

Essay on forensic science

Law, Evidence



Merriam-Webster's dictionary defines science as " a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through scientific method." On the other hand Forensics is defined as " suitable to courts of judicature." As such, Forensic Science is the use of a knowledge system covering general truths, tested through scientific method that is suitable to judicature or to public discussion and debate.

Comparing and contrasting " normal" science with forensic science is a quixotic task. The contrast is absurd on its face because forensic science is appropriately a part of the normal sciences - were it not part of " normal" science and subject to the laws of scientific validity (e. g. scientific method, peer review) the value of the " science" would be nil and inadmissible in anything but a kangaroo court. There is a litany of case law throughout the common-law world which discusses the admissibility of scientific evidence and the fact that divinations and sorcery masquerading as science have no place in the courts of justice of the English-speaking world.

Forensic Science, as we know it, is based on the scientific method. Scientific method is the means with which a scientist conducts his inquiries. It is by careful adherence to the rules that a scientific discovery is validated. The scientific method has its roots in Plato's methods of deductive reasoning, which was further elaborated by Aristotle and his use of empiricism. The steps of the scientific method are as follows: 1) observation/research, 2) Hypothesis, 3) Prediction, 4) Experimentation, 5) Conclusion. The method can be traced to William Whewell and William Stanley Jevons in England and Charles S. Peirce in the United States. Karl popper introduced the concept of

falsifiability into our scientific lexicon and it quickly gained a foothold.

Falsifiability means to be able to show something is false, if something is falsifiable, it can be tested and this is now a cornerstone of the scientific method.

One of the earliest uses of forensic evidence in a criminal case was during the Sung Dynasty in China, documented by Song Ci. Following the murder of a Chinese peasant circa 1235 A. D., investigators decided that a hand sickle was the murder weapon. All villagers with sickles were instructed to come to the town square with their sickles and told to place them on the ground in front of them. Shortly thereafter, flies swarmed around a single sickle, suggesting that its owner was in fact the murderer. According to Song Ci, the villager quickly confessed. To look at even this ancient case, one must quickly realize that scientific observation occurred before the meeting at the village square – how else would the investigators have known that flies would congregate around blood?

Given that the *raison d'être* of forensic science is the presentation of scientific principles in front of the court, it would be useful and informative to understand what the court itself regards as legitimate science. In the United States the law of the land is based on two seminal cases *Frye v. United States*, 293 F. 1013 (D. C. Cir. 1923) and *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U. S. 579, 586 (1993). The rationale of *Frye* stated that the only way a court could entertain the scientific testimony of the expert was when his means and methods “gained general acceptance in the particular field to which it belongs.” That is to say, forensic methods are only admissible in a court of law when they are in fact scientific methods and not

fanciful sorcery divined by a witch doctor. Clearly what the learned justices meant by their statement was that science, in order to be admissible to a court, had to be peer-reviewed, replicable, and falsifiable. Daubert on the other-hand brought this a step further by saying that the judge has a positive obligation to ensure that the science presented in a court is actually science even though he might not be a scientist. Judicial review and the appellate process have an important role in filtering out junk science from the legal system – there was a time when phrenology was accepted and admitted as scientific evidence of character in some courts.

It would be foolhardy to say that the straightforward forensic sciences are any different than the normal sciences. Ballistics, stab wounds, basic human pathologies have all been tested ad infinitum. Were it not for their scientific reliability they would never be accepted into courts as evidence. Anyone can stab a pig's corpse with innumerable knives and can document the various differences in each wound the various types of knives leave. Ballistics analysis is a time-honored tradition with a long pedigree that no one is realistically going to challenge due to its easy replication. A more complicated and controversial area is when subjective analyses begin to be employed, as is the case with forensic psychiatry. In fact, the fear of subjectivity biasing the hard science aspect of certain subdivisions of “forensic science” lead congress to enact laws authorizing the National Academy of Sciences to perform massive studies on the reliability of these fields. However, fields that the layperson thinks of infallible such as fingerprint analysis, have also proven to be error prone and subject to human biases. The case of the mistaken identification of one of the Madrid

train bombers illustrates this problem. This case of the mistakenly identified train bomber led the National Academy of Sciences to conclude that the interpretation of forensic evidence was often not based on any sort of science and that rather personal biases could easily come into play. Its panel noted that there was a very noticeable lack of peer-reviewed scientific literature attesting to the validity of many methods of forensic analysis. Whereas the methods of the forensic scientist and the normal scientist are appropriately the same, the major difference between “normal” science and forensic science is the forum that the findings are presented to. Whereas regular scientific findings are presented to conferences or peer-reviewed journals and the audience is generally expert. Forensic scientists though explain their findings to the largely scientifically illiterate masses. To complicate matters even further for the forensic scientist is that his findings may be used to condemn a person by people who may not have understood the science, and would not really be in a position to tell the difference between “junk science” and well performed analysis. Another difference involves the ethical issues faced by the forensic scientist vs. the normal scientist. This was alluded to above in the case of the bias affecting the investigation into the Madrid bombers of 2004.

The ethical issues for the “normal” scientist are manifold. They can be related to human experimentation (covered by the Nuremberg Code), animal experimentation (covered by the Guide for the Care and Use of Laboratory Animals), or academic dishonesty such as data fabrication or plagiarism. The forensic scientist is also responsible for the above stated ethical problems that may arise, but he is also responsible for his representations towards the

court. Further ethical problems for the forensic scientist arise with issues such as crime scene mishandling as may happen with evidence planting, destruction, or general mishandling. After the initial processing at the crime scene, the evidence can be contaminated or otherwise mishandled. And finally, the evidence must be appropriately and accurately described in court to an audience of non-scientists. The American Academy of Forensic Scientists published a code of ethics in their bylaws under Article II, section I. The code is largely ambiguous (certainly compared to the ethical standards set by the Nuremberg codes or The Guide,) but they attempt to formulate rules of practice. The majority of the code relates to how the forensic scientist relates to the academy, but parts b and c are universally applicable with part b being a general rule of not misrepresenting ones education levels and experience, and part c relating to not misrepresenting any scientific findings that may have resulted from the forensic scientists work.

It can be seen that there is ultimately not much difference between the “normal” sciences and the forensic sciences. The differences are in style, but should not be in substance. Both are required to follow scientific method and are based on the discovery of objective truth. The case law on the admissibility of scientific evidence into the forum tells us explicitly that in order for the evidence to be admitted it must be part of the normal sciences. Furthermore, both branches of sciences have ethical codes that are followed. The major differences between the two fields are the audience to which the findings are presented. For the “normal” scientist, it is a very rare thing to break out from the scientific world of the peer-reviewed journal or academic conferences at a university. The forensic scientist on the other hand,

whether working in a civil or a criminal context is constantly presenting his findings to the layperson. Whereas the average scientist will never have to “dumb-down” his findings because only learned and studied people will ever converse with him about his research material, the forensic scientist must always be prepared to bring his findings down to the lowest common denominator. Finally, whereas the life and death of millions may be effected by the research of a “normal scientist,” the work of a forensic scientist will greatly affect one party - even to the point of costing that person his life, and as Stalin said “The death of one man is a tragedy, the death of millions is a statistic.”

Ultimately it is unwise and incorrect to think of “normal” science and forensic science as two different fields that can be contrasted as such. The two fields are two sides of the same coin of human discovery. The court system is designed to find out the truth and administer justice based on the truth. Science attempts to discover the objective truths of the universe and to make our lives better using those truths. Forensic science is the unique bridge that attempts to make the proper administration of justice fair through the application of objective truth and the methods that are used to derive that truth.

Bibliography

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