 (1934).

⁷⁷ *Hopkins v. E. I. Dupont Company*, 199 Fed. 2d 930 (C. A. 3, 1952); *Canada Life Assurance Co. v. Houston*, 241 Fed. 2d 523 (C. A. 9, 1957).

⁷⁸ *Dancigerol Refining Co. v. Donahey*, 238 P. 2d 308 (Okla., 1952) (a layman could properly conduct an evaporation experiment by taking water from his well and water and soils from a depression in a draw near such well, and by a process of evaporation, produce a residue, and from actual taste testify that the resulting residue and sediment contains salt).

⁷⁹ *Sanders v. Glenshaw Glass Co.*, 204 Fed. 2d 436 (C. A. 3, 1953).

⁸⁰ *Charles v. Texas Co.*, 199 S. C. 156, 18 S. E. 2d 382 (1942).

⁸¹ *Pass v. Firestone Tire & Rubber Co.*, 242 Fed. 2d 914 (C. A., Ga., 1957).

⁸² *Orthopedic Co. v. Eutsler*, 276 Fed. 2d 455 (C. A., Va., 1960).

⁸³ 125 Fla. 189, 169 S. 660 (1936).

escape from their well and flow into the stream;⁸⁴ experiments with naphthalene causing explosion;⁸⁵ tests as to mercury content per cubic meter of air in a mill;⁸⁶ and tests concerning the pressure entering a gas heater in a wrongful death action.⁸⁷

Unusual Cases

In *Guinan v. Famous Players-Laskey Corp.*,⁸⁸ Judge Crosby stated in his opinion:

The experiments in the case at bar consisted of subjecting pieces of film to various degrees of heat, to contact with electric sparks after burning to ascertain its inflammable character. Small pieces of film were pulverized, inserted in a cartridge and fired from a revolver to determine the explosive qualities of the film. Obviously, an exact duplication of an explosion in a streetcar would not be practicable. We are of the opinion that the judge was warranted in admitting evidence of the methods and results of the experiment to assist the jury in determining the inflammable and explosive character of the scrapped film, a question of much importance in the case at bar.

McComb v. C. A. Swanson & Sons,⁸⁹ held that testimony concerning results of a certain test, made under an employer's direction, to determine the time required by employees in changing to and from working uniforms was competent but was not conclusive. The tests were generally made in a room with only two employees or at most a very few persons present, whereas actual daily changes were generally, though not always made, with many fellow workers present.

The leisure class became the subject of an experiment in *Blue v. St. Clair Country Club*⁹⁰ which involved the testimony of a mechanical engineer, based on calculations using principles and tables of aerodynamics, that wind of a specified velocity, exerting its maximum force upon a beach umbrella of specified size would

⁸⁴ *Chaplin Refining Co. v. Smith*, 190 Okla. 287, 123 P. 253 (1942).

⁸⁵ *Flahertys Case*, 316 Mass. 719, 56 N. E. 880 (1944).

⁸⁶ *Pershing Quicksilver Co. v. Theirs*, 62 Nev. 382, 152 P. 2d 432 (1944).

⁸⁷ *Cervantes v. Maco Gas Co.*, 177 Cal. App. 2d 246; 2 Cal. Rep. 75 (1960).

⁸⁸ 267 Mass. 501, 167 N. E. 235 (1929); *Commonwealth v. Best*, 180 Mass. 492, 62 N. E. 748 (1901); *Commonwealth v. Buxton*, 205 Mass. 49, 91 N. E. 128 (1910).

⁸⁹ 77 Fed. Supp. 716 (D. C. Nebr., 1948).

⁹⁰ 10 Ill. App. 2d 151, 134 N. E. 2d 540 (1956).

lift a specified number of pounds. It was held that this was not testimony concerning the results of experiments requiring the showing that all essential conditions of the experiment were identical with those existing at the time of the occurrence, which would give rise to an action.

A mother's action was brought against a sheriff's sureties, for the death of her son who suffocated while imprisoned in a county jail, as the result of a burning mattress, in *Baker v. Walston*.⁹¹ There was testimony that two men from inside of a cell, using buckets and running water which were in the cell on the night when the prisoner lost his life, extinguished a mattress set on fire outside of his cell, similar to the one which was burned on the night when the prisoner was suffocated. This was admissible, and the fact that the experiment was not made under the exact circumstances that existed on the fatal night went to the credibility of the testimony rather than to its admissibility.

