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STORIES, FORENSIC SCIENCE, AND IMPROVED VERDICTS

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How should DNA typing and the probabilities it generates affect decisions and inferences in litigation? This question could just be treated in an abstract, theoretical manner, but DNA profiling is too important to be consigned solely to academic discussions. DNA profiling is too important because lives are irrevocably affected by it, and the issues raised extend far beyond forensic applications of DNA technology.

These are some of the lessons I drew from the case that dragged me into this field a decade ago.[1] An Orthodox Jew had been stabbed to death in an apparent robbery attempt and a Jewish sect invaded and occupied the local precinct house. A police task force was assembled and quickly arrested three youths.

Jose had been caught fleeing another robbery during which the victim had been stabbed. He first told the police that he had been in a nightclub with friends at the time of the killing. About twenty-four hours later, after he was told that his brother Jimmy and his friend J.R. had been arrested for the killing, Jose changed his story and stated that he was the lone killer. He was by himself, he maintained, when he asked the victim for a match. The victim looked frightened and struck at him. Jose swung back with a knife, which he dropped. When he retrieved it, Jose contended the victim kicked him. As Jose came up, he stabbed the man.

Jose's statement, however, was not the sole basis for the prosecution. The prosecutor also relied on the testimony of Michael, an eyewitness, who had been given immunity. Michael, a sometime petty thief and a sometime Avon cosmetics salesman, said he was high that evening when he met his friends, the three defendants, Jose, Jimmy, and J.R. Michael's version of that night changed each time he related it, but at trial he stated that the four of them were getting hamburgers when the victim came in seeking change for a telephone call. Jose, Jimmy, and J.R. talked of robbery and followed the man out of the

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[1] People v. Julbe, No. 4167/1978 (Kings County, New York 1979). The trial was completed in February, 1979 and the unsuccessful appeal was argued in 1982. The case was not reported, and there seems little point now in stating the identities of those involved. The descriptions of the case and quotations from it are based upon trial and appellate documents in the author's possession. Where possible, cites to the trial transcript are given.

White Castle. Michael trailed, merely wanting to watch what would happen. Michael swore that he saw Jose grab the man around the neck and J.R. knock him down. Pockets were searched, and Jose stabbed the victim.[2]

Besides the numerous contradictions within the full report of his story, other evidence also conflicted with Michael's version. For example, although he stated that a woman in her home had witnessed the murder, the police, after much investigation, could not find her. Most important, a friend of the victim—another Orthodox Jew—testified that the victim was prohibited by his religious beliefs from carrying money or making telephone calls on the Sabbath, and since the killing occurred on the Sabbath, his friend would not have had a dollar bill, would not have asked for change, and would not have used a coin to make a call. The friend explained that at least a portion of Michael's testimony could not be the truth.[3]

Jose, through the testimony of numerous witnesses, presented his alibi. He maintained that the story he originally told the police was the truth. Jose's friends, relatives, and the president of the club all testified that Jose was with them at the club at the time of the killing. Jimmy's witnesses stated that he was at a restaurant at the time of the crime. J.R. produced no evidence.[4]

The prosecution, however, presented a forensic serologist, who testified that he had analyzed the victim's blood and fingernail clippings, dried blood found on clothing worn by Jose when he was arrested, and blood from each of the defendants. The blood was typed not only for the well-known ABO blood typing system,[5] but also for five other proteins using techniques different from those used in ABO blood typing. The serologist stated that the types discovered in the victim's blood were also present in the dried blood on Jose's clothing. He told the jury that only 1.08% of the population had the factors found in the two samples. The serologist also testified that the victim's fingernail clippings contained blood. The resulting genetic profile did not match the blood of the victim, Jose, or J.R. However, it was duplicated in Jimmy's blood. The witness concluded by telling the jury that 9% of the population had this genetic combination.[6] Closing arguments were made and jury instructions given. The jury

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[2] Trial transcript at 63-414, *People v. Julbe* [hereinafter *Julbe* Transcript] (on file with author).

[3] *Id.* at 512-17.

[4] *Id.* at 524-631.

[5] For a description of ABO typing and its applications, *see* Jonakait, *Will Blood Tell? Genetic Markers in Criminal Cases*, 31 EMORY L.J. 833, 836-38 (1982).

[6] *Julbe* Transcript, *supra* note 2, at 487-507.

deliberated and returned with the the verdicts: Jose guilty of intentional and felony murder; Jimmy guilty of felony murder; J.R. guilty of nothing.

