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### E26 How Abductive Reasoning Impacts Criminal Investigations

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After attending this presentation, attendees will understand the relationship between the six modes of abductive reasoning and criminal investigations.

This presentation will impact the forensic science community by highlighting the importance of abductive reasoning during criminal investigations and provide educational tools to enhance these reasoning skills.

In legal and investigative research domains, abductive reasoning has been used and discussed and computerized programs have even been developed.<sup>1,2</sup> This research explores the six modes of abduction in relation to reasoning patterns of criminal investigators in an effort to better develop reasoning-in-practice skills for forensic science education students. Peirce argued that “All the ideas of science come to it by way of abduction. Abduction consists of studying facts and devising a theory to explain them.”<sup>3</sup> The six modes of abduction are based on Peirce’s first six classes of signs. The six abductive reasoning modes are: Omen/Hunch; Symptom; Metaphor/Analogy; Clue; Diagnosis/Scenario; and Explanation.

Analysis of two exemplar homicide investigation cases are used in this study. The first case examines the murder of Dr. Jeffrey Farkas, a 26-year-old pediatric intern at Children’s Hospital in Pittsburgh, PA, who was found brutally murdered in his home. The convicted murderer, William Yarbough, was sentenced to life in prison. The second case example is based on historical documentation and is known as the “Dutch Case of the Ball Point Pen Murder.” In 1991, a woman’s son found her lying dead on the floor of the living room in her house. Her right eyelid was swollen and slightly wounded. An autopsy performed the next day found a complete ballpoint pen that had penetrated her eye, causing mortal brain damage.

A comparison of these two cases highlights the importance of abductive reasoning during criminal investigations and highlights ways education can help enhance these skills. In the Dr. Farkas case, the criminal investigation team focused on the evidence and began to build that evidence together from hunches, to clues, to analogies, to potential scenarios of who and why. In the ballpoint case, the investigators focused on an explanation, the end stage of abduction, of murder almost instantly. The case then fixated on finding evidence to support the explanation and not the reverse. The investigators appeared to start with induction and deduction instead of developing multiple potential scenarios and then testing them, as is common with abduction.

This study demonstrates the reasoning processes that occur in criminal investigations and the importance of using abductive reasoning as a primary investigative tool. This is more than basic pattern searching, which can lead to incorrect inferences.<sup>4</sup> The key is the development of the pattern and then the testing of that pattern with new data (evidence). This type of Peircean experimentation is the skill set that needs to be developed and understood to be used to its fullest capacity during investigations. In addition to this work, related work is ongoing in forensic education with reasoning, decision points, and the ethical consequences associated with them.

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#### Criminal Investigation, Reasoning, Education