Harper v. Blasi,⁹² was an action for damages for injuries alleged to have been inflicted in a personal assault. An experiment as to the effect of a blow to the eye was held to be not admissible.

Other decisions concerned experiments in pouring salt water upon two small plants in order to determine the effect of salt water on the plants;⁹³ an experiment with the effect of fire upon furs;⁹⁴ tests made on underground basements for wells in an action to enjoin a defendant from interfering with the flow of a river;⁹⁵ and an analysis of soil by a chemist in an action against an oil company for pollution of a stream.⁹⁶

Harper v. Holcomb,⁹⁷ was an action for injuries to the plaintiff caused by the defendant shooting him because of mistaking him for a deer. Evidence of experiments made after the occurrence showed that the defendant might readily have distinguished the plaintiff from a deer, had he exercised reasonable care. This was competent on proof that the conditions were so similar to those existing at the time and place of injury as to render the results of the experiments of substantial value.

⁹¹ 121 S. W. 2d 409 (Tex. Civ. App., 1940).

⁹² 112 Colo. 518, 151 P. 2d 716 (1944).

⁹³ *Ruth Fuel Co. v. Nichter*, 174 Okla. 601, 51 P. 2d 502 (1935).

⁹⁴ *Snowiss v. Firemens Insurance Co. of Newark, N. J.*, 322 Pa. 161, 185 A. 260 (1936).

⁹⁵ *Rancho Santa Margarita v. Bail*, 11 Cal. 2d 501, 81 P. 2d 533 (1938).

⁹⁶ *Skelly Oil Co. v. Jordan*, 186 Okla. 130, 96 P. 2d 524 (1940).

⁹⁷ 146 Wisc. 183, 130 N. W. 1128 (1911).

Results of experiments that have been held to be admissible include evidence of a watch-ticking test made by an attending physician in order to determine the hearing of the plaintiff;⁹⁸ tests concerning the spontaneous ignition of oil stains;⁹⁹ experiments in an action against the defendant for negligently furnishing unfit ether and against two physicians for negligently administering the ether;¹⁰⁰ an experiment in loading hogs on a wagon;¹⁰¹ tests concerning the inflammability of substances immediately adjacent to a heated stovepipe;¹⁰² tests with different water supply faucets for the purpose of showing that the quantity of water shown by a water meter could not have flowed through;¹⁰³ tests and observations of a lay witness concerning a Babcock test requiring no particular knowledge in chemistry;¹⁰⁴ an experiment indicating that broken pipe would not rust where gas escaped;¹⁰⁵ tests as to the tensile strength of fabric yarn;¹⁰⁶ and tests indicating that a telephone pole could not roll without human intervention.¹⁰⁷

Experiments which were held to be inadmissible included testing of the strength of a fire hose;¹⁰⁸ an experiment tending to show the amount of pressure brought upon a steam pipe which burst;¹⁰⁹ tests to show the qualities of cement;¹¹⁰ and testimony of physician concerning flinching as an expression indicating suffering.¹¹¹

⁹⁸ *Wilson v. Chicago City Railway Co.*, 144 Ill. App. 604 (1908).

⁹⁹ *Thornhill v. Carpenter-Morton Co.*, 220 Mass. 593, 108 N. E. 474 (1915).

¹⁰⁰ *Moehlenbrock v. Parke-Davis & Co.*, 141 Minn. 154, 169 N. W. 541 (1918).

¹⁰¹ *Kohlhagen v. Cardwell*, 93 Ore. 610, 184 P. 261, 8 A. L. R. 11 (1919).

¹⁰² *Adams v. Wilkes*, 118 S. C. 93, 109 S. E. 804 (1921).

¹⁰³ *Eastport Water Co. v. E. A. Holmes Packing Co.*, 121 Me. 345, 117 A. 311 (1922).

¹⁰⁴ *Graustein v. Wyman*, 250 Mass. 290, 145 N. E. 450 (1924).

¹⁰⁵ *James v. Bailey Reynolds Chandelier Co.*, 325 Mo. 1051, 30 S. W. 2d 118 (1930).

¹⁰⁶ *Tebermill v. Southern Brighton Mills*, 49 Ga. App. 390, 175 S. E. 665 (1934).

¹⁰⁷ *McPheters v. Loomis*, 125 Conn. 526, 7 A. 2d 437 (1939).