I was assigned to the indigent Jose as his appellate attorney. I raised a number of issues, which the appellate courts rejected. Jose stayed in prison serving his life sentence, waiting the required minimum twenty-five years before he might see the parole board. The case, however, while all too typical in many ways, taught me a lot about issues concerning forensic science evidence, issues that continue to be central to the consideration of DNA evidence today. I learned that this kind of evidence has a powerful effect.

The genetic marker typing was the key proof. The jurors certainly could not have accepted Jose's confession at face value. If they had, they would not have convicted Jimmy, who, according to Jose, was not present. They obviously did not accept Jimmy's or Jose's alibis, or there would have been no conviction at all. But the jury did not fully believe Michael, the prosecution's witness, either. If so, all three defendants would have been found guilty because Michael had testified that J.R., who was acquitted, was a more active participant in the crime than Jimmy, who was convicted.

The split verdicts could only be explained by the serological evidence. The two defendants linked by the forensic scientist to the victim were convicted, while the third, not connected by the blood typing, went free. Such evidence has an important impact on jury verdicts.[7] Lives, consequently, are irrevocably affected by such forensic science evidence. Jose's certainly was. Jose, slight of build and slow of wit, did not fare well in prison. He was defenseless against bigger and more cunning prisoners. He contracted AIDS and died in jail.

The case, of course, forced me to think about the proper use of probabilities in trials. I considered whether one in a hundred meant a 99% certainty that Jose was guilty, or a 99% certainty that the blood came from the victim. I pondered the alternative: that the 1.08% figure only defined a subset of the population, and that of the eight million or so in the region, 80,000 people had blood like that. Neither alternative seemed right, and I started to read the burgeoning literature on Bayes' Theorem. This, too, was unsatisfying.

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[7] A survey has found that jurors believe that they comprehend scientific evidence as well as or better than other evidence. In addition, "[a]bout one quarter [of jurors who] were presented with scientific evidence believed that had such evidence been absent, they would have changed their verdicts—from guilty to not guilty." Peterson, Ryan, Houlden & Mihajlovic, *The Uses and Effects of Forensic Science in the Adjudication of Felony Cases*, 32 J. FORENSIC SCI. 1730, 1748 (1987).

Bayesians began from the proposition that the formula was the correct way to process probabilities. When they found that jurors did not come out with the same results as the statisticians, the Bayesians concluded that jurors did not use the evidence properly and suggested ways to get the jurors to think "correctly."[8] This is a disturbing argument.

The Bayesian analysis ignores the central reasons for our jury system. We value jurors because we believe that verdicts should be the product of community values and common sense.[9] If the Bayesians were correct in concluding that our present jurors are fundamentally wrong in how they approach, assimilate, and assess information, then the jury system must be wrong. By insisting that jurors abandon their ordinary ways of processing evidence, the Bayesians were undercutting the basic value of our juries.

The starting point for improving decision making in trials should not be an insistence that juror's think in alien ways (probably a fruitless goal anyway), but instead should be an understanding of how jurors actually do treat the information presented to them. If that were grasped, refinements might be found to make that processing better. This concept, however, was of limited value because so little was known about how jurors really assimilate and assess evidence.

What I was aware of at this time was how criminal defense attorneys instinctively handled information. The good ones, at least among themselves, referred to "stories." If I sought advice on a trial, I would hear: "What is the prosecutor's story?" "What is the client's?" I might then hear that a fact did not fit a story; or if the story was right, that this witness or that document should be found. If that confirming evidence did not exist, then other stories had to be considered.

The successful attorneys shunned a defense comprised of an inconsistency here and an improbability there with the hope that, as a

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[8] *See, e.g.*, Thompson and Schumann, *Interpretation of Statistical Evidence in Criminal Trials: The Prosecutor's Fallacy and the Defense Attorney's Fallacy*, 11 LAW AND HUM. BEHAV. 167, 181, 184 (1987) concluding that experiments demonstrate "that people are not very good at drawing correct inferences" from probabilistic evidence based on the assumption that Bayes' theorem is the correct way to draw such inferences and reviewing the literature that proposes the use of Bayes' theorem in trials.

[9] The Supreme Court has provided that:

> [T]he purpose of the jury trial . . . is to prevent oppression by the Government. . . . Given this purpose, the essential feature of a jury obviously lies in the interposition between the accused and his accuser of the commonsense judgment of a group of laymen, and in the community participation and shared responsibility that results from that group's determination of guilt or innocence.

