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The relevance of understanding bloodstain patterns and bloodstain patterns analysis (BPA) at crime scenes in Johannesburg, South Africa

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Abstract: It is very essential for the crime scene investigator to understand the importance of the bloodstain spatter at the crime scene specially where violent toot place. It doesn't matter how small the drop or the spatter is it will always tell a story. Bloodstain pattern analysis (BPA) is an important part of forensic science that contributes significantly to crime scene investigations. Forensic investigators may learn a lot about a crime scene occurrence by examining the shape, distribution, and position of bloodstains. Bloodstains can show the sort of weapon used, the number of strikes or bullets, the victim and assailant's positions and movements, and the order of events. The usefulness of bloodstain pattern analysis lies from its capacity to recreate the crime scene and reveal previously unknown information. Bloodstains of various sorts, such as splatter, droplets, pools, or smears, might suggest a variety of acts, including a fight, a fatal wound, or an attempt to clean up the crime scene. Furthermore, the examination can help determine if the bloodstains were created by the victim, the offender, or another person, assisting in the identification of those involved. BPA results can be used as strong evidence in court, supporting or opposing witness testimony and providing to a better understanding of the crime. It is a subject that needs careful attention to detail, a understanding of forensic science and the aforementioned analysis in order to discover the truth behind violent occurrences. Participants were interviewed for the article using a qualitative empirical technique with approval from the South African Police Services and ethical clearance from the University of South Africa. The article's conclusions and suggestions were important for the police to follow.
Keywords: Bloodstain, Bloodstain pattern, Blood pattern analysis; Crime scene; Crime scene reconstruction; identification and individualisation.

Introduction

Protecting and preserving the crime scene is necessary when investigating bloodstain patterns in violent crimes in order to gather solid evidence that will hold up in court (Baxter, 2015: 34; White, 2010: 27). Bloodstain patter analysis during criminal investigations is not a completely new technique, and has long been used by the SAPS (SAPS, 2015: 2). In addition to the above-stated associated variables, the researcher's understanding of criminal investigations involving bloodstain patterns at crime scenes was enhanced with the classification of bloodstain patterns obtained in the literature from luminaries in the field, such as James, Kish and Stutton (2009: 67). The latter authors intimate that the classification or categorisation of bloodstain patterns is also reflective of the continuing evolvement of the terminology of blood pattern analysis. Both Siegel (2011: 99), and Dutelle and Becker (2019: 177) share the view that blood splattered spatter pattern recognition and analysis is a growing area in crime scene technology and forensic science. It has become a vital method in assisting forensic investigators to determine *what* occurred in a violent incident involving bloodshed.

Additionally, this method can be used to incriminate or exonerate a suspect, and also instrumental in the reconstruction of the violent incident. In fact, Siegel (2011: 100) clearly states that blood spatter patterns will reveal valuable details of a violent crime, including the following: (a) nature of activity 'triggering' the bloodshed;(b) origin or source of the bloodshed;(c) direction travelled; (d) distance between blood source and surface of the target; (e)

positions and movements during or after bloodshed incident;(f) number of blows or hits; (g) identifying individuals who were at scene; (h) and establishing order of events during, and after bloodshed event.

The purpose of the article basically explores the concept, 'bloodstain patterns' as pivotal aspect of criminal investigation in relation to the research topic.

Research Methodology

Qualitative research permits the researcher to engage with respondents effectively and gather information from them (Creswell, 2014:9-24).This study used a qualitative research technique, with the target audience being crime scene investigators from the South African Police Service's 14 Ekurhuleni North Cluster police stations. Sample A participants were chosen using a simple random sampling technique, and they were 28 Ekurhuleni North Cluster Local Criminal Record Centre crime scene investigators. Sample B participants were chosen using purposive sampling, and they were two blood pattern analysis experts from the Forensic Science Laboratory in Pretoria. A semi-structured interview begins with a planned set of open-ended interview questions, but the interviewer can rearrange the questions based on the research setting (Saunders, Lewis, & Thornhill 2016: 600). In adding Bertram and Christiansen (2014:80) emphasizes that an interview is a conversation between the participant and the researcher, which supports this viewpoint. However, the researcher sets the agenda and poses the questions, which is how it varies from a normal chat.