¹⁰⁸ *City of Chicago v. Greer*, 76 U. S. 726, 19 L. Ed. 769 (1869).

¹⁰⁹ *Mitchell v. Sayles*, 28 R. I. 240, 66 A. 547 (1907).

¹¹⁰ *Burke v. Garden City Sand Co.*, 141 Ill. App. 603, *affd.* 237 Ill. 473, 86 N. E. 1055 (1908).

¹¹¹ *Norris v. Detroit United Railway*, 185 Mich. 264, 151 N. W. 747 (1915).

Ohio's Attitude Towards Experimental Evidence

Generally, in Ohio, in order to render experiments made out of court admissible, the conditions need not be identical to those existing at the time of the occurrence in question. It is sufficient if there is substantial similarity.¹¹²

Similarity of conditions will amount to a demonstration and be conclusive upon the issues involved in the case. Dissimilarity will, of course, affect the weight of the evidence, and in some instances, affect its admissibility.

Ohio Jurisprudence on Evidence states:

According to the general rule, evidence of experiments made out of the court and not in the presence of the jury is admissible upon the same principle that admits experiments conducted in the jury's presence.¹¹³

An early case in the state of Ohio was *Smith v. State*.¹¹⁴ This was a criminal action in which it was attempted to establish by experiments that the state's star witness could not have recognized the defendant as the person committing the crime of malicious shooting as seen through a tavern window, in the light emitted by the discharge of a gun. The defendant offered to prove that, since the filing of the indictment, the witnesses had, at another place, tried experiments of looking through a glass window at a person at various distances varying from 2 to 15 feet. A candle was burning in the room in such a position as to reflect its light through the window and toward the place where the person on the outside of the window stood. While the witness was so looking through the window, the person outside fired a pistol directed towards the witness looking out through the window. The witness, though he could see the person outside the window, could not distinguish and identify him. The light from the flash of the pistol did not enable the witness to distinguish the person being looked at. Nor did the light from the firing of the pistol aid his vision or enable him to see the person any more clearly or distinctly. Judge Thurman of the Supreme Court of Ohio said that rejection of this experimental evidence was error. Judge Thurman went on to comment on the use of the expert witness as compared with the ordinary man and said:

¹¹² *State v. Ferrel*, 64 Ohio L. Abs. 481 (1953).

¹¹³ 21 Ohio Jur. 2d, Evidence, Sec. 524, at 548.

¹¹⁴ 2 Ohio St. 512 (1853).

It requires no scientific witness to tell a jury whether he saw the eyes and nose and the white of the teeth of the man who shot at him, by the flash of the pistol that he fired. And proof that a number of men, of ordinary powers of vision, have tried the experiment, and found themselves unable thus to distinguish countenances—found that their vision was not thereby aided at all—is evidence entitled to as much, if not more, weight, than opinions of scientific men. . .¹¹⁵

Perhaps the first civil case in Ohio involving the admissibility of experiments was *Schweinfurth v. The C. C. C. & St. L. Railway Co.*¹¹⁶ This was an action for wrongful death caused by the decedent being struck by a passenger train operated by the defendant while he was driving on Greenwood Street, in the city of Marion, where it crosses the defendant's road. The alleged wrongful acts of the defendant which resulted in decedent's death consisted of running its passenger train at the street crossing at a reckless and dangerous rate of speed, downgrade and beyond control, at a speed of more than 35 mph, without signals nor any ringing bells or lookout ahead.

The defendant railway company was permitted, at its request, with the consent of the plaintiff and in pursuance of an order of court procured by it, to make experiments in the presence of the jury (outside the courtroom), of the running of a train over the crossing where the plaintiff intestate was killed, under conditions practically the same as those which existed when the accident occurred. The court held in the fifth paragraph of its syllabus,

. . . the information of the jury as to the nature and cause of the accident, the information so obtained was competent evidence for consideration of the jury and the instruction to that effect was not erroneous.

Judge Williams in the *Schweinfurth* case,¹¹⁷ stated:

Experiments made in the presence of the jury . . . are, in a measure, a substitute for oral testimony, and often may afford evidence more satisfactory and reliable.

Not long after the *Schweinfurth* case, the Lorain Circuit Court, on October 22, 1898, decided the case of *Cleveland, Cincinnati, Chicago and St. Louis Railway Co v. Hudson*.¹¹⁸ The

¹¹⁵ *Ibid.*, at 513.