Williams v. Florida, 399 U.S. 78, 100 (1969).

result, the jury would find a reasonable doubt. Time and again I heard that this approach was a choice of last resort. This explanation made sense. Any competent presentation by the prosecution would form a story. Those jurors favoring the prosecution would have something to relate in a coherent way during deliberations. The strongest counter, therefore, was always another narration, or another way to order the information into coherency, but this time in a way that pointed towards acquittal. Those jurors favoring the defense needed a story if they were going to be successful in persuading other jurors. Thus, at least in my experience, the goal of the criminal defense attorney was to process the information into a story indicating the client's innocence, or at least into a story that raised a reasonable doubt about his guilt. Although we could not prove it, we all felt that stories mattered to juries and affected how information was processed.[10]

The thought that stories are important underlined the difficulty with the forensic science evidence. A probability may be easily plugged into a mathematical construct, but incorporating it into a coherent narrative is difficult. The storytelling art seems stretched to the limit by the information that the blood at the crime scene and the defendant's blood share the same types, and that those types occur in one in every hundred or thousand or million people.

More thought is needed on how to fit such evidence into a sensible, potentially accurate narrative that can be grasped by jurors.[11] The conclusion that more needs to be learned in this area, however, does not mean that the decisions and inferences based on forensic science such as DNA typing cannot be improved before we have that knowledge. Decisions and inferences might be made more wisely if we improve how people process the resulting information, but those decisions ought also be improved by presenting the jury with more accurate and complete data. Certainly, however juries use the expert testimony, they are more likely to use the expert testimony effectively if the information and issues concerning that evidence are as complete

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[10] Today, as much information in this symposium on Decision and Inference in Litigation indicates, *see e.g.*, Allen, *The Nature of Juridical Proof*, 13 CARDOZO L. REV. 373 (1991); Pennington & Hastie, *Cognitive Theory of Juror Decision Making: The Story Model*, 13 CARDOZO L. REV. 519 (1991), significantly more empirical data exists demonstrating the importance of stories for the processing of information by juries.

[11] The difficulty of processing or incorporating the probability evidence increased in Jose's case because the jury did not have certain information. Thus, although testimony indicated that the victim's blood matched the blood found on Jose and that the typed genetic markers occurred with a frequency of one in a hundred, the other robbery victim whom Jose stabbed did not have his blood analyzed. Similarly, neither the blood found under the victim's fingernails nor Michael's blood was analyzed.

as possible. Jose's case taught me, however, that such complete presentations are now unlikely. Most participants in our litigation system are ill-equipped to deal with such scientific evidence, and consequently, the proof and arguments about the scientific information will be routinely incomplete.[12]

Jose's trial attorney was a respected leader of the local bar. He was an experienced criminal defender, a pro at savage cross-examination of a government witness like Michael. He could effectively present an alibi and give a stirring summation on police coercion. But when it came to the scientific and mathematical testimony, the adversary system ceased to exist and the evidence was not challenged. The cross-examination of the forensic scientist was without point. No defense witness testified about the serological evidence. The relevant defense arguments were feeble. Indeed, the attorney told the jury, "Frankly, I never heard anything like that [scientific evidence] before."[13] When asked out of the jury's presence why he had not had the other robbery victim's blood typed to see if it matched that found on Jose's clothing, the attorney stated, "May I say that the serologist testified that the blood as found on the shirt could very well and probably did come from [the murder victim.] So, I couldn't see any benefit [in having the robbery victim's blood typed.]"[14]

This attorney, unfortunately, was not unusual.[15] Many lawyers

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12 See A. MOENSSENS, F. INBAU & J. STARRS, SCIENTIFIC EVIDENCE IN CRIMINAL CASES 7 (3d ed. 1986) stating that:

> [L]awyers as a group evidence an appalling degree of scientific illiteracy, which ill equips them to educate and guide the bench in its decisions on admissibility of evidence proffered through expert witnesses. This scientific illiteracy is shared by a large segment of the trial and appellate bench; many judges simply do not understand evidence based on scientific principles . . . .

See also McCord, *Syndromes, Profiles and Other Mental Exotica: A New Approach to the Admissibility of Nontraditional Psychological Evidence in Criminal Cases*, 66 ORE. L. REV. 19, 25 (1987) ("[M]ost lawyers and judges do not have extensive training or experience in dealing with scientific matters. Accordingly, many lawyers and judges are uncomfortable dealing with scientific evidence . . . ."); Sperlich, *Social Science Evidence and the Courts: Reaching Beyond the Adversary Process*, 63 JUDICATURE 280, 288 (1980) ("Judges and their clerks are not normally able to distinguish relevant from irrelevant materials and good science from bad.").

