WASHINGTON UNIVERSITY
LAW QUARTERLY

Volume 1956 February 1956 Number 1

DEMONSTRATIVE EVIDENCE AND EXPERT OPINION

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Demonstrative evidence has become the fashion of today in the trial of cases. The subject has reached epidemic proportions, and modern trials include this magic method of persuasion as one of the best gadgets yet devised to obtain jury verdicts and to aid the court in understanding the full meaning of factual and scientific evidence. The emphasis upon demonstrative evidence is a part of the times even though it has been used in one form or another as long as there have been court trials.

Even in biblical times Solomon the Wise resorted to demonstrative evidence when called upon to decide which of two women was the mother of an infant child. When he proposed to cut the child in half and give half to each, the human instinct of the true mother readily demonstrated the one to whom the child belonged, for she asked that the other woman be given the child.

People are pictorial-minded today. With television in almost every home, color pictures covering the pages of almost every magazine as a part of advertising or as illustration for articles, with the use of diagrams and graphs to explain the news and economic trends, and with a blackboard in every classroom of our schools, it is not surprising that similar devices have become commonly employed to make the triers of fact better understand the meaning of testimony and thus to aid in the determination of the controverted issues of a lawsuit. The use of charts and other visual aids as a teaching procedure by the armed forces has added its part to the new look in the presentation of evidence and testimony. With everyone else making use of pictorial and other visual aids in the development of ideas, why shouldn't lawyers make greater use of demonstrative evidence in the preparation and presentation of proof so that jurors drawn from a visual-minded public will be able to understand the problems they are to

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decide and to evaluate more accurately the testimony of witnesses who are sometimes not too articulate in relating the facts which they have perceived or in expressing opinions which they have formed and are authorized to make.

The use of the many new devices and techniques employed in trials today may be looked upon critically by some because of the chance of abuse and unfair practice.[1] The fact that demonstrative evidence may make a strong impression upon the triers of fact which may prejudice the adverse party is not a ground for objecting to it if the evidence offered is relevant to the issue in dispute and serves a useful purpose in helping the judge or jury understand the facts as they are.[2] There is no older form of evidence than real evidence, and the subject is given extensive treatment in the earlier digests and treatises.[3] In damage suits for breach of a contract where merchandise was sold by sample it has always been the common practice to introduce in evidence the sample and a representative portion of the goods delivered under the sale so that the jury can decide by observation and comparison whether the merchandise furnished corresponds with the sample.[4] In a paternity proceeding to determine who is the father of an illegitimate child it is not uncommon to exhibit the child to the jurors so that they can compare his appearance with the appearance of the alleged father, if the child is mature enough to have developed physical characteristics which disclose a hereditary resemblance.[5] For the purpose of identifying an accused person as the one who committed the crime, he may be asked to stand up in the courtroom, to try on wearing apparel to see whether it fits, or to do other acts to enable the jury to determine whether prosecuting witnesses are correct in their identification.[6] It is an old story that in a personal injury suit the

1. Bunge, *Demonstrative Evidence—A Grandstand Play?* 42 ILL. B.J. 72 (1953); Dooley, *Demonstrative Evidence—Nothing New*, 42 ILL. B.J. 136 (1953); Hinshaw, *Use and Abuse of Demonstrative Evidence: The Art of Jury Persuasion*, 40 A.B.A.J. 479 (1954).

2. State v. Beckwith, 243 Iowa 841, 53 N.W.2d 867 (1952); State v. Wieners, 66 Mo. 13 (1877) (Where bones of deceased were admitted as evidence, the court held a party cannot, upon the ground that it may harrow up feelings of indignation against him in the breasts of the jury, have competent evidence excluded from its consideration.).

3. THAYER, PRELIMINARY TREATISE ON EVIDENCE AT THE COMMON LAW 277-313 (1898); 1 GREENLEAF, EVIDENCE 13-15 (15th ed. 1892); 1 BENTHAM, RATIONALE OF JUDICIAL EVIDENCE 401-05 (1827).

4. St. Louis Paper-Box Co. v. J. C. Hubinger Bros. Co., 100 Fed. 595 (2d Cir. 1900).

5. State *ex rel.* Feagins v. Conn, 160 Kan. 370, 162 P.2d 76 (1945).

6. Holt v. United States, 218 U.S. 245 (1910); Richardson v. State, 168 Miss. 788, 151 So. 910 (1934); State v. Bazemore, 193 N.C. 336, 137 S.E. 172 (1927). The Missouri Constitution provides in Article I, Section 19 that "no person shall be compelled to testify against himself in a criminal cause. . . ." This provision has not been construed as being limited to compulsory testimonial disclosure; rather, the court has stated that it also prohibits any disclosure in which the accused is compelled to participate, such as compulsory furnishing of clues. State v. Sexton, 147 Mo. 89, 48 S.W. 452 (1898). In this case the accused gave his shoes

plaintiff's attorney asked the party-witness to show the jury how high he could raise his arm since the accident occurred. The witness thereupon raised his arm some distance below the height of his shoulder, but when opposing counsel on cross-examination asked the witness to show how high he could raise his arm before the accident the witness raised his arm high above his head. In the case of *Woodward & Lothrop v. Heed*,[7] the plaintiff sued a department store for breach of an implied warranty in the sale of a muskrat fur coat. She complained that the fur had worn off around the neck, down the front, and at the ends of the sleeves; the defendant contended that the fur had not worn off, but merely had become matted down and needed brushing. In the trial for the return of the purchase price, the defendant produced two expert witnesses who were fur buyers who testified that the fur was matted down but was not worn off. The plaintiff introduced the coat itself in evidence. The defendant urged that the failure to meet expert testimony with evidence of a like character entitled him to a directed verdict. The case, however, was submitted to the jury which, from its own inspection of the coat and the testimony of the plaintiff, returned a verdict in plaintiff's favor. In affirming the case on appeal the court quoted from the North Dakota decision of *Reid v. Ehr* in which the court said "the physical facts speak louder than the testimony of the experts. . . . The jury must have disbelieved the testimony of the experts, and this they did have a right to do. . . ."[8] This case was of a kind in which expert testimony was admissible to assist the jury, but a decision of fact was not dependent upon it. The case is illustrative of the many instances where the thing itself is the subject of legal inquiry and is regularly admitted as real evidence for its evidential value.[9] The almost endless number of exhibits constantly used in the

