A17 Reliability in Forensic Science: Pedagogical Implications

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After attending this presentation, attendees will better understand the relationship among the components of reliability analysis.

This presentation will impact the forensic science community by improving the ability of practitioners and educators to assess their knowledge of the components of reliability analyses.

The goal of reliability in forensic science can only be achieved when the concepts relating to uncertainty are understood and implemented by the practitioners. Accomplishing this goal; however, is a real challenge. The uncertainty involved with the different types of examinations varies dramatically and therefore so does the approach to measuring the probability. Learning to quantify probability in a classroom is daunting but even more complex is applying it to the different decision-making styles within the scientific method.

In order to achieve reliability in their scientific examinations, forensic scientists obviously need to know how uncertainty and probability impact each phase of the scientific method. These impacts are: (1) the validity of the theoretical basis requires knowing the probability distribution of the variables being measured; (2) the reproducibility of the empirical protocol requires knowing the expected error rate for the measurement technique; and, (3) the objectivity of decision criteria requires knowing how the observed results compare to the expected probability distribution. Since the nature of the uncertainty is different for each phase of the scientific method, the probability techniques applicable to each phase must also be different.

Reliability analysis; however, is not only a complex subject but is applied in a complex human system. Therein lies the real problem. The typical forensic scientist applies the principles of science within constraints imposed by attorneys, managers, consultants, and reformers who not only are ignorant of the principles but who unabashedly dictate their ignorance via obfuscation and whimsy. The crux of the problem for the profession of forensic science is that forensic scientists cannot protect themselves against the obfuscations posed by those who wish to control them without first eliminating their own ignorance of reliability analysis.

Education is the traditional solution to ignorance. However, in the case of reliability analysis in forensic science, there are some novel challenges due to its comprehensive nature. The three phases of the scientific method involve logic, technology, and decision-making, three topics seldom discussed together. The theoretical basis requires applying inductive, abductive, and deductive logic. The forensic scientist also employs one or more of three types of examination–classification, individualization, and reconstruction–each of which approaches

probability differently. Analyzing uncertainty requires combining the theoretical, empirical, and subjective probability approaches. And, all of these aspects convolute.

Both those who have not performed the particular examinations, and those who have performed them without knowledge of probability, are challenged when trying to teach them. The pedagogical questions thus boil down to three succinct matters: (1) what to teach; (2) how to teach it; and, (3) equally importantly, who to teach it. This presentation will focus on the easiest of the three, what to teach.

This presentation presents a concept map of the key interactions of reliability considerations, providing a topical outline of the key areas. This format summarizes the topics in a way that allows practitioners to review their knowledge of reliability components and assess whether they have the knowledge background to make an informed, reliable decision, not only on the results of the examination but also on the formulation of the questions, and the evaluation of the results. This assessment is an appropriate first step whether one is a practitioner educating oneself, or an educator attempting to educate a practitioner.

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 ** Presenting Author*