Limitations and opportunities of the likelihood ratio approach for evidence evaluation

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By Bayes' Theorem, the likelihood ratio (LR) is, in principle, an ideal measure of the probative value of a single piece of evidence against a hypothesis and its negation.

However, due to the choice and context of hypotheses, there are common situations where the LR of a piece of evidence may be quite unrelated to its 'probative value'. Hence, the use of the LR may be misleading (I will demonstrate the serious implications of this with examples of probabilistic arguments that were used in both the Barry George and Sally Clark cases). In particular, the most common scenarios are:

1. Where the LR is applied (as is common) to a piece of evidence E with two hypotheses H1 and H2 that are not mutually exclusive and exhaustive. Contrary to most expectations, in this case the LR may tell us nothing about the probative value of H1 against 'not H1'.
2. Where the LR is applied to a piece of evidence with respect to a source-level hypothesis and its negation (such as defendant was/was not at the crime scene). Contrary to most expectations, in this case the LR may tell us nothing about the probative value of the evidence on the relevant offence-level hypothesis (defendant is/is not guilty) of the case.

It is also important to note that the computation of the LR – even for a single piece of evidence against a source level hypothesis - is often erroneous due to failure to incorporate different types of potential process and testing errors.

All of the above limitations on the use of the LR for evidence evaluation can be addressed by using Bayesian networks that incorporate the necessary offence level hypotheses as well as other (normally unstated) hypotheses needed for correct computation of the LR. Of course, there is much resistance to such an approach (by both forensic practitioners and lawyers) and so the talk will also address why there is resistance and how it can be tackled effectively.