to the sheriff voluntarily, and they were matched against footprints found at the scene of the crime. The evidence was held admissible since the accused's action was voluntary. In State v. Horton, 247 Mo. 657, 663, 153 S.W. 1051, 1053 (1913), the court stated that evidence obtained in a physical examination to which an accused did not consent would be inadmissible. Although there is strong language in the Missouri cases which exclude compelled evidence that is not testimonial in character, it is doubted that the Missouri Supreme Court would follow their ruling in all situations. To do so would eliminate much fingerprint testimony and other demonstrative evidence regularly used in courts elsewhere. Both the MODEL CODE OF EVIDENCE rule 205 (1942) and the UNIFORM RULES OF EVIDENCE rules 23-25 take positions squarely opposed to at least the dictum statements of the Missouri court. See 8 WIGMORE, EVIDENCE §§ 2250-52, 2265 (3d ed. 1940). For extensive discussion of this problem, see INBAU, SELF INCRIMINATION—WHAT CAN AN ACCUSED PERSON BE COMPELLED TO DO? (1950); Ladd & Gibson, *The Medico-Legal Aspects of the Blood Test to Determine Intoxication*, 24 IOWA L. REV. 191 (1939).

7. 44 A.2d 369 (D.C. Munic. Ct. App. 1945).

8. 43 N.D. 109, 112, 174 N.W. 71, 72 (1919).

9. 1 HALE, PLEAS OF THE CROWN *635 (1847) (exhibition of a rupture as a defense in a prosecution for rape); State v. Phillips, 212 Iowa 1332, 236 N.W. 104 (1931) (production of whiskey bottles and their contents to be looked at, smelled, and tasted by the jurors); People v. Herk, 179 Misc. 450, 39 N.Y.S.2d 246 (Sup. Ct. 1942) (viewing of an allegedly lewd show by court and jury); Gabarsky v. Simkin, 36 Misc. 195, 73 N.Y. Supp. 199 (Sup. Ct. 1901) (exhibition to show age).

trial of cases, including weapons, clothing, stolen property found in the possession of the accused, photographs, plats, maps, diagrams, charts, models, handwriting and fingerprints (with their standards for comparison), and documentary evidence, along with the right to view the premises in cases where observation by the triers of fact serves as an aid to the understanding and decision of the issues, indicates clearly that there is nothing novel in the use of real evidence, although with the progress of science and the improvement of the processes for obtaining demonstrative evidence there are many new methods of utilizing the old and accepted rules of evidence. There is surely nothing startling about the provisions of the Model Code of Evidence or the Uniform Rules of Evidence in providing for the admissibility of models, plats, and other demonstrative evidence.[10]

Much demonstrative evidence has no relationship to expert testimony, but a large amount of it is used to explain the basis of the expert's opinion and to enable the jury to understand scientific matter otherwise difficult to comprehend or evaluate. There is much criticism of medical experts because of their use of technical language and their inability to translate their thinking into language which the jury can understand. The use of a model, a picture, a diagram, or an X-ray film presented in such a manner that the jury may visualize the thing about which the expert is testifying will often enable the jurors to understand so that they may draw their own conclusion in accordance with the opinions expressed by the experts. It is the function of the jury to make the decisions upon the ultimate questions of fact raised by the legal issues of the case. The forward-looking view of the law of evidence permits the expert to express his opinion upon the same ultimate issues, but the jury is not compelled to accept the expert's view upon the ultimate facts in issue.[11] The blind acceptance of a conclusion simply because an expert with profound learning and exceptional qualifications has expressed it is both unlikely and unexpected in our system of trials. The basic justification for the departure from the earlier rule which denied experts the right to express their opinion upon ultimate facts is that although the expert may express such an opinion the jury is not compelled to follow it and must, furthermore, rely upon its own determination of the final conclusions to be drawn. The jurors might conclude that the expert

10. The MODEL CODE OF EVIDENCE rule 105(j) (1942) provides for the use of models and for other understandable means of communication to demonstrate evidence given in the trial. The UNIFORM RULES OF EVIDENCE rule 1(2) assumes that such use may be made by its definition of relevant evidence.

11. Mutual Benefit Health & Acc. Ass'n v. Francis, 148 F.2d 590 (8th Cir. 1945); Cropper v. Titanium Pigment Co., 47 F.2d 1038 (8th Cir. 1931); Grismore v. Consolidated Products Co., 232 Iowa 328, 5 N.W.2d 646 (1942); Annot., 78 A.L.R. 755 (1932); MODEL CODE OF EVIDENCE rule 401(1) (1942); UNIFORM RULES OF EVIDENCE rule 56(4).

has had years of training in the subject, that he is thoroughly familiar with the basic facts, and that therefore his opinion should become their own opinion even though they do not understand the reasoning which led the expert to his conclusion. It is not believed that juries generally decide cases this way, although there is no way to know just what causes jurors to reach a decision. Competent attorneys use great care in qualifying expert witnesses, not only to establish their competency as experts but also to impress the jury with the reliability of their opinions. This is an important part of the technique of trial. Nevertheless, however respectful the jurors may be of the capability of the expert, his testimony will have but little convincing force if they are not able to understand and accept the reasoning which led him to the conclusions expressed. The greatest difficulty arises when experts having substantially equal qualifications express conflicting opinions. Then opinions alone accomplish little and the triers of fact must be made to understand the reasoning of the expert and its application to the precise issue to be decided.

In many cases, demonstrative proof may be essential to enable the expert to express his opinion. This is true where X-ray films are used or in the case of fingerprint and handwriting testimony. There are other cases, however, in which the testimony could be totally verbal or could be implemented by the use of models, drawings, and illustrations which would visually show to the jury those facts which would escape its understanding when told by words alone.

