



## Physical Anthropology Section - 2014

### H27 An “Insider” Look at Forensic Anthropology: Theoretical Grounding, Logical Reasoning, and Scientific Explanation

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The goal of this presentation is to explore the epistemological foundations of forensic anthropology. A focus is the applicability, accuracy, and limitations of three major forms of reasoning and argumentation utilized in forensic anthropology, which contribute to its status as a distinct, scientific discipline.

This presentation will impact the forensic science community by helping attendees to gain a clearer understanding of the theoretical grounding which defines forensic anthropology as a discipline. Meeting attendees will gain a clearer perspective on the differences between the major forms of logical reasoning, their effect on hypothesis generation and testing as well as evidence collection and interpretation, and their importance in the fields of scientific and legal argumentation.

A recent “outsider” view of forensic anthropology has questioned its legitimacy as a discipline and as a science due to the absence of a grounding body of theory. Forensic anthropology is seen as focused on applied “lab-based” activities; field recovery and documentation utilize established archaeological methods, but no broader theoretical development in the field is evident.<sup>1</sup>

Scientific theory provides testable explanations for observed phenomena.<sup>2</sup> It is shown here that forensic anthropology routinely constructs and utilizes scientific theory, both in the lab and field. In arriving at explanations for observed incidences of trauma, taphonomic effects, and even the characterization of the biological profile, forensic anthropologists develop and utilize a broader theoretical base (including well-established forms of logical reasoning) than is suggested by the above criticism.

Construction of theory is dependent upon logical reasoning and argumentation. Three major forms of logical reasoning—deductive, inductive, and abductive argumentation—are used by forensic anthropologists to offer plausible explanations for the specific types of data they examine.<sup>3</sup> As explanations of observable phenomena, they form the scientific theoretical foundation of forensic anthropology. In this presentation, each of these three forms of logical argumentation are defined, compared, and illustrated by examples from forensic anthropological research.

Deductive reasoning is based on the concept that if the premises of a statement are true, then the conclusion must also be true. Inductive inference is based on the statistical evaluation of a set of data and assessment of the probability that an explanation is correct. Although both inductive and deductive reasoning are components of the traditional model of scientific reasoning referenced in the *Daubert* standard, less rigorous or definitive abductive arguments are also a component in the development of scientific knowledge. This form of reasoning is also called “inference to the best explanation” - the explanation that is most compatible with the available data.<sup>4</sup> Abductive reasoning is context-dependent and most effective in providing explanations for rare or unique events (common to forensic anthropology), with the ability to incorporate large numbers of variables into an explanation. It is dynamic and falsifiable in that new data can invalidate initial explanations. Although abductive reasoning is the initial step in the development of scientific hypotheses, abductively-based explanations in themselves are critical for guiding evidence collection and interpretation. In forensic anthropology, abductive reasoning forms the basis for the majority of taphonomic studies, reconstructions of forensic scenes and events, and interpretation of trauma. Abductive arguments should not be excluded from scientific theory building (or courtroom testimony) for they are often compatible with both scientific and legal dialogue – the *Kumho* ruling allows the judicial system some flexibility in admissibility of arguments like these that have not been fully tested.<sup>5</sup>

Thus, much of what forensic anthropologists do is indeed scientifically rigorous, although not in the strict deductive-nomothetic sense in which science is often portrayed. There is a solid, albeit nascent, grounding body of theory (and theory building) inherent in forensic anthropology. The characterization of our discipline as atheoretical is not a “fatal flaw” – this depiction is both inaccurate and untenable.

#### References:

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### **Forensic Anthropology, Theoretical Reasoning, Scientific Explanation**