13 *Julbe* Transcript, *supra* note 2, at 731.

14 *Id.* at 844-47.

15 Peterson, Ryan, Houlden & Mihajlovic, *supra* note 7, at 1749, have found that:

> [D]efense attorneys [use] a variety of tactics . . . to challenge forensic science evidence, ranging from efforts to have the evidence ruled inadmissible . . . to attacks on the expert's qualification or intense cross-examination of the expert's conclusions. Usually, however, defense counsel will attempt to 'explain away' the physical evidence by supplying a reasonable and lawful explanation for its presence. If the above tactics cannot be used, defense counsel will usually stipulate to the evidence and attempt to draw as little attention to it as possible. Contrary to a commonly expressed attitude that defense attorneys distrust the analyses and

and judges feel unable to deal with issues raised by forensic science. Perhaps as a group, attorneys are reasonably bright people who became lawyers partly because they were afraid of science and math. Perhaps when lawyers lie awake in the dark of night, they fear that scientists are smarter than they are. If so, lawyers will not examine the scientific evidence with as much skepticism as they would other information. As a result, the jury will not be as completely informed as it ought to be.

The lawyers' fear, avoidance, or ineptitude concerning scientific issues might matter little if the opinions of forensic scientists could be accepted as complete and accurate, but experience teaches otherwise. Forensic scientists' assertions are often misleading. For example, the serologist testifying at Jose's trial unequivocally proclaimed that the aging and drying of blood did not destroy it or make it difficult to detect any of the genetic markers.[16] He failed to reveal that almost no research had been done on the ability to type such factors accurately in dried blood; he did not testify that the few existing studies had already revealed false positives.[17] He based his frequency calculations on data that others might not see as scientific. That population study had not been published or otherwise analyzed by scientists.[18]

This situation is routine. The conclusions of forensic science are often based on skimpy, nonexistent, or shoddy research.[19] Forensic

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testimony of 'prosecution' experts, defense counsel we interviewed are basically satisfied with the competence and nonpartisanship of forensic scientists with whom they have contact.

Cf. Symposium on Science and the Rules of Legal Procedure, 101 F.R.D. 599, 634 (1983) Prof. Michael Graham commented that: "Often the plaintiff or the prosecution alone calls an expert who testifies with little or no cross-examination. The opponent more or less accepts the expert's evidence as being true if it does not concern a major issue in contention." *Id.* at 634. Even novel scientific evidence often goes unchallenged. *See* Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, A Half-Century Later*, 80 COLUM. L. REV. 1197, 1243 (1980) ("a surprising number of novel techniques have gained admissibility without the presentation of defense expert testimony").

16 *Julbe* Transcript, *supra* note 2, at 502.

17 Several years later, I was part of a panel discussion at New York Law School sponsored by a student organization where this forensic scientist explained the electrophoretic typing of blood. I was a questioner from the floor. The serologist then said that such factors as heat and humidity could alter the electrophoretic patterns in aged blood. This would not cause mistyping, he maintained, because he could tell from the patterns that the degradation had occurred and, thus, would report inconclusive results. He continued that while it might be useful to publish a paper on this topic, he had not yet done so.

For a review of the scientific studies examining the typing of these genetic markers, see Jonakait, *supra* note 5.

18 *Julbe* Transcript, *supra* note 2, at 494-95, 499-501.

19 For a discussion of the often poor and limited nature of forensic science research, see Jonakait, *The Quality of Forensic Science: The Need for Regulation*, 4 HARV. J. L. & TECH. 109 (1991).

scientists do not give juries a thorough presentation of information about the scientific technique. Seldom have they actually sought to obtain such data. Indeed, a crucial piece of information—the true error rates for the scientific procedures—cannot be presented because these rates are not collected.

No scientific procedure always produces correct results. No human being is perfect. All scientific analyses have error rates. Those rates will vary depending upon who performs and interprets the work. Whether or not the reasons for the errors are understood, they can be measured, and those measurements can be presented to the decision maker. The jury, however, does not hear this information because it is not compiled. It should be collected from a program of mandatory, blind proficiency testing of forensic laboratories, but such testing, while easy to institute and administer, does not exist.