The use of demonstrative evidence may help eliminate the ineffectiveness of expert opinion presented through elongated hypothetical questions which are often hard for the attorneys to state, for the witnesses to understand, and for the jury to use. The hypothetical question is undoubtedly necessary where experts are used who have no personal knowledge of the facts about which expert opinion is to be expressed.[12] In such situations the expert's opinion is tested by counter-questions either eliminating some of the assumed facts when their existence is questioned, or by assuming different facts from the evidence which is in conflict, or by the inclusion of additional facts which would change the opinion based upon the hypothetical assumptions. The linguistic ritual employed in obtaining expert opinion through hypothetical questions does not provide a realistic way to help the triers of fact to obtain an understanding necessary for a proper solution of the issues. There is a rather strong effort upon the part of attorneys to get away from extensive use of the hypothetical question when the expert has personal knowledge of the facts upon which his

12. De Donato v. Wells, 328 Mo. 448, 41 S.W.2d 184 (1931); 2 WIGMORE, EVIDENCE §§ 676-78 (3d ed. 1940); ROGERS, EXPERT TESTIMONY § 48 (3d ed. 1941); Ladd, *Expert Testimony*, 5 VAND. L. REV. 414, 425-27 (1952).

opinion is expressed. While under our present system of using expert testimony the hypothetical question may be necessary, the substitution of demonstrative evidence may provide a solution in many cases which will enable the jury to understand intelligently the validity of the expert's opinion. The ingenuity of the lawyers and the experts in creating devices through which expert opinion may be better understood may be a costly procedure in the preparation for trial, but efforts toward a greater use of demonstrative evidence should bear fruit in the results of fact-finding decisions.

Scope of Expert Testimony—How Challenged

There are many factual situations arising in trials in which the line for determining whether expert testimony may or may not be used is very narrow. While expressed in varying terminology, the substance of the test for determining when experts may be used is the common-sense inquiry whether untrained laymen would be qualified to determine intelligently and to the highest possible degree the particular issue without enlightenment from those having a specialized understanding of the subject involved in the dispute.[13] An interesting illustration of this problem is found in the cases in which highway patrolmen, who have gone to schools to study traffic accidents and have had a great deal of experience in the observation of accidents and determination of their causes based on a knowledge of the physical facts, are offered as expert witnesses. Any juror is able to draw inferences from the facts and formulate an idea as to how an accident occurred, and different deductions from the facts may be presented in argument by counsel. Nevertheless there is a tendency in this and similar areas to admit the testimony of specially qualified persons, and to allow them to express their opinion upon these matters as an aid to the jury for its better determination of the ultimate issues.

A recent Missouri case held that an experienced patrolman could not give his opinion as to the point of impact of two cars based upon his observation of the vehicles and the debris which had fallen from the cars as a result of the crash.[14] The officer had related the facts showing the location of the debris, but it was held that the evidential value of the location of the debris falling from the two vehicles was a matter for the jury to determine and was not a proper subject for expert testimony. The reason given was that such opinion evidence invaded the province of the jury and was therefore incompetent.

In a Minnesota case, a deputy sheriff who had investigated many automobile accidents was asked to express his opinion as to the place

13. Manhattan Oil Co. v. Mosby, 72 F.2d 840 (8th Cir. 1934); United States Smelting Co. v. Parry, 166 Fed. 407 (8th Cir. 1909).
14. Hamre v. Conger, 357 Mo. 497, 209 S.W.2d 242 (1948).

of impact, based upon his observations of the tracks of the cars and the position of the automobiles after the accident.[15] Objection was urged on the ground that the question called for the conclusion of the witness based on speculation and conjecture, and that it invaded the province of the jury. The objection was overruled, and the opinion was expressed that the accident had happened in the northern half of the highway. The officer also was permitted to demonstrate with the use of model cars his explanation of how the accident occurred. On appeal the case was reversed. After reviewing many cases, the court considered the evidence given by the officer as not a proper subject for expert opinion and as having sufficient weight with the jury to be a determining factor in bringing about the verdict. A California appeals court reached a contrary conclusion when a traffic officer who had investigated accidents for many years was permitted to express his opinion as to the place of impact of colliding cars coming in opposite directions after he had related the facts, based upon personal observation, showing the position of the cars and their appearance when he arrived at the scene of the accident about five minutes after it had occurred.[16] In another Minnesota case expert testimony was admitted where evidence of lay witnesses was in conflict as to whether the defendant's truck was standing still at the time of the accident.[17] Photographs were introduced as demonstrative evidence showing the condition of the vehicles. An expert witness, who was a mechanic and had supervised the repair of wrecked automobiles for a long period of time, was permitted to express his opinion that the truck involved in the collision was standing still at the time of impact because of the absence of side-swipe marks upon it. He reasoned that if the truck had been moving any impact would have extended laterally along the side of the truck. It would seem that this testimony required no greater scientific knowledge than is needed in the case in which the location of the cars involved in an accident is determined from the position of the debris.

A most interesting decision upon this subject is the federal case of *Een v. Consolidated Freightways.*[18] A deputy sheriff with seventeen years of experience in investigating accidents as a law enforcement officer arrived at the scene of an accident an hour after its occurrence, but before the damaged vehicles had been moved from the position in which they had come to rest after the impact. Defense counsel, after laying a foundation showing the sheriff's experience and personal observations from the scene of the accident, asked the officer if he had

15. Beckman v. Schroeder, 224 Minn. 370, 28 N.W.2d 629 (1947).
16. Zelayeta v. Pacific Greyhound Lines Inc., 104 Cal. App. 2d 716, 232 P.2d 572 (1951).
17. Woyak v. Konieske, 237 Minn. 213, 54 N.W.2d 649 (1952).
18. 120 F. Supp. 289 (D.N.D. 1954).

formed an opinion as to where the impact had occurred. Upon answering in the affirmative, he was then asked to express his opinion. The plaintiff's counsel objected on the grounds that the question was "incompetent, irrelevant and immaterial, calling for speculation, guess and conjecture, invading the province of the jury and called for a conclusion."[19] The objection was overruled, and the officer was permitted to give his opinion that the accident had happened in the left lane of traffic. Judge Vogel of the United States District Court for North Dakota, in an ably written opinion, discussed at length the question of whether the point of collision upon a highway is properly the subject of expert testimony by a witness who personally observed the scene of the collision after its occurrence. In the case, counsel had urged conflicting inferences from the same physical facts, and also had contended that the jury was as capable of drawing the inference as the expert. The court stated:

> It would seem, therefore, that this is not a case where the conclusion as to where the collision occurred is so obvious that any reasonable person, trained or not, could easily draw the inference. Rather, it would seem to be a case where trained experts in the field would be of considerable assistance to the jurors in arriving at their conclusions.
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> Modern legal thinking indicates quite clearly that the rule excluding opinion evidence is to be applied sparingly, if at all, so that the jury may have all evidence that may aid them in their determination of the facts.[20]

The court took the view that although the jurors might be able to draw inferences from the facts presented in evidence and were ultimately required to do so, nevertheless a witness having extensive experience in observing similar occurrences ought to be able to express his opinion upon the facts for whatever aid it might be to the jurors in formulating their own conclusions.

