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When does absence of evidence constitute evidence of absence?

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Abstract:

Negative forensic evidence can be defined as the failure to find a trace after looking for it. Such evidence is often dismissed by referring to the aphorism “absence of evidence is not evidence of absence.” However, this reasoning can be misleading in the context of forensic science. This commentary is designed to help forensic scientists understand the probative value of negative forensic evidence.

Keywords:

Forensic science; trace evidence; inference; Bayesian; Popper; likelihood ratio

Text (1,423 words):

Forensic science is sometimes said to be the science of traces. It involves detection and interpretation of the vestiges of past events, typically for the purpose of solving crime. One of the founders of forensic science, Edmond Locard, argued that “[i]t is impossible for a criminal to act, especially considering the intensity of a crime, without leaving traces of this presence” [1]. Locard’s work gave rise to the exchange principle, which asserts that *every contact leaves a trace*.

The exchange principle cannot be entirely true, however, because not every contact leaves a trace, at least not a trace that can be detected. A criminal may handle a gun without leaving a fingerprint; fire the gun without having detectable amounts of gunshot residue on his person; and so on. Uncertainty about whether traces will be found is the basis for the common expression “absence of evidence is not evidence of absence.” According to this expression, one should not

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