The participants' empirical data showed that a large number of them think that a suspect can be identified by comparison using DNA that was swabbed from the blood spatter. The process of individualization can also be used to identify whose blood was discovered on the scene from the blood spatter. Individualization is a process that links tangible evidence to its likely source and demonstrates that a given sample is unique, even within the same class. Additionally, individualization is characterized by the identification of a particular source of evidence by comparison with a recognized entity (Lochner, 2016:48; Ogle & Plotkin, 2018:10).

What procedures are used in the Ekurhuleni North policing cluster to record and handle bloodstain patterns at crime scenes? Every participant gave nearly identical answers, with the exception of the phrase they employed. The majority of these answers are consistent with the research, which holds that forensic investigation is focused on using science to uncover the truth during the investigation (Becker & Dullete (2019: 7; Orthmann & Hess, 2013: 8).

Literature Review

Understanding bloodstain patterns and bloodstain patterns analysis (BPA)

In Johannesburg, South Africa most serious and violent cases closed undetected because lack of blood spatter experts, less knowledge and as a results lead to a failure of protecting and preserving the blood spatter analysis by the citizens mostly professionals like paramedics, police officers and investigating officers attending such crime scenes involving bloodshed.

Bloodstain

According to the study, a bloodstain is a surface mark, discoloration, or tint that is brought on by blood from its primary source (Maloney & Housman, 2012; 251). In addition, the Oxford Advanced Learner's Dictionary (2015), in agreement with the above author that a bloodstain is "a mark made by blood, often as a result of a violent event" (Oxford English Dictionary). According to this study, any bloodstain on any surface serves as a focal point of interest that both first responders are drawn to.

Bloodstain Patterns

Bloodstain patterns can be discovered in a variety of contexts, such as suicides and violent crime scenes. Consequently, the classification of bloodstain configurations on the surface at a crime scene is associated with bloodstain patterns (James et al., 2005: 67). Bloodstains, on the other hand, are seen by Maloney and Housman (2012:251) as characteristic patterns of splatter, flows, and drips that come from violent or harmful crimes and are useful for reenacting bloodbath episodes. Furthermore, Brodbeck (2012:53) concurs with the aforementioned writers that bloodstain spatter is the term used to describe an airborne drop of blood created when an external force is applied to liquid blood.

Bloodstain patterns can be categorized and arranged in this way to help detectives and other interested parties understand how a specific major criminal incidence might have happened. In this investigation, bloodstain patterns are essential for identifying or distinguishing a certain criminal suspect from numerous others (Lochner, 2016: 48).

Bloodstain Pattern Analysis (BPA)

Since each crime scene is unique, all that is needed to uncover the facts and create a convincing presentation of the prior acts is a thorough analysis of the evidence. The most comprehensible aspect of forensic science that shows its reconstructive existence in analyzing and interpreting bloodstain patterns is bloodstain pattern analysis (Shaler, 2012: 373). In order to comprehend complex crimes and apprehend offenders, forensic investigators rely on this fact, which is subject to strict forms of proof. The BPA data helps the investigator rebuild the crime scene, validate witness statements, and decide whether to include or rule out potential suspects.

Bloodstain pattern analysis basically involves analyzing bloodstains at a crime scene in order to recreate the actions associated with the violence (James, Kish, & Stutton,2009:163). Analysts might draw conclusions about actual or likely crime scene events based on the patterns that the blood makes during bleeding, including the size, shape, position, and distribution of the bloodstains (Shaler, 2012: 373). Bloodstains patterns can be seen in a variety of contexts, such as violent crime scenes and suicides.

In order to recreate the sequence of events, BPA analyzes and interprets the dispersion, shape, volume, pattern, number, and relationship of bloodstains found on the crime scene (Houck and Siegel 2010: 244). On the other hand, Larkin (2015: 218) highlights that BPA is the forensic analysis of blood forms at crime scenes after violent incidents.

BPA is defined by Fish, Miller, Braswell, and Wallace (2014:162) as the identification of bloodstain shape, location, and spreading patterns to explain the physical activity that took place at the crime scene.