On appeal to the circuit court another interesting and informative opinion was written affirming the decision.[21] It is sometimes said, whether accurately or not, that when an appellate court is reluctant to consider a problem and yet is satisfied with the conclusions reached, the court may search for some other means of resolving the issue. Whether that observation is applicable here or whether the opinion reflects the astuteness of a very able judge, Chief Judge Gardener resolved the appeal by holding that a proper specific objection had not been urged by plaintiff's counsel to raise the issue.

This opinion is important upon the question of proper trial techniques in raising the issue of whether a matter is within the scope of

19. *Id.* at 291.
20. *Id.* at 293.
21. Een v. Consolidated Freightways, 220 F.2d 82 (8th Cir. 1955).

expert testimony. The objection urged in the trial court, as quoted previously, was sufficient to cause the trial court to know that counsel had challenged the question as raising matter not subject to expert testimony, for otherwise the trial judge would not have written the opinion which he did. Counsel asserted that the question called for the conclusion of the witness, and that it invaded the province of the jury. He further claimed that the question asked would result in speculation, guess, and conjecture. He threw in for good measure the general objection that the question called for incompetent, irrelevant, and immaterial evidence. This objection was sufficient to enable the trial judge to see what the issue was, and he proceeded to consider the question of whether expert testimony could be given upon the subject of the point of impact from the position of the cars after the accident. Did such opinion invade the province of the jury? Did the question call for an opinion on a factual issue upon which the jury alone could draw the inferences? Whether the language of the objection as urged raised this issue or not, it awakened the trial judge to the problem and he proceeded to decide it on that ground. On appeal, however, with technical refinement, and observing the well-established rule that for review upon appeal counsel must have made the proper specific objection in the trial court, the Chief Judge held that the objections which were urged were without merit. He stated:

> No question is raised as to the qualification of the witness. Neither is any question raised by the objection that the question propounded was not a proper subject for expert testimony.
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> It is essential to a review of a ruling on the admissibility of evidence that a specific objection be made in the trial court sharply calling the ground relied upon to the attention of the court and on appeal the objection interposed must be relied upon.
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> . . .
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> Quite aside from this, however, we are of the view that on the state of the evidence in the record the verdict of the jury was clearly correct.[22]

While the appeal opinion in the *Een* case may appear to be overly technical, it is perhaps logically sound and serves as a warning for attorneys to use great care in urging the proper objection to a question calling for the opinion of a witness when it is claimed that the matter in inquiry is not a proper subject for expert testimony. Just what should this objection be? It would appear not to be that the witness has not qualified as an expert, because in many instances the witness will be highly qualified as an expert. He might be an engineer with many years of experience and training in the type of subject matter

22. *Id.* at 87-88.

in issue. Some highway patrolmen attend traffic schools and have had an abundance of experience which should enable them to have much more knowledge and understanding of the subject matter involved than the ordinary person. While it is always necessary to give foundation testimony qualifying the expert, there was no absence of this in the *Een* case. The proper objection to raise the issue is simply that the subject matter of the question was not a proper subject nor within the scope of expert testimony. This surely would be a sufficiently specific objection. However, to play safe in view of the opinion in the *Een* case, it might be well to add that neither this witness nor any other witness could qualify as an expert upon the subject matter involved.

It would have been interesting to see what the court of appeals would have done had these specific objections been urged. The court would have had to decide the real problem in the case. The court might have said it was error without prejudice, but that would have been contrary to the Minnesota case where the trial court's admission of expert testimony on this subject was reversed because such proof could have had great weight with the jury.[23] What the decision would have been is of course speculative, but it may be that the decision upon the technical issue relating to the specific objection permitted the appellate court to uphold the admission of evidence otherwise regarded as proper.

The areas in which there is a close question of whether expert opinion along with demonstrative evidence may be used to assist the jurors in drawing conclusions which they otherwise could make themselves extend into the whole field of tort liability.[24] The tendency in the past has been to exclude expert opinion, and to let physical facts and demonstrative proofs speak for themselves. Gradually, with improvement of objective aids and the growth of scientific understanding, this tendency is in the process of change. Whereas far greater use is now being made of demonstrative evidence in tort cases, the expansion of expert testimony in respect to demonstrative evidence has moved at a slower pace. Its future depends upon the degree to which specially trained and experienced persons can reliably give additional light so as to enable the jury to evaluate more accurately the significance of facts.

USE OF DEMONSTRATIVE EVIDENCE—COMPARISON AND INTERPRETATION

Much demonstrative evidence used in connection with expert testimony is for purposes of comparison and interpretation. This is most

23. See note 17 *supra*.
24. Morris, *The Role of Expert Testimony in the Trial of Negligence Issues*, 26 TEXAS L. REV. 1 (1947).

commonly used in the identification cases involving fingerprints,[25] moulage castings,[26] and ballistics,[27] and in the forgery cases involving handwriting.[28] The pattern for the introduction of exhibits and for questioning of the experts in all of these cases is much the same. Through known exhibits representing standards of comparison, questioned writings or imprints are examined for the purpose of identification of the two as the same or to distinguish them if not the same. Often photography plays an important part in this type of evidence, and through a process of enlargement the identifying elements are made more apparent to the triers of fact who can see for themselves the basis of the experts' opinion and formulate an opinion of their own in accord with it. Effective use of this type of evidence involves skill in obtaining and processing the exhibits, careful technique upon the part of counsel in their introduction, and clarity of the expert witness in pointing out the elements which form the basis of his opinion. The principles of law affecting the use of this type of testimony are pretty well settled, but the techniques and methods of using the law have progressed rapidly with the development of science.