Obviously, the worth of a scientific result is affected by how likely it is to be wrong. The assessment of the conclusion that two samples match and that only one in 35,000 have similar DNA depends upon whether the forensic scientist is wrong 1% or 10% or 25% of the time when he declares a match. This crucial information regarding accuracy, however, is not now available and, thus, cannot be presented to the jury.[20] Decisions in litigation can only improve

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[20] See M. SAKS & R. VAN DUIZEND, THE USE OF SCIENTIFIC EVIDENCE IN LITIGATION 76 (1983) which points out that:

> [I]n order to determine the significance of test results, fact-finders should be presented with information regarding the base rates for common phenomena analyzed by forensic scientists; the accuracy limits of the tests and analytic techniques used (such limits have been determined for virtually all biomedical laboratory tests) and the accuracy of the tests *in practice*, as determined by quality control studies run on the laboratories. . . . Judges and lawyers will then have to become sufficiently conversant with the statistical principles involved in order to employ these background data in assessing the testimony presented.

While the increased information ought to increase the accuracy of the verdicts, it further increases the difficulty of presenting a good, potentially accurate story. The story must not only incorporate one sort of information that does not fit well into a narrative—that the blood samples matched and the typed factors occur at a rate of one in, say, 35,000. It must now incorporate more of the same information—the analyst makes a mistake one in ten times—that reverses the story. If a mistake was made, then the samples did not match. In many cases, if the blood at the crime scene does not match the defendant's, then the forensic evidence, instead of being powerfully damning, actually shows that the accused is innocent. *See Symposium on Science and the Rules of Evidence*, 99 F.R.D. 188 (1983), at which Miron Straf commented:

> But to say that the expert passed the test by being correct 95% of the time really does not help the fact-finder too much, because the issue in question concerns a particular case to which that probability does not necessarily apply. It would be additional evidence to be considered, but the distinction between the prior tests and the specific questions at trial must be made clear.

Id. at 228.

when factfinders are presented with such data.

A requirement of mandatory, blind proficiency testing should, by itself, lead to improved decisions and inferences, but it should also trigger other steps towards improving the DNA profiling procedures. Although we do not know for certain what the testing program will reveal, forensic laboratories perform incredibly poorly according to the available information. Indeed, the test data reveal that inadequate performances are endemic in our crime labs. The lack of quality is not limited to particular forensic techniques or restricted to a handful of laboratories, but affects all procedures and many, if not all, facilities.[21]

The problems with the testing procedures, however, are not intractable. Crime laboratories can be improved. Good regulation of DNA laboratories will take care of the problems with the testing procedures, as regulation of clinical laboratories has already established.[22] The necessity for the improvements is dramatic, and the knowledge to produce the changes is there. Only whether the will exists to bring about the necessary changes is in doubt.

Reform in DNA procedures and laboratories can have an important effect in improving decisions and inferences in real litigation. Such an improvement does not depend upon the wishful and wrong notion that juries can be instructed to some alien, "correct" way of thinking. The inability of lawyers and judges to grasp scientific issues should not block the necessary improvement in the procedures. Instead, no matter how the information is processed, presented, or debated, the resulting decisions should be better if the scientific proof is more complete and more accurate. And since forensic science affects many trials and investigations, a significant increase in the completeness and accuracy of the resulting data will produce more accurate decisions in litigation.

Jose's decade-old case has led me to conclusions about how to improve forensic science evidence in our courts and investigations, but perhaps forensic science itself indicates an important way to improve decisions and inferences in litigation generally. We do need to know more about how juries and lawyers process information, but even without that knowledge we can improve decision making. More

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21 For a review of the available data on proficiency testing of American forensic laboratories, see Jonakait, *supra* note 19, at 109-24.

22 "Studies [of clinical labs] consistently discovered that unregulated, unlicensed laboratories performed lower quality work" than their licensed counterparts. Jonakait, *supra* note 19, at 173. Armed with this information, Congress chose to regulate all clinical laboratories. Clinical Laboratory Improvements Amendments of 1988, Pub. L. No. 100-578, 102 Stat. 2903 (1988) (to be codified at 42 U.S.C. § 201).

accurate and complete "facts" will lead to more accurate results no matter how that evidence is assimilated and assessed. As forensic science indicates, however, the necessary "facts" for more complete litigation must often be developed outside the litigation system. Instead of simply examining or theorizing how information is collected, presented, and processed by the various actors within the litigation system, we need also to examine how, in real life, "facts" can be more fully developed before they become part of that system.