¹¹⁶ 60 Ohio St. 215, 54 N. E. 89 (1899).

¹¹⁷ *Ibid.*, at 216.

¹¹⁸ 22 Ohio Cir. Ct. 586, 12 Ohio Cir. Dec. 661, *affd.* 60 Ohio St. 631, 54 N. E. 1107 (1898).

plaintiff, Hudson, was injured on one of the defendant's cars. The defendant railroad company, near Wellington, Ohio, took up a number of rails from the track and was in the process of placing a new rail. A signal was placed about a mile and one-third west of the point where the rails were removed. Train No. 96 was approaching from the west on a misty and moist day. The tracks over which the train rode were moist. As the train approached the place where the track had been removed, a man signalled to stop the train. The signal from the man caused the engineer to apply brakes to the three cars next to the engine and tender, and the engineer, in addition, blew a whistle for the brakes on the other cars to be applied. The train was made up of approximately 52 cars. When the signal to stop was given and the whistle blew, the brakes were set and the engineer applied sand to the track and reversed his engine, and set his air brakes. But the train failed to stop before the place was reached where the track was taken up. The engine went over the track beyond and the cars were "piled up." Hudson, the brakeman, upon seeing the cars in front of him going to pieces, "leaped from the car and received very serious injuries."

The defendant railway company claimed that the plaintiff was not in his proper position when the signal was given to shut down the brakes. This time lost prevented the train from being stopped, or at least slowed down, so that the plaintiff could have gotten off the train without injury. The plaintiff, however, contended that because of the negligence of a fellow brakeman, the train did not stop within the prescribed time, nor allow him to remove himself with safety. The railway company undertook to establish a facsimile situation with the same number of cars, by starting a train and undertaking to stop it in a particular time at a particular place.

Judge Caldwell, in his decision in the *Hudson* case,¹¹⁹ held that when the accident occurred, the track was wet and slippery and the men were not anticipating the necessity for stopping. In the experiment, however, the track was not in the same condition and the crew anticipated the duties to be performed.

As pointed out before, Judge Caldwell was the first Ohio judge to recognize the very important factor of the mental attitude of witnesses anticipating that about which they were to testify.

¹¹⁹ *Ibid.*, at 588.

In *Baltimore & Ohio Railroad Company v. Fouts*,¹²⁰ the plaintiff, Fouts, was a conductor, and Barnes was an engineer of the company's east bound freight train on the 3d day of October, 1908. Fouts got up on the deck of the last car at the rear end and gave the backup signal and put himself in position for backward motion. The engineer could see only the upper part of the signal and took it for a "go ahead" signal and moved the train *forward*, which threw the conductor backward off the car. Both bones of his right leg were broken and he had to have the leg amputated below the knee. He sued the company for damages, alleging that the engineer negligently interpreted his back-up motion for the go ahead signal. The affirmative defense was that Fouts violated a rule of the company by giving the signal where he could not see the engineer. In the lower court, the jury awarded damages to the plaintiff. A motion for a new trial was overruled and judgment entered on the verdict. The Circuit Court affirmed the judgment and error was assigned to the Supreme Court of Ohio.

The plaintiff attempted to reproduce in the courtroom the signal which he gave to the engineer, Barnes, against the bright sky, five to six hundred feet away. The lower court had admitted the demonstration of the signal before the jury. The Supreme Court held that this was error, and Judge Wilkin in his opinion stated:

. . . that concrete evidence of the signal was given to the jury by ocular demonstration in the courtroom, and that this exhibition of the real thing is more reliable than word pictures of it. This objection is unattainable and it points out the very source of the error of the lower courts. It was a mistake to let the plaintiff attempt to reproduce in view of the jury in the courtroom the signal which he thought he gave. The controversy was not about how he made the signal, but how it appeared to the engineer in the situation in the open country as seen against a bright afternoon sky at five to six hundred feet distant when only the head and hand of the conductor was visible. What the jury saw, close at hand, indoors under a subdued light, was a distinctly different thing than that which was presented to Barnes . . .¹²¹

*Toledo Terminal Railroad Company v. Mauk*¹²² is another example of counsel for the railroad company, as in the *Fout* case,

¹²⁰ 88 Ohio St. 305, 104 N. E. 544, 1915A Ann. Cas. 1256.

¹²¹ *Ibid.*, at 307.