Often, the question of the use of these exhibits involves the problem of expressing an opinion in the terms of the ultimate fact. In the fingerprint cases the ultimate issue for the jury to decide is the identity of the person. In the forgery cases the controversy is whether a questioned writing was or was not written by the defendant. In an Iowa case the trial court was reversed because the witness was permitted to testify that the two fingerprints were the prints of the same person.[29] It was held that this was an issue to be decided by the jury and that a more roundabout method should have been used to question the expert witness. Just what this method should have been is hard to determine because the ultimate issue and the subject matter of expert testimony were identical. A question could perhaps have been more adroitly put through hypothetical formulation asking indefinitely the question as to whether fingerprints generally similar to those indicated by the two exhibits would have been made by the same person, and if

25. In a criminal case photographs of fingerprints found at the scene of the crime are admissible in evidence for comparison with the fingerprints of the accused or with enlarged photographs of his fingerprints. Duree v. United States, 297 Fed. 70 (8th Cir. 1924); State v. Richetti, 342 Mo. 1015, 119 S.W.2d 330 (1938).

26. Nebergall, *Moulage*, in ELEMENTS OF POLICE SCIENCE c. VII (Perkins ed. 1942).

27. State v. Campbell, 213 Iowa 677, 239 N.W. 715 (1931) (expert witness used photographs of two bullets to explain his conclusion that they had been fired from the same gun). 2 WIGMORE, EVIDENCE §§ 410-11, 417a (3d ed. 1940).

28. "By suitable photographs the genuineness or spuriousness of handwriting alleged to have been forged and the authorship of anonymous handwriting often can be demonstrated conclusively to judge and jury." SCOTT, PHOTOGRAPHIC EVIDENCE § 401 (1942).

29. State v. Steffen, 210 Iowa 196, 230 N.W. 536 (1930).

an affirmative answer had been given then the jury could have inferred the conclusion which was given by the witness.

The Iowa court later expressly overruled this opinion[30] and many others like it by saying that there was no objection to allowing an expert witness to express his opinion upon an ultimate fact, because the jurors are at liberty to accept or reject the expert opinion. These two cases point up the importance of skill in questioning a witness upon comparative evidence. The opinion would mean very little, either on the point of identity or difference, were it not brought home to the triers of fact so that they could see with their own eyes the common points of identity in the two exhibits being compared which caused the expert to arrive at his conclusion. The statement "seeing is believing" is never more true than in the courtroom where demonstrative evidence is used. In the fingerprint cases, by use of enlarged photographs of the print the expert points out the various features of the papillary ridges showing abrupt endings, bifurcations, islands, dots, whirls, and other characteristics setting in the same relationship to each other on the questioned print as on the standard of comparison. In this way the jurors can say that the opinion of the expert is their opinion also, not just because he expressed it, but because he demonstrated it to them. Indeed, fingerprint testimony, if the questioned print is reasonably clear, could almost be regarded as a statement of the fact of identity rather than mere opinion.[31]

The use of moulage castings has almost the same force as fingerprint testimony because when they are enlarged through photography the identifying characteristics reveal themselves with a clarity which gives almost complete understanding without need of opinion, although of course the opinion is expressed.[32] The same is true in the matching of wood, such as in the Lindbergh kidnapping case where the splintered ends of a broken board fitted together so perfectly that there was no question but that the two pieces were a part of one board.[33] The use of ballistics is a scientific development by which the imperfections and variations in the barrel of a firearm that become engrained in the softer substance of the bullet as it is discharged from the weapon can be observed. It may be said that each firearm has a "personality" all its own. With the development of the science of photography the grooves or markings upon a bullet become apparent and afford the basis of an inference that the bullet in question came from the same barrel as that from which the standard for comparison

30. Grismore v. Consolidated Products Co., 232 Iowa 328, 362, 5 N.W.2d 646, 663 (1942).

31. See People v. Jennings, 252 Ill. 534, 96 N.E. 1077 (1911); State v. Kuhl, 42 Nev. 185, 175 Pac. 190 (1918); UNDERHILL, CRIMINAL EVIDENCE §§ 870-73 (4th ed. 1935).

32. See note 26 *supra*.

33. State v. Hauptman, 115 N.J.L. 412, 180 Atl. 809 (Ct. Err. & App. 1935).

was fired.[34] Comparative typewriting involves the same principle.[35] Experts simply aid the jury in seeing what is already there, usually accompanied by an opinion expressing the result of their observations.

While the characteristics of handwriting may be less pronounced in some cases than in the types of comparative evidence mentioned above, the process of proof and demonstration is much the same.

Photographic enlargements bring out the characteristics of forged writing and show the fuzzy edges, the hesitations, and the irregularities of tracing. Expertness in handwriting has become highly developed, but still has not received the judicial recognition which might properly be accorded to it.[36] The success of the handwriting expert therefore is dependent upon the degree to which the expert can demonstrate the correctness of the conclusion by pointing out upon the exhibits being compared the peculiarities in the formulation of letters, the spacing between them, the slant of the writing, and other distinguishing observations. The opinion of the handwriting expert and its influence upon a jury is believed to be negligible when compared to the effect of pointing out to the jury the things taken into account as indicated upon demonstrative exhibits through which the expert has formed his opinion.

The use of an X-ray film or a skiagram affords the best illustration of interpretation as distinguished from comparison. The film is the very basis upon which the expert makes a diagnosis or prognosis. It is technically not a picture, but is a record of the penetration of the rays which discloses the densities and soft substances. The light portions of the film show the absence of penetration and the darker portions or shadows record the varying degrees of completeness of the penetration. Thus, for example, if there has been a complete union of a bone fracture, there will be little, if any, variation in the light area of the bone structure, but if the union is not complete, the X-ray will penetrate through the unsolid portion and will appear as a shadow on the

34. State v. Campbell, 213 Iowa 677, 239 N.W. 715 (1931).

35. State v. Freshwater, 30 Utah 442, 85 Pac. 447 (1906) (competent for an expert to testify that a comparison of the letters, defendant's typewritten affidavits, and the work done on a certain machine indicated, because of defects in type, alignment, and spacing, that the letters and affidavits were written on the machine in question). In People v. Storrs, 207 N.Y. 147, 154, 100 N.E. 730, 732 (1912), the court of appeals said,

> Inasmuch as its work affords the readiest means of identification, no valid reason is perceived why admitted or established samples of that work should not be received in evidence for purposes of comparison with other typewritten matter alleged to have been produced upon the same machine.

