

E11 Forensic Gait Analysis—Scientific Foundations, Applications, and a Case Study

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Learning Overview: After attending this presentation, attendees will understand the scientific foundations, limitations, and current methodology of forensic gait analysis as well as the potential applications of forensic gait analysis to other forensic and scientific specialties and precautions to be aware of when utilizing gait. These areas of consideration will be shown through a detailed review of a case study involving the identification of the criminal of a violent armed robbery.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by imparting insight and understanding into the scientific principles and methodology of the new, growing field of forensic gait analysis while explaining the limitations of gait in the forensic context and recognizing the growing number of applications of forensic gait analysis to other scientific and forensic specialties.

Gait—the individual way that people walk or step—has been used by laypersons to identify criminals since 1839. However, the modern, scientific use of gait analysis in the forensic context began in 2000 when a podiatrist used gait analysis to link a suspect to a crime. Since then, striking advances and standards—from the robust United Kingdom’s *Forensic Regulator’s Gait Analysis Code of Practice* to reliable, scientific methodologies—have developed in the new, growing field of forensic gait analysis.¹ This strong, structural framework has enabled forensic gait analysis to become an extremely valuable tool in criminal investigation and prosecution, with applications emerging in medicine, anthropology, digital science, engineering, biology, and other sciences.

Recent research has established a standardized methodology to analyze and recognize features of gait among individuals that offers significant validity, reliability, and accuracy.²⁻⁴ To that end, forensic gait analysis has played an important role in over 100 criminal cases in the United Kingdom and has been increasingly accepted as relevant, admissible evidence in the United States.

Forensic gait analysis allows investigators to assist law enforcement by linking (or unlinking) suspects to crimes by analyzing the way in which a person of interest walks or their *gait* as valuable legal evidence that in the past has often been overlooked. With increasing frequency, perpetrators are captured on surveillance video, and at times—even with their faces obscured or hidden—a suspect may be linked to the criminal activity based on his or her gait.

Principles of forensic gait analysis are now being utilized by other forensic and science disciplines. For example, the use of footprints and foot tracks found at crime scenes can be analyzed in conjunction with surveillance video to enhance the assessment of the perpetrator’s gait, either for comparison with a suspect or to create a biologic profile. With video surveillance increasing and phone technology that allows for the recording of crimes becoming more ubiquitous, the need for forensic gait analysis is certain to grow and, with it, the increased application of forensic gait analysis to other disciplines.

Reference(s):

1. *Code of Practice for Forensic Gait Analysis*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918878/137_Forensic_Gait_Analysis_Issue_2.pdf.
2. Birch, Ivan, Maria Birch, Lucy Rutler, Sahrah Brown, Libertad Rodriguez Burgos, Bert Otten, and Mickey Weidemeijer. The Repeatability and Reproducibility of the Sheffield Features of Gait Tool. *Science & Justice* 59, no. 5 (2019): 544-551.
3. Birch, Ivan, Maria Birch and Jalmeen Lall. The Accuracy and Validity of the Sheffield Features of Gait Tool. *Science & Justice* (2020).
4. Birch Ivan, Louis Raymond, Anastasia Christou, Milan Angelo Fernando, Nigel Harrison, and Flo Paul. The Identification of Individuals by Observational Gait Analysis Using Closed Circuit Television Footage. *Science & Justice* 53, no. 3 (2013): 339-342.

Forensic Gait Analysis, Gait, Video Comparison