¹²² 9 Ohio App. 438 (1918).

failing to establish similarity of conditions in order to properly lay the foundation for the introduction of an experiment conducted outside the court.

The plaintiffs in *Breymann v. the Pennsylvania, Ohio & Detroit Railway Co.*,¹²³ sought to recover damages for the destruction by fire, on the 8th day of June, 1926, of four dredges and three tugboats. The dredges and tugboats were moored on a river property which was owned by the Pennsylvania, Ohio & Detroit Co., an Ohio corporation. The plaintiffs contended that the fire on the dredge could have been caused by cinders or sparks emitted from a locomotive owned by the defendants. The defendants called Gilbert A. Young, of the engineering department of Duke University, admittedly an expert on the subject, to describe and give results of experiments made by him as to how far sparks emanated from locomotives of various types—one of which was equipped as that of the defendant's in error—could carry and retain sufficient heat to cause ignition of substances on which they fell.

To rebut the testimony of Young, in the *Breymann* case, the plaintiff offered a Mr. McLaren, an employee of the U. S. Forestry Division of the Department of Agriculture. To qualify him as an expert on the subject, evidence was offered concerning experiments which he had made to determine at what distances sparks emitted from locomotives would ignite various described substances. The court erroneously refused to permit him to describe the experiments, because the conditions were not identical to the fact in issue.¹²⁴

A good statement by a court in Ohio concerning the admissibility of experimental evidence conducted outside the courtroom, depending on the substantial similarity of the conditions, was made by the Supreme Court in the case of *St. Paul Fire & Marine Insurance Co. v. The Baltimore & Ohio Railway Co.*:¹²⁵

Evidence of experiments performed out of court, tending to prove or disprove a contention in issue, is admissible if there is a substantial similarity between the conditions existing when the experiments are made, with those existing at the time of the occurrence in dispute; dissimilarities, when not so marked as to confuse and mislead the jury, go to the weight rather than the admissibility of the evidence. (Case

¹²³ 43 Ohio App. 473, 183 N. E. 771 (1932).

¹²⁴ *Ibid.*, at 475.

¹²⁵ 129 Ohio St. 401, 195 N. E. 861 (1935).

involved cinders passing through the spark arrestor attached to a locomotive to the vegetation on the right of way immediately adjacent to the railroad property.)

In May 1936, in *Weaver v. Liberty Cabs, Inc.*,¹²⁶ decided by the Second District, Ohio Court of Appeals (Montgomery County), railroad cases involving experiments, began to give way to the new leader of American transportation, the automobile.

The defending company in the *Weaver* case,¹²⁷ a negligence action, attempted to admit into evidence testimony of a mechanic in the employ of the company as to a general check made of the cab involved in the accident. The mechanic was allowed to testify, over objection of plaintiff's counsel, concerning the check, consisting of observations of brakes, lights, horns, windshield wipers, and the mechanical condition of the car throughout. The witness was permitted to describe the type of lights on the defendant's car, the kind and power of bulbs carried in the headlights, and that the headlights, as determined from the tests in the shop, would throw a light in darkness ahead, a distance of about 75 feet. Judge Hornbeck stated in his opinion:

On direct and cross-examination, it was made plain to the jury that the evidence was submitted only as it might be helpful as it would reflect upon the charge that the headlights on the defendant's car on the night of the accident did not comply with the laws as to the distance which the beams would be projected ahead. There was no error in admitting the testimony with the qualifications appearing in the record.¹²⁸

Judge Carpenter, in *Bickley v. Sears, Roebuck & Co.*,¹²⁹ had presented to him a factual situation providing an excellent opportunity to rule upon dissimilarities which may occur in attempting to conduct an experiment out of court in order to comply with the requirement of "substantial similarity." The plaintiff (a woman) brought an action against the Sears Roebuck Company following a fall on a slippery substance known as "Dustdown" which was on the defendant's floor. A male employee of the Sears Roebuck Company, the day following the

¹²⁶ 21 Ohio L. Abs. 563, 33 N. E. 853 (1936); *Streit v. Kestel*, 161 N. E. 2d 409 (Ohio, 1959).

¹²⁷ *Ibid.*

¹²⁸ *Ibid.*, at 565.

