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Title: THE TRACKS THAT ARE LEFT BEHIND FOOTPRINTS ON CRIME SCENES

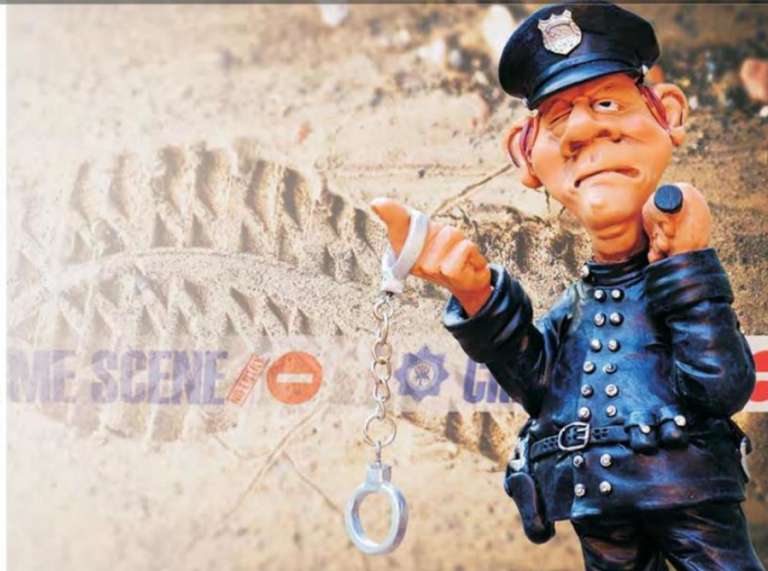
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THE TRACKS THAT ARE LEFT BEHIND FOOTPRINTS ON CRIME SCENES

By Kotie Geldenhuys in cooperation with Lt-Col (ret) Frans van der Merwe
Photos courtesy of Wikimedia, Pexels and Needpix

When a perpetrator tries to hide evidence of a crime, it is commonly referred to as "covering their tracks" such as when a burglar wipes his fingerprints off with a cloth after breaking into a home. Although he believes that he has erased his traces, he might not realise that his shoe or vehicle's tyre impressions can still connect him to the crime scene. These impressions are referred to as "pattern evidence" because they create unique patterns. Shoes and boots leave distinct prints and impressions based on their brand, style and size.

Footwear mark evidence involves comparing the physical characteristics of footwear items. During this analysis, a shoe is evaluated against a footwear mark based on pattern, pattern arrangement, wear and fine details, including unique damage. The interpretation of features and evidence in footwear mark cases is subjective and depends on the examiner and the specific comparison conducted.

The scope of a thorough examination has two primary functions: first, the recovery process, which involves discovering and preserving the prints; and second, the identification process, which includes evaluating, comparing and interpreting the recovered impressions (Steyl and Potter, 2011).

Value of footwear evidence

Forensic footwear evidence can be crucial in legal proceedings, helping to establish the presence of a specific shoe at a crime scene. Footwear evidence is often the most abundant type found at crime scenes and can sometimes be as specific as a fingerprint. In South Africa, unlike fingerprint matching, shoeprint identification does not require a minimum number of similarity points to be admissible in court. When unique characteristics are insufficient for a definitive match, the shoe impression can still reveal class characteristics such as the approximate size and weight of the person. Deeper impressions at the heel might indicate that the person was carrying a heavy load, while deeper impressions at the sole could suggest that the suspect was running (Lochner and Zinn, 2015).

The following four factors can help investigators to establish a suspect's profile and link them to a crime scene:

- **Footwear manufacturer, model and size:** Analysing the footwear impression for class characteristics can help to identify the manufacturer, model and size of the footwear.
- **Approximated height:** Measuring the footwear impression and stride length can provide an indication of the suspect's possible height.
- **Activity of the wearer:** Impressions can differ based on whether the person was running or walking and whether they were carrying a heavy load, reflecting these activities in the depth and pattern of the impressions.
- **Individualising the suspect's shoe to the impression:** Expert comparison between the suspect's shoe and the recovered



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cast can confirm that a specific shoe, and no other, made the impression found at the crime scene (Steyl and Potter, 2011).

Despite its potential value in connecting a person to a crime scene, footwear evidence is sometimes overlooked by investigators in forensic investigations. If this evidence is not immediately identified and preserved, it can be easily destroyed.

