



A30 A Philosophical View of Forensic Science: Native and Non-Native Principles That Form the Foundation of the Discipline

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After attending this presentation, attendees will gain insights into the philosophical foundations of forensic science and enhance their perspectives on the basic theories and principles that may guide this discipline.

This presentation will impact the forensic science community by influencing how forensic scientists think about their discipline and profession and may guide thinking on basic research that is needed and has been called for by the forensic community, national groups, and critics.

This presentation offers a philosophical view of forensic science that provides at least some of the necessary underpinnings to conduct its work and research. In this view, forensic science is seen to have three native principles that form a philosophical basis: other principles or concepts; borrowed from related historical disciplines; and fill in necessary working modes.

The first native principle is classification. Any collection of objects, real or imagined, is a set; set theory is the branch of mathematics that studies these collections. Basic set theory involves categorization and organization of objects and involves operations such as set union and set intersection. Advanced topics, including cardinality, are standard in undergraduate mathematics courses. The notion of set is undefined; the objects constituting (its members or elements) the set define it. The members of a set may be real or imagined but membership criteria for a set should be definite and accountable. Forensic science's taxonomies are additive to the taxonomies of nature and the manufacturers, although are initially based on them. Forensic science has developed an enhanced appreciation for discernment between otherwise similar objects but hasn't exploited them to their benefit. Thus, although classification is an inextricable part of forensic science, forensic science does not necessarily truck in fixed taxonomies.

The second native principle is uniqueness. Uniqueness comes with assumptions that affect the resolution of analyses. The first assumption is that all things are unique in space and, thus, their properties are non-overlapping. The second assumption is that properties are constant with time. The assumption of uniqueness of space is considered axiomatic and, therefore, an inherently non-provable proposition: The population size of "all things that might be evidence" is simply too large to account. A statistical analysis is therefore warranted when uncertainty, either of accounting or veracity, exists.

The third native principle that guides forensic science is the exchange principle, which posits that when two items come into contact, information may be exchanged; the results of such a transfer would be proxy data. Because forensic science demonstrates associations between people, places, and things through the analysis of proxy data, essentially all evidence is transfer evidence.

Principles from other sciences, mainly geology, apply to forensic science. The first is Uniformitarianism, which states that natural phenomena do not change in scope, intensity, or effect with time. Paraphrased as "the present is the key to the past," the principle implies that a volcano that erupts today acts like volcanoes did thousands or millions of years ago; geologists can interpret proxy data from past events through current effects. Likewise, in forensic science, bullets test-fired in the laboratory today are comparable to bullets fired during the commission of a past crime. The same is true of any analysis in forensic science that requires a replication or reconstruction of processes in play during the crime's commission.

Three additional principles from geology applicable to forensic science are of

- Superposition, in a physical distribution, older materials are below younger materials unless a subsequent action alters this arrangement;
- Lateral Continuity, disassociated but similar strata (layers) can be assumed to be from the same depositional period; and
- Chronology, the notion of absolute dates in a quantitative mode and relative dates in a relational mode, that is, older or younger.

A forensic example of the principle of superposition would be the packing of different soils in a tire tread, the most recent being the outermost. A good case of lateral continuity would be the cross-transfer of fibers in an assault, given that the chances of independent transfer and persistence prior to the time of the incident would be improbable. An example of absolute chronology in forensic science would be the simple example of a purchase receipt from a retail store with a time-date stamp on it; examples of relative chronology abound but can be thought of as a layer cake, with the older layers at the bottom.

Philosophy, Foundations, Principles