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Relevance of Identification in the Context of Bloodstain Pattern Analysis

The process of categorizing an object according to its specific groups is known as identification (Van Rooyen, 2012: 20). A predefined class with comparable traits or attributes is assigned to an entity, object, or person throughout this process (Champod, 2015: 95; Girard, 2015: 40). Since it refers to the classification procedure that places an entity in a predefined and restricted class with the goal of analyzing physical evidence and eventually identifying and comparing it to a known source or origin, identification is a key concept in criminalistics (Osterburg & Ward, 2014: 34). On the other hand, identification, according to Van Graan and Budhram (2015: 47), is the process of comparing the characteristics or form of an object or substance to evidence collected from a crime scene. There are various forms of identification, according to Zinn and Dintwe (2015: 48), including situational, witness, victim, imprint, origin action, perpetrator, and cumulative identification.

The Use of Bloodstain Patterns in Suspect Identification

Dutelle and Becker (2019: 179) assert that the ability to perceive a bloodshed case should be regarded as a forensic capability that is helpful to the crime scene investigator's better understanding of what did, and did not happen during a bloodshed event. The information gathered could help prosecute a suspect, corroborate witness testimony, interrogate a suspect, recreate a case, and potentially exonerate an accused individual (Dutelle & Becker, 2019: 179; Lyman, 2011: 19).

Meaning of Individualisation and Its Value

Zinn and Dintwe (2015: 64) assert that the act of linking tangible evidence to its likely source is known as individualization. Individualization, according to Lochner (2016: 48), is evidence that a certain sample is unusual, even among students in the same class. Ogle and Plotkin (2018: 10) go on to say that identifying a particular source of evidence by contrasting the item in question with something that is known is what defines individualization.

In agreeing to the responses mentioned above, participants defined individualization as the process by which unique traits become unique. This definition differs from Birzer and Roberson's (2012: 104) definition, which defines individualization as the process of reducing a classification until only one item is left in the class.

The Use of Bloodstain Pattern in Suspect Individualisation

Fisher and Fisher (2012: 5) ascertain that physical evidence could emanate from a single source, and only be associated with group or class. Only a few cases of physical proof are capable of being personalized. Meanwhile Van

Graan and Budhram, (2016: 64) assert that individualisation is preceded by identification, followed with classification, and results in allocation of specific sources to specific items of physical evidence.. The following case law provides another example of the utilisation of bloodstain patterns for identifying a suspect.

The Case of Gebengwana and Another v S (CA&R186/2015) [2016] ZAECGHC 95 (21 September 2016)

A third man, "Mr. M," was initially charged with two other accused appellants, "Mr. G" and "Mr. N," in the aforementioned criminal case, which was heard at the Eastern Cape Division of the High Court on August 22, 2016, and delivered on September 21, 2016. The case involved murder and robbery with aggravating circumstances. However, Mr. M passed away prior to the trial. According to Constable "F's" testimony, she was on duty on May 29, 2011, when she was notified at around 20,000 hours that a house robbery was taking place at the Kooms' residence. Additionally, she was informed that three individuals who spoke IsiXhosa had driven off in a black Golf. Shortly after midnight, she was going about her day when she spotted a black Golf car carrying three men.

Dr. "O" collected the deceased's blood for DNA analysis during the post-mortem. According to a declaration he submitted in accordance with Section 212 of the Criminal Procedure Act (No. 51 of 1977), Lieutenant "B," a forensic science laboratory monitoring officer, provided testimony. After analyzing the results of several DNA tests, he discovered that the DNA on the T-shirt discovered in the deceased's bedroom and the DNA on the swab taken from one of the first appellant's shoes matched the DNA obtained from the deceased's reference blood sample. The DNA from the deceased's reference samples, however, did not match the DNA from the first appellant's other shoe swab.

To select a credible response, the participants in Samples A and B were given the following open-ended question: *"How can blood spatter be used to individualize a suspect*?" No further or optional answers were offered. The responses from each sample group's participants are displayed below:

Participants A Only three respondents agreed with the statement that DNA can be swabbed from blood spatter to identify a culprit through comparison, despite the majority mentioning this (Dutelle and Becker, 2019: 179; Ogle (2012: 9).

Participants B show that by gathering and comparing the blood samples of the victim and suspect for DNA testing, blood spatter can be used to identify a culprit.

Girard (2011: 337) says that bloodstain patterns can be utilized to individualize a suspect through DNA analysis of, for example, hair obtained from a person's scalp, and all of the participants' comments support this claim. Additionally, Fish, Miller, and Braswell (2011:141) noted that each person's genetic code is contained in their DNA.