See also OSBORN, QUESTIONED DOCUMENT PROBLEMS c. XVIII (4th ed. 1944).

36. OSBORN, QUESTIONED DOCUMENT PROBLEMS c. XLIV (4th ed. 1944). On the value of opinion testimony of handwriting experts that a document is not genuine opposed to testimony of persons claiming to be attesting witnesses, see Young Estate, 347 Pa. 457, 32 A.2d 901, 154 A.L.R. 643 (1943). See also Note, *Instruction to the Jury Where Handwriting Is Identified by Expert Testimony*, 7 IOWA L. BULL. 55 (1922).

film. The variation between light and shadows may be comparatively slight but may still have significant meaning to the medical expert. Therefore the use of an X-ray film for demonstrative purposes must be accompanied by the testimony of an expert. It is ordinarily worthless without expert testimony. However, in one case which involved the question of the curvature of the spine the court took the position that the film exhibit spoke for itself and questioned the need of expert opinion.[37] The interpretation of a skiagram is not so obvious, and expert opinion is not only admissible but is required for interpretation.[38] In order to show the existence of severity of a fracture shortly after its occurrence, the X-ray film as demonstrative evidence is perhaps more effective than any other type of proof because the broken portions of the bone stand in a clear relief which a jury may easily understand and consider in determining the amount of damages. The use of a skiagram with the light back of it to make the exposures apparent enables the jury to see visually the various factors upon which the expert bases his opinion. While the jurors must rely upon the opinion of the expert as to what significance they may give to varying degrees of lights and shadows, their visual observation is an influential factor in evaluating the opinion of the expert. There may be a photographic reproduction of an X-ray film but this is less satisfactory as a means of demonstrative presentation. Also it is possible to make a slide through photographing the X-ray film for projection of the film on a screen. The film itself is ordinarily better for interpretative purposes because much detail is often lost in other reproductions. It is desirable ordinarily to have several films representing the different angles of exposures in order to get the true exhibition of the condition of a patient. The introduction of X-ray films and the interpretation of them should be a slow, careful process in the trial of a case. After qualification of the expert, foundation testimony showing what an X-ray is and what it does should be given by the expert. The film must be connected through proper identification so as to leave no doubt that it belongs to the right party. The film exhibit is offered in evidence as are other exhibits. While there is nothing unique about the use of X-ray films and expert opinion explaining them, it affords one of the best examples of the use of demonstrative interpretative evidence.

PHOTOGRAPHS, MODELS, AND BLACKBOARDS

The trial of a damage suit, whether it be for injury to person or destruction of property, is hardly complete today without an abundance of photographs. Mr. Hinshaw, in an article in the American Bar

37. Lang v. Marshalltown Light, Power & Ry. Co., 185 Iowa 940, 170 N.W. 463 (1919).

38. Appleby v. Cass, 211 Iowa 1145, 234 N.W. 477 (1931). See SCOTT, PHOTOGRAPHIC EVIDENCE § 804 (1942); 3 WIGMORE, EVIDENCE § 795 (3d ed. 1940).

Association Journal, suggests the possible use of as many as twelve copies of each photograph so that each of the jurors may have a copy of the exhibit to examine during argument of counsel.[39] All treatises on the subject of evidence deal with the subject of photographs, and the ably-prepared book by Charles C. Scott[40] on photographic evidence along with the emphasis upon the subject in Melvin M. Belli's *Modern Trials*[41] indicates the extensive use of pictorial evidence today. The danger of trick photography to produce the kind of evidence which will best serve the party offering it has not precluded the use of proper photography any more than the danger of perjury has prevented testimonial evidence generally. These dangers are very real, however, and may give an erroneous indication of distance or size, or produce other exaggerations which destroy the true representation of the subject matter of the photograph. In such cases an expert in photography may be necessary to expose the distortion. Nevertheless, it is not necessary to have an expert in photography for the introduction of photographic exhibits. A witness having personal knowledge of the object photographed can testify that the exhibit is a fair and accurate representation of what he has seen.[42] Also, there is nothing wrong in the use of color photographs when they fairly represent the subject photographed, both as to form and color.[43] Motion pictures have been less extensively used, but what could better indicate the sobriety or drunkenness of one charged with driving while intoxicated than a motion picture disclosing his demeanor and conduct shortly after arrest. An audio-visual presentation of the taking of a confession would likewise be significant upon the question of whether it was voluntarily made.[44]

Medical photography has been highly developed for use by doctors, and it likewise serves a valuable purpose in litigation.[45]

39. Hinshaw, *Use and Abuse of Demonstrative Evidence: The Art of Jury Persuasion*, 40 A.B.A.J. 479, 481 (1954).

40. SCOTT, PHOTOGRAPHIC EVIDENCE (1942).

41. 2 BELLI, MODERN TRIALS (1954).

42. New York, S. & W.R.R. v. Moore, 105 Fed. 725 (2d Cir. 1901); Huntington Light & Fuel Co. v. Beaver, 37 Ind. App. 4, 73 N.E. 1002 (1905).

43. Green v. Denver, 111 Colo. 390, 142 P.2d 277 (1943); State v. Long, 195 Ore. 81, 244 P.2d 1033 (1952).

44. Heiman v. Market Street Ry., 21 Cal. App. 2d 311, 69 P.2d 178 (1937) (movie taken of plaintiff admitted to show extent of her injuries); Philippi v. New York, C. & St. L.R.R., 136 S.W.2d 339 (Mo. App. 1940) (motion pictures taken of reconstruction of truck-train collision); Commonwealth v. Roller, 13 Pa. D. & C. 332 (1930), *aff'd*, 100 Pa. Super. 125 (1930) (talking motion picture taken of confession of accused in criminal case). See Sweet, *The Motion Picture as a Fraud Detector*, 21 A.B.A.J. 653 (1935).

