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Strengthening Forensic Opinions through Objective Assessment of Evidentiary Value: A Prospective for Future Directions in Criminalistics

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Abstract: The search for ways to replace categorical statements resulting from forensic examinations has become a topic of increased research focus. This is especially true regarding pattern evidence in the wake of the National Research Council report in 2009. Much of the research has examined objective methods of assessing the strength of evidence through a Bayesian likelihood ratio approach. A significant advantage of this approach is that the analyst is relieved of the responsibility of making categorical statements. The method provides the analyst with an objective assessment of the strength of the evidence to inform the rendering of an opinion. A quantitative assignment of evidentiary value also lends itself to the use of verbal scales as a way of communicating the strength of the evidence to a jury using easily understood and standardized statements. Research in our laboratory has addressed the use of a likelihood ratio approach in the analysis of physical evidence, including fire debris and fiber comparisons. The likelihood ratio approach has been taken in determining the strength of evidentiary support for the hypotheses that a sample is positive or negative for ignitable liquid residue. In fiber analysis, the hypothesis of a common source is addressed for fibers exhibiting highly similar visible light absorption profiles. This talk will introduce the likelihood ratio approach in general terms and give specific examples taken from our research. The focus of the talk will be on the methodology, research results and calling attention to the challenges of the approach.