Crime scene footwear evidence

Footwear evidence is commonly found at crime scenes in two forms namely impressions and prints. While various sources describe the types of footwear impressions differently, Zinn and Dintwe (2015) inform us that sources agree on two types of evidence left by footwear at a crime scene:

- **Two-dimensional impressions or transfer prints:** These prints are transferred from a soft to a hard surface, typically found indoors on surfaces such as ceramic tiles (Zinn and Dintwe, 2015).
- **Three-dimensional impressions:** Also known as indented impressions or compression marks, these prints are transferred to a softer surface and are usually found outdoors in materials such as mud, sand or snow (Zinn and Dintwe, 2015).

Lt-Col (ret) Frans van der Merwe explained that while two-dimensional prints have length and width, three-dimensional prints include length, width and depth.

Footwear evidence at crime scenes is classified into three categories, namely:

- **Visible prints** are formed when footwear step into a foreign substance, become contaminated and then make contact with a clean surface, leaving a mark that is visible to the naked eye. These prints are typically left on contrasting surfaces such as tiled floors and are made by substances such as blood, grease, oil or water. It is crucial to photograph this type of print before using any other methods. An electrostatic dust lifter can also be used for prints found in dust (Hilderbrand, nd). The number and direction of footprints can provide insights into the sequence of events, as demonstrated in the Griekwastad murder case. In this case, police were able to refute the accused Don Steenkamp's alibi by analysing a shoeprint made in blood, which helped to establish the timeline of events (Lochner and Zinn, 2015).
- **Plastic prints** are impressions formed when footwear steps into a soft surface, such as deep mud, snow, wet sand or dirt, creating a three-dimensional mark. These impressions should be photographed and then cast, as they provide a detailed view of length, width and depth (Hilderbrand, nd).
- **Latent prints**, often found on smooth surfaces, are commonly overlooked. These prints can be developed similarly to latent fingerprints, requiring various powders, chemicals and forensic light sources to become visible for proper collection. These prints should typically be photographed before any recovery process (Hilderbrand, nd). In the 2013 murder case of Dustin Blom, forensic investigators discovered a shoeprint and a bare footprint using Blue Star, a substance that reveals blood traces. Both the Local Criminal Record Centre (LCRC) and the provincial forensic team were



involved, with the latter providing photos to the prosecution. One photo clearly showed a bare footprint with dimensions. State prosecutor Adv Zaais van Zyl, upon comparing it to his own foot, noticed it was small. He instructed the investigating officer to obtain a footprint image of one of the suspects, namely Maruschka Robinson for comparison purposes. A footprint lifted from the murder scene floor matched Maruschka's footprints. When Adv Van Zyl examined photos of the footprints found at Dustin Blom's home, he inquired about their grainy appearance. The forensic expert explained that it seemed that the floor had been wiped before the footprints were made and that the person was wearing socks when making the prints in the blood. Despite attempts to clean the scene, the footprints remained visible and were used as evidence in court. J P Malan and Maruschka Robinson were eventually convicted of Dustin's murder. (Refer to the Crime Series published in **Servamus**: December 2015.)

Recovering footwear impressions

Recovering footwear impressions at a crime scene is crucial although Lt-Col (ret) Van der Merwe emphasised the need to prevent contamination when collecting this evidence. To mitigate this risk, forensic experts should use forensic stepping plates while processing the scene.

Examiners use several techniques to collect footwear and tyre track evidence, depending on the type of impression encountered. Four primary methods are used for recovering footwear impressions at crime scenes:

- When **photographing** the scene, it is crucial to capture overall, medium and close-up shots before proceeding with comparison photographs. Use a relationship technique by placing numbered markers next to evidence prints for reference. Ensure that crime scene photographs are taken before altering evidence with numbered markers. Use the same numbering system for quality examination photographs. High-quality close-up shots are essential for a thorough examination, achievable with patience and careful setup. Mount the camera on a tripod, aligning it parallel to the print's plane for 1 to 1 scale reproduction. The frame should include the print, scale and information card. When using flash, position it at least 45 degrees from the print and shoot from three different angles to achieve oblique lighting. This technique enhances contrast by reflecting varying amounts of light from shadowed and non-shadowed areas, revealing finer details. Whenever possible, photograph prints from each foot, with no maximum limit on the number of photographs. It is preferable to have excess rather than insufficient documentation. Correctly photographed impressions often provide footwear examiners with more detailed information than lifting or casting, facilitating a more precise examination and comparison. In tracking, photograph the scene as initially found and label each impression with numbers. This aids in later reference to

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the location of each impression. Subsequently, quality examination photographs can be taken (Hilderbrand, nd and Steyl and Potter, 2011).

