



B125 The Demarcation Problem and the Cheapening of Forensic Science: How Philosophical, Practical, and Legal Definitions of Science Shape Our Discipline

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The goal of this presentation is to provide information about the demarcation problem in the philosophy of science (distinguishing science from pseudoscience) and how it relates to forensic science. Forensic science offers a new wrinkle to the demarcation problem in the requirement of science to be defined in legal, not scientific, settings. Legal rulings, such as *Kumho*, threaten to reduce forensic science to a technical specialty and this must be avoided for the benefit of the discipline.

In the philosophy of science, the demarcation problem is the decision between what constitutes science, i.e., astronomy, and distinguishes it from pseudoscience, astrology. This has a direct bearing on forensic science, inasmuch as certain disciplines are still considered scientifically “borderline” by some and it is important to sort out the science from the junk. Forensic science adds a novel wrinkle to the demarcation problem because, not only must it adhere to the definitions of science as understood by philosophers and practicing scientists (à la Kuhn), its science is applied in the legal arena where the home field provides a distinct advantage. Under *Daubert*, Courts act as gatekeepers, allowing “good” science to pass while barring the door to “bad” pseudoscience. This legal interpretation of what constitutes acceptable science, as seen in such rulings as *Frye*, *Daubert*, *Kumho*, and others, may or may not have any grounding in what scientists consider “good science” to be.

The four conditions of *Daubert* are well known: general acceptability by the relevant scientific community, knowledge of the actual or potential rate of error for the practice, subjection of the practice to peer review, and actual or potential testability of the method’s results. This final condition is an overt homage to Karl Popper’s falsification model, which is referenced heavily in the *Daubert* court’s decision. The *Daubert* decision is only one case law interpretation of Federal Rule 702 and not all philosophers of science agree that the Popperian approach is what defines science most accurately and, in fact, few adhere to this model today.

Popper’s model precludes any science that is not overtly oriented toward controlled laboratory experimentation, such as geology, astronomy, archaeology, and, to some extent, forensic science. This is because forensic science is partly a historical science, albeit dealing with very short time frames.⁽¹⁾ As has been noted⁽²⁾ reference to known rates of error and testability presumes a model of science focused on controlled laboratory experimentation. Forensic scientists rarely have the luxury of controlled experimentation: Crimes cannot practically or ethically be reproduced under strictly proscribed conditions. Certain isolated events, such as discharging a firearm, identifying a controlled substance, or spattering blood, can be approximately repeated to allow for experimentation and these results are part of daily casework or publications in peer-reviewed journals. These results are not used, however, solely to further the growth of science but to reconstruct past events to determine causes, sources, and effects in crimes. This information, and other, is presented in court to assist the trier of fact. Of the possible competing hypotheses offered by the involved parties, one will be selected as more plausible by judge or jury, based in part on scientific conclusions and interpretations, leading to a legal decision.

This duality of identity, empirical and historical, has probably led to the perception that forensic science is a lesser science or even “merely” a technique with no guiding philosophy. Historical disciplines have been derided as unscientific.⁽³⁾ Legal rulings such as *Kumho* encourage this perception by reducing scientific disciplines with potentially sufficient supporting research to technical specialties that are unscientific and simply applications of “real” scientific principles.⁽⁴⁾ Forensic science as a discipline is cheapened by the promulgation and reinforcement of this perception; resources of all kinds, from grants to budgets to public confidence, are reduced by the devaluing of the science in forensic science.

But if *Daubert* isn’t a proper definition of science and *Kumho* cheapens forensic science, what is to be done? The legal community and forensic science laboratories should seek more education on the nature of science and the underlying philosophy of forensic science. Forensic scientists should eschew the implications of current legal rulings and pursue research that will integrate the forensic science literature into a cohesive scientific foundation that will exceed the *Kumho* and even the *Daubert* framework. The information exists, the requirements are known, and the only obstacle that remains is our perception of forensic science as a lesser discipline.

References

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Demarcation Problem, Philosophy of Science, Admissibility