45. See Kent, *Medical Photography in a Teaching Hospital*, 23 MEDICAL RADIOGRAPHY AND PHOTOGRAPHY 13 (1947). Mr. Kent has spent more than twenty-five years as photographer for the State University of Iowa devoting a large amount of his time to technical-medical photography. This journal is published by the Eastman Kodak Company, Rochester, New York, and is devoted to photography as connected with medicine. This publication contains extensive illustrative material of a scientific character and has very valuable reference material for the use of scientific photography.

For the most part, the use of photography in the courts is not accompanied by expert opinion. Such testimony depends upon whether the object photographed and the subject in inquiry concerned the use of scientific knowledge which will better enable the triers of fact to understand what would otherwise be less apparent without the use of an expert.

In the presentation of photographic evidence there are a few principles essential for admissibility. It must first be shown that the condition of the object photographed was the same at the time the picture was taken as it was at the time the events giving rise to the legal question occurred, or that at the time the photograph was taken the condition was then a proper subject of legal inquiry. This really relates to the problem of relevancy, which is as much present in photographic evidence as in any other kind of evidence. While it may not be necessary that the person who took the photograph appear as a witness, it is surely the better practice to call him as a witness. The test of whether a photograph is a fair and accurate representation and portrays the actual condition of the object photographed is the basis of admissibility, and this may be established by one who has personal knowledge of these facts.[46] Testimony regarding the techniques used in the photography and development of a film are not necessary for admissibility, although it may be very important where distortion is charged. The relationship of photography to expert testimony, other than in challenging the accuracy of the photograph, simply involves the over-all question of whether the object photographed involves the subject of expert testimony.

Models serve a purpose in trials similar to photographs in that they attempt visual demonstration to supplement testimonial evidence. They differ, however, in that they are more in the nature of illustrative proof and are used to explain other evidence, while the photograph represents an actual portrayal of a specified object of evidence.

The use of models assists in almost every area of the law in which physical conditions are involved in expert testimony relating to scientific matters. The engineer, the architect, the chemist, and the medical expert are making increased use of charts, diagrams, models, skeletons, pictures, and exhibits to explain facts, and to demonstrate factors involved in reaching their opinion. The use of such evidence is unlimited. In the medical field a carefully drawn anatomical chart may well illustrate the difference between normal and abnormal conditions, explain the parts of the body, show the nervous and muscular system, the bone structure, and their method of function.[47] The mobility of

46. See cases cited in note 42 *supra*.

47. State v. Knight, 43 Me. 11 (1857). See Lackey v. State, 215 Miss. 57, 60 So. 2d 503 (1952) (anatomical charts used to illustrate medical testimony); Segee v. Cowan, 66 R.I. 445, 20 A.2d 270 (1941) (medical expert testifying in a negli-

the parts of the body may be demonstrated by models which experts have established through testimony as being a fair and accurate representation of the portions of the body involved in medical testimony. If the jury can see models of the skeletal structure, it helps far beyond verbal testimony picturing the same matter. The personal injury lawyer, whether he represents the plaintiff or defendant, may make equal use of such demonstrative evidence to explain, through his experts, the theory employed in diagnosis or to express an opinion upon the prognosis. Human skeletons, bone preparations, and illustrative exhibits are regularly used in the education of medical students, and the medical expert in the courtroom performs a service analogous to that of a teacher in explaining enough to the triers of fact that they may draw their conclusions of cause and effect and the amount of damages sustained in a personal injury case. The jurors must receive scientific information regardless of how difficult it may be for them to understand, if they are to perform with any degree of intelligence the task of rendering a verdict in these cases. While it may be said that courts and juries bring about a rough and ready justice, nevertheless they are called upon to decide scientific issues which they can hardly be expected to comprehend fully without every effort to produce an understanding. Demonstrative medical evidence is the best devised answer to provide this information and to make sense out of the too often learned, technical dissertations given by doctors upon the witness stand.

The lawyer must also educate himself upon the scientific matters involved in the factual determination if he is to perform adequately his service as a lawyer in such cases. Through his education by the doctors in the case and his reading, he should know all there is to be known about the scientific issues involved. While the lawyer thus informed would not be worth much in the treatment of a patient, it is entirely possible for him to become sufficiently expert in the scientific matter involved in the case so that he may examine a witness with telling effect. He is the medium through which scientific evidence is presented by experts, and he must have a detailed understanding if his job is to be well done.

The exhibition of a person disclosing the character of his injury is a proper type of demonstrative evidence in many cases, although it is a subject of much controversy. The question is the extent to which such exhibition will serve to enable the triers of fact to evaluate better the evidence and to understand more fully the issues which they are to decide. Objection is ordinarily raised that the exhibition may enlist the sympathy of the jury; but if it makes a vital contribution to its

gence action may make an illustrative drawing of a fractured tibia to explain his testimony). See also 2 BELLI, MODERN TRIALS § 269 (1954).

understanding, its usefulness should outweigh this danger. Objection is sometimes urged that such evidence may be indecent, but indecency depends upon the purpose of the act and should not preclude a court of justice from admitting the evidence if it serves a worthwhile purpose in the trial.[48]

A good deal of controversy has arisen in the legal profession about the use of blackboards in the courtroom.[49] As demonstrative evidence the blackboard is questionable because it lacks permanency and cannot be preserved as a part of the record on appeal unless the court employs the awkward device of continuously photographing or copying all writings or drawings before erasure is made. Even then, in many cases the film could not be developed in time to permit photographs of what was on the blackboard to be taken into the jury room as exhibits. Diagrams and charts accurately prepared in advance of trial would serve a much more useful purpose if this material meets the admissibility requirements and is used as demonstrative evidence. To connect testimony with markings upon a blackboard made by the witness while testifying would be a difficult task. Even when a plat is used, upon which markings and locations are made by a witness, great care must be taken to identify the different markings by letters or numbers so as to connect up the testimony with the plat. A not too uncommon mistake in the technique of trial occurs when attorneys ask witnesses to make marks upon a plat but do not ask the witness to designate by symbol the different markings so that there is a proper permanent identification. Again, by the time opposing counsel uses the same chart in cross-examination with another set of marks the difficulties are multiplied. When other witnesses use the same chart with their markings and symbols, the chart may become a confused mass, useful to no one.[50] Objection to a blackboard is not because it is novel, but

48. Sullivan v. Minneapolis, St. P. & S. Ste. M. Ry., 55 N.D. 353, 213 N.W. 841 (1927); Dunkin v. City of Hoquiam, 56 Wash. 47, 105 Pac. 149 (1909). *But cf.* State v. Stevens, 133 Iowa 684, 110 N.W. 1037 (1907) (on a charge of rape, the defendant's request to have the jury examine him in a private room was properly refused); Garvik v. Burlington, C.R. & N. Ry., 124 Iowa 691, 100 N.W. 498 (1904) (same); 8 WIGMORE, EVIDENCE § 2180 (3d ed. 1940).

