Footwear and Foot Impressions: Overview

Comparison and Identification

Comparison is defined as “the process of ascertaining whether two or more objects have a common origin” [1]. In footwear and foot impression evidence, this occurs through the analysis of the impression in question from the scene of a crime and an evaluation of similarities and differences to a source in question. The source item and exemplar impressions made by the item are compared to the impression from the scene.

In the area of footwear comparison, impressions are made by the outsoles of the shoes or boots. A footwear comparison is conducted using both the actual shoe and test impressions made using the shoe in question (Figure 1). The characteristics that are compared range from class or manufactured characteristics, which are attributes of the design and manufacturing processes, to accidental or acquired characteristics, which are due to random occurrences. Class characteristics may include the item of footwear as a possible source of the scene impression or they may eliminate the item of footwear as a source of the impression. The presence of sufficient individualizing characteristics, as well as the absence of unexplainable/meaningful differences, in both a scene impression and an item of footwear may result in identifying a particular shoe as the source of an impression.

There are quantitative and qualitative elements involved in the comparison of shoe impression evidence. Physical size, shape, and relative position of both manufactured and acquired characteristics may be compared quantitatively through processes such as overlaying a test impression of a shoe on top of an actual size photograph of a crime scene impression or examining the exemplars side by side and using calipers. Differences, similarities, and value of associations and disassociations are interpreted qualitatively based on training and experience. Influences such as movement during impression deposition, effects of substrate material, and collection methods are studied during training and are continually evaluated through experience. Training and certification programs establish standards and expectations for footwear examiner experts.

The International Association for Identification has established a recommended course of study for shoe and tire examiners and has a certification program in the area of footwear examination [2]. The Canadian Identification Society also has a footwear examination certification program [3].

It is noted that there are differences in the methods of reporting of comparison conclusions between agencies and between countries. However, comparison results commonly range from general correspondence of outsole design characteristics to an agreement of unique characteristics. More information about the interpretation of footwear impression can be found in the Statistics(Interpretation) section of the present Encyclopedia.

Foot impression comparisons are conducted by analyzing an impression of a bare or sock-clad foot from a crime scene and an evaluation of the similarities and differences to the foot of a person to determine if they may or may not have made the impression. If a barefoot impression includes the recording of skin detail, known as friction skin, then the impression is analyzed in the same manner as fingerprints and palm prints. However, if a conclusion based on the unique features of the skin is not possible, a comparison of the shape features of the feet may be conducted. This type of comparison may result in the inclusion or exclusion of a person as the possible source of the crime scene impression.

Foot impressions and linking foot to shoe

Foot impressions also may be present in the insides of shoes. This type of impression may be of value to determine who wore a particular shoe. A shoe may be compared to exemplar impressions of the foot of a person and/or to other items of their footwear. By comparing the size and shape of the features of the foot, with consideration for the possible effects of these features when inside of a shoe, a person may be included or excluded as the possible source of the impressions in an item of footwear (see Footwear and Foot Impressions: Foot Impressions and Linking Foot to Shoe for more information).

Footwear impressions

Footwear impressions may occur as a result of deposition of a material, removal of a material,
An item of footwear may step into a material such as dirt, dust, oil, or blood. This material can transfer in subsequent steps to a relatively clean surface, leaving an impression of the outsole of the footwear. A clean footwear outsole may come into contact with a surface covered with material such as dirt, fine dust, or powder. This material may stick to
the clean outsole as travel occurs across the surface. This may leave an outline, or negative impression, of the outsole design behind.

A soft material, such as mud or snow, may hold an impression of a footwear outsole after a step into it has occurred. The condition of the material and the environment affects the quality of the impression over time. For example, the snow may melt, or wet mud may flow back into the impression, covering detail. If, however, the nature of the material is conducive to maintain the shape of the footwear outsole, a three-dimensional recording of the outsole will be recorded.

Detection and recovery techniques

The methods utilized for detection and recovery are dependant upon the condition and nature of the impression. Deposition or removal of material usually results in a two-dimensional impression and is usually photographed and lifted. A three-dimensional impression is usually photographed and cast.

Detection of footwear impressions may be accomplished by careful observation and through the use of lighting techniques, forensic light sources, application of chemicals, or lifting materials and equipment (Figure 3). The composition material of the impression will determine the method used for detection, possible enhancement and recovery. Dust and blood, for example, require a different series of processing techniques for two-dimensional impressions. There are also different casting materials and techniques utilized for three-dimensional impressions in dirt, mud, sand, and snow. Impressions on surfaces that may be removed from the scene may be collected, still attached to the original surface, such as a shoe impression on a piece of paper, or on flooring that may be cut out and removed.

Footwear outsole databases

Databases of footwear outsole impressions are utilized to search impressions from scenes of crime to determine what type of footwear may have left the impression. Once a possible source is determined, it may be possible through manufacturer information to determine a size or size range of shoes that made the impression. Outsole databases are created through the collection of footwear designs and entry into an electronic system, which allows searching and retrieval based on the patterns and designs of an impression.

Crime scene impressions of footwear may also be entered into database search and retrieval systems. Unidentified impressions may be compared to one another, potentially linking impressions from different crime scenes to one another (see Footwear and Foot Impressions: Databases for more information).

References

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Further Reading


LESLEY HAMMER