¹²⁹ 62 Ohio App. 180, 23 N. E. 2d 505 (1938).

accident, conducted an experiment where he placed sweeping compound on the floor and himself tried to slip on it. The court rejected this evidence.¹³⁰

*Taylor v. Sidwell*¹³¹ involved evidence of an expert witness, a seismologist, concerning an experiment conducted shortly before the trial in an action for damages to plaintiff's residence as the result of the defendant's blasting operation. The evidence was refused, where two years after the injuries and damages complained of, defendant's operation had moved at least one thousand feet west from the point and location of blasting, and where all of the mineral products had been blasted and extracted from all of the parts of the field occupied and operated by defendants. It was no longer possible to reproduce any experiment either at or near the original locale.

State v. Sheppard,¹³² aside from its news noteworthiness at the time of trial, presented a very interesting question concerning the admissibility of out of court experiments conducted in a criminal trial. In this case, a criminologist, Dr. Kirk, called in behalf of the defendant, Dr. Sheppard, attempted to reproduce the skull of the victim in order to determine the characteristics of blood splattered from impact. In this experiment, a wooden block was taken as approximating the hardness of the skull. A layer of sponge rubber 1/8th inch thick was placed over it, this being about the thickness of the subcutaneous layer of the forehead and scalp. Then a sheet of polyethylene plastic, to simulate the skin, was placed over the sponge rubber. The arrangement, so prepared, was placed on a stool on wrapping paper in order to collect blood splatter. Around the region was built a rectangular wall bearing removable paper strips in order to collect all flying blood on the side and in front of the swing of the object used as a weapon. The objects used as weapons included a small peen hammer, a metal two-cell flashlight with flared rims, an inch thick steel bar 15 inches long, a brass rod 20 inches long, etc. Blood was puddled on top of the plastic cover and such heavy blows were dealt that, at least with one object, the plastic sheet and rubber sponge were cut through to the wood.

¹³⁰ *Ibid.*, at 185; and see note, Experiment Performed in the Absence of Jury, Admissibility of Evidence Concerning, 9 Cinn. L. Rev. 514 (1935).

¹³¹ 79 Ohio L. Abs. 361, 155 N. E. 2d 726 (1958); *Wood v. General Electric Co.*, 159 Ohio St. 273, 112 N. E. 2d 8 (1953).

¹³² 100 Ohio App. 399, 128 N. E. 2d 504, *dism.* for want of a debatable question, 164 Ohio St. 428, 131 N. E. 2d 837 (1955).

Presiding Judge Kovachy, commenting on the admissibility of the Dr. Kirk experiment, stated:

Experiments to be admissible as evidence must be performed with identical and substantially similar equipment and under conditions closely approximating those existing at the time of the occurrence being investigated . . . The most important, the head of the victim, was attempted to be simulated by a contraption, conjured up by Dr. Kirk without any scientific correlation to the original body whatever.¹³³

Conclusion

Perhaps the greatest insight into what not to do (or what to do) in conducting experiments can best be gained by a thorough reading of the various decisions.

The largest number of decisions rejecting the results of experiments were based on the lack of the element of "substantial similarity." However, the burden of the trial lawyer has been eased by decisions reducing the requirement of "identical similarity" to that of "substantial similarity."

It is the duty of the trial lawyer, in preparation of his lawsuit, to conduct experiments under conditions as similar as possible to the conditions existing at the time under inquiry.

The condition attempted to be duplicated may include climate, time, machinery used, speed, etc., just to mention a few. In addition to the requirement of similarity, the trial lawyer must also consider the "mental attitude" of the lay witness or of the expert conducting the experiment.

In the purely scientific experiment, involving the laws of science rather than a variable human factor, the "mental attitude" is of little consequence.

In conducting experiments where the human factor plays an important role, the "mental attitude" of the lay witness or expert is to be considered in framing the circumstances under which the experiment is to be conducted. There appears to be no method available to eradicate the human factor from the conduct of such experiments.

As the experiments mentioned in this article often must be conducted outside of the courtroom because of the size of the machinery involved or the space needed, it is important that the jury be given an insight into the similarity of conditions and the detailed work used in conducting the experiment.

¹³³ *Ibid.*, at 402.

Therefore, by the use of 35 mm. color slides, 8 or 16 mm. film, descriptive charts, and other media available for impressing the jury by sight accompanied by the oral testimony of the lay witness or expert, the story of the experiment may be readily conveyed to the jury.

Modern advocacy methods, of course, are part of the trial lawyer's practice. By the use of visual aids a more convincing story concerning the experiment may be brought to the courtroom.