49. Hinshaw, *Use and Abuse of Demonstrative Evidence: The Art of Jury Persuasion*, 40 A.B.A.J. 479, 542 (1954); Dooley, *Demonstrative Evidence—Nothing New*, 42 ILL. B.J. 136, 143 (1953).

50. Sometimes after the attorney for one of the parties has prepared a careful plat and has used it in presenting the testimony of his witnesses, the opposing counsel may attempt to use the same plat for his witnesses, and, in so using it, might make the plat such a jumbled affair that the first party would lose the benefit of all his original efforts. To prevent this, it is suggested that counsel initiating the use of a plat should have duplicate copies without markings, and offer them for use by the opposing counsel. While the matter would rest in the sound discretion of the trial court, it is reasonable to assume that the court will require the use of the independent plat to come in as a separate exhibit. The same situation exists wherever markings are to be made in court upon exhibits offered in a case. The problems in respect to charts and plats are even greater

because a better method of preservation of exhibits and means of offering them in evidence is available.

There is a place, however, for the blackboard in the courtroom for those who care to use it. In argument by counsel there would appear to be no real objection to the attorney using a blackboard, and it might be very effective in presenting his analysis of the evidence. If he can describe by words there is no reason why he should not illustrate by drawings. If a drawing is an effective medium of communicating ideas in argument, there is no justifiable reason to preclude its use.[51] Arguments are not ordinarily reported so that writing on a blackboard made by counsel during argument would not need to be preserved any more than the spoken word. If there was an objection that the drawing was unfair or inflammatory for some reason, the writing on the board could be preserved by a similar writing on a paper which could be made a part of the trial record. In much the same way that the record of a matter objected to in oral argument is preserved, an objection to writings or drawings used by counsel in argument could be included in the record through use of the court reporter when objection was made. In opening statements it is possible that a blackboard may assist counsel in showing the jury what he proposes to establish by proof in the case, but ordinarily it would seem that this type of communication could be more effectively used at the conclusion of the case when all the evidence has been presented and when final arguments are given. Many courts have approved the use of a blackboard in the ways mentioned.[52]

CONCLUSION

Much has been written upon the use and abuse of demonstrative evidence.[53] The subject of expert testimony generally has received its share of criticism. The Model Code of Evidence and the Uniform Rules of Evidence have provided for marked improvement in the use of opinion testimony.[54] The hypothetical question often may accom-

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with the use of the blackboard. For excellent discussion of techniques, see Stichter, *A Practitioner's Guide to the Use of Exhibits and Expert Testimony*, 8 OHIO ST. L.J. 295 (1942).

51. Haley v. Hockey, 199 Misc. 512, 103 N.Y.S.2d 717 (Sup. Ct. 1950); *cf.* Murray v. State, 19 Ariz. 49, 165 Pac. 315 (1917).

52. See, *e.g.*, Haley v. Hockey, *supra* note 51.

53. See note 1 *supra*; Note, *Real Evidence: Use and Abuse*, 14 BROOKLYN L. REV. 261 (1948).

54. Both the Model Code and the Uniform Rules greatly liberalize the use of opinion testimony by lay witnesses by permitting them to give testimony in terms of inference, thus eliminating the fine line between what is inference and what is fact. The Model Code permits testimony in terms of inference unless the judge finds the witness could testify as well through facts and that damaging effects could result from testimony expressed in terms of opinion. The Uniform Rules require factual testimony unless the judge finds testimony in terms of inference or opinion would be helpful to a clearer understanding. Both the Model Code and the Uniform Rules require the testimony to be based upon the personal perception

plish more in confusion than in providing understanding. As a means of communicating scientific matter and opinions in respect to them, demonstrative evidence provides perhaps the most effective device to enable the laymen who make up our juries to understand and evaluate the wide range of expert testimony which they are required to apply in the innumerable and varied problems which are presented to them for decision. The present fashion in trials requires a new type of preparation and presentation of a case, more ingenuity of counsel, and more expense. Although there is the possibility of abuse by counsel, this can be prevented by the court, and greater use of demonstrative evidence should bring about an improvement in the determination of the rights of the parties.

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of the witness and simply liberalize the method of expressing relevant information. Both permit testimony as to the ultimate fact whenever opinion is admitted. They strike a hard blow at rigid traditional limitations which hampered so much the efforts of a witness to tell his story in court in language which the witness ordinarily uses. Hypothetical questions are not necessary for questioning the opinion of the expert unless the judge in his discretion requires them. The expert with personal knowledge of the facts may express his opinion without first indicating the factual background but opposing counsel may require specification of the data upon which the expert relied.

Provision is made in the Model Code and the Uniform Rules for the appointment of impartial experts by the court where the court determines it desirable. The parties may suggest a panel of names to the court but the court makes the selection. The experts then study the matter in question and make a written report. This report is to be read in the courtroom, but the experts are subject to cross-examination. Parties are permitted to call other experts of their own. Other provisions are made in the Code and in the Rules with respect to adequate fees for experts. Demonstrative evidence can still be used to illustrate the findings of the experts when they are examined in court with respect to their written report. Perhaps the greatest feature of the new proposals as they relate to expert testimony is the effort to eliminate the feeling by the expert that he is an advocate for the party who calls him and to create in the expert a responsibility to seek out the truth and to express an objective opinion based on scientific accurateness. See MODEL CODE OF EVIDENCE c. V (1942); UNIFORM RULES OF EVIDENCE c. VII.