- Detailed **documentation and sketching** of impressions are conducted to supplement photographic evidence, providing additional context and clarity.

- **Lifting (visible and latent prints):** Using the oblique lighting technique often reveals numerous latent footwear impressions. Once detected, capturing clear photographs can be challenging, but using latent fingerprint powders aids in enhancing contrast for easier documentation. This process mirrors the method used for dusting latent fingerprints. Following development and photography of the prints, the retrieval process remains consistent, using fingerprint lifting tapes and appropriate contrast backgrounds for mounting the lifts. It is crucial not to prematurely cover an impression with tape to preserve it before completing the photographic documentation, as this action may obscure the print and hinder subsequent enhancement efforts. Tape should only be applied over the impression once all other enhancement methods have been exhausted. It is also important to ensure that the footwear evidence hasn't been contaminated by dust, as alternative collection methods may be more appropriate (Hilderbrand, nd).

- **Casting** stands as the predominant method for collecting impressions in soft surfaces such as soil or snow. Previously, plaster of Paris was commonly used for casting footwear and tyre tread impressions; however, current recommendations call for the exclusive use of dental stone. Dental stone, similar to plaster of Paris, is a variant of gypsum but yields superior outcomes. It has demonstrated significantly greater strength, negating the need for reinforcement materials during pouring. Notably, dental stone surpasses plaster of Paris in durability and hardness, facilitating easy cleaning in the laboratory with a potassium sulphate solution without sacrificing surface detail. Dental stone is readily accessible from local dental supply outlets and is overall more cost-effective compared to plaster of Paris. While it is ideal to cast all three-dimensional footwear impressions at a scene, it may not always be feasible. In cases where casting all impressions is impractical, meticulous attention should be paid to casting the most exemplary footwear impression evidence available. Close examinations of each impression should be undertaken to ascertain which impression exhibits the clearest detail. Illuminating each impression obliquely from all angles can help with these visual assessments. Impressions with the finest detail should be identified and preserved for future casting, while all impressions should be photographed with a scale for future reference, regardless of casting intentions. Three-dimensional impressions should always be cast if clarity permits and the surface allows. After the dental stone has fully cured and before removing the cast, it is imperative to inscribe essential identification details, such as the date, time and location of the cast, GPS coordinates, the particulars of the caster and any witnesses present, using a permanent black marker on the back side. Casting holds significance for various reasons, including:

- ❖ The cast provides a lifelike, actual-size replica of the original impression, capturing uneven surfaces and depths.
- ❖ It reproduces microscopic characteristics.

- ❖ In deep impressions, it replicates characteristics of the sides of outsoles and midsoles of shoes, which are often not captured in photographs.
- ❖ It eliminates focus or scale issues.
- ❖ It furnishes tangible three-dimensional evidence.
- ❖ It serves as a backup to photographs (Hilderbrand, nd and Steyl and Potter, 2011).

Fitting the shoe to the person in question

Once it has been established that a particular shoe left the print or impression, the challenge shifts to identifying the individual who wore the shoe at that time. Investigating officers should ensure that shoes are included in the search warrant and collect both left and right shoes from the suspect. With the shoes, footwear prints, impressions and a suspect in hand, tracking dogs can conduct a scent identity parade to identify the person whose scent is most prominent on the footwear. DNA analysis and circumstantial evidence can be used to connect a person to a specific shoe (Steyl and Potter, 2011).



Footwear or shoeprint evidence stands out as one of the most effective means to connect a suspect or victim to the crime scene. This type of evidence serves to ascertain whether a suspect was present at the scene or to rule out a person of interest from the investigation. Despite its significance, shoe prints may not always conclusively establish guilt or innocence. Variables such as environmental conditions, print quality, and the presence of additional prints at the scene can influence the interpretation. Consequently, shoe print analysis serves as a component of the forensic puzzle and is usually complemented by other evidence to construct a case.

In the September 2024 issue:

Next month we will look at tyre tracks at a crime scene.

List of references

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