Documentation of Bloodstain Pattern at A Crime Scene

The first police officer to arrive at the crime scene usually starts by securing the area, removing anyone who is not authorized to be there and documenting a bloodstain pattern (Maloney & Housman, 2014: 254). Forensic investigation and crime scene management, as well as making sure that the video and pictures have been captured, depend on the crime scene being handled properly.

Ogle (2004: 35) asserts that photography plays a significant role in the sequential reconstruction of the crime's actions. Reconstructing the acts that produced the patterns and their timing requires photographs of bloodstains on items (Ogle, 2004:35-36; Bevel & Gardner, 2008: 250). The task of reconstructing a crime scene also requires accurate and thorough scene recording.

In agreeing with the above athor Saferstein (2013: 123), affirms that photos are essential for reconstructing the crime scene and ought to be taken prior to any alterations being made, unless they are necessary to save lives. Like Orthmann and Hess (2013: 50), Saferstein (2013: 123) agrees that a crime scene should be documented as soon as possible, with the most vulnerable areas of the scene being the first to be photographed. In order to avoid leaving behind crucial evidence, such bloodstains that may be used to recreate the scene later, Orthmann and Hess (2013: 50–51) emphasize the significance of taking close-up, mid-range, and long-range photographs while documenting a crime scene.

The Value of Bloodstain Pattern at a Crime Scene

Bloodstain patterns must be analyzed in order to reconstruct the events at the crime scene. Numerous exegetical literature contain this type of study, which has developed into a particular area of forensic science. Albalooshi and Eltabie, 2015: 1. For example, using bloodstain pattern analysis, a case study of a traffic accident helped to reconcile discrepancies between the reports of forensic examiners and a forensic biology department. In one case, a 22-year-old guy passed away right away, and a 31-year-old lady survived a traffic accident.

Both the survivor and deceased were found outside their overturned car, and preliminary observations could not immediately lead to the identification of the driver (Albalooshi & Eltabie, 2015: 1). An external examination revealed that the 22-year-old man succumbed to severe brain injury. Based on the deceased's pattern of injuries, the forensic examiners concluded that he was the driver. Meanwhile, the woman survivor dislocated her clavicle bone, a fractured forearm, and other minor injuries. Furthermore, DNA analysis of bloodstains found on the driver's seat matched the woman, suggesting she drove the vehicle during the accident.
Because of this obvious discrepancy, forensic professionals were able to identify the true driver by running a BPA on the driver's seat. This case study highlights the importance of BPA in road traffic accident reconstruction. Albalooshi and Eltabie, 2015: 1).

Findings

The idea of bloodstain pattern analysis and its related key factors, including forensic investigation, identification, and individualization, were examined and explained in detail in this article. All of these are representative of procedures used to determine important evidence by proving the distinctiveness of traits and actions that were most likely to guide detectives toward connecting the suspect to the crime scene (Orthmann & Hess, 2013:220). It is important to note that the opinions of the sampled participants were most helpful in allowing the researcher to combine the theoretical and empirical aspects of the study into a single framework for constructing the conclusions. According to the participants' comments, there is still more research to be done on the topic of crime scene investigation.

The Analysis of Bloodstains

Only one participant agreed with the literature perspective, which holds that the analysis is based on patterns of blood left on a surface or person, whereas the majority of individuals stated that the bloodstain is likely blood found at the site (Lochner, 2016: 48; Zinn & Dintwe, 2015: 64).
The following open-ended question was presented to the participants in Samples A and B; no other or optional answers were offered, so they had to select a tenable response: "What do you know about the analysis of bloodstain patterns?" Below are the responses from participants A and B
According to participant A, bloodstain pattern analysis defines what happened at the crime scene.
Participant B indicated that the goal of the bloodstain pattern analysis is to learn about and read through the blood spatters in order to conclude what occurred.

In order to ensure that well-prepared and successfully prosecutable cases convert into a higher conviction rate and victory against lawlessness, bloodstain pattern analysis must be used with precision and professionalism, and the crime scene must be documented and photographed.

Recommendations

• Newly investigating officers should receive theoretical and practical training to help them understand forensic investigation regarding bloodstain pattern analysis;
• Experienced crime scene investigators should take a refresher course at least once every five years to empower them and keep them updated on new BPA strategies for handling violent situations involving carnage at the crime scene;
• Workshops should be considered for the assessment, protection, and preservation of bloodstain spatter at crime scenes.

Conclusion

In order to ascertain what bloodstain pattern analysis comprises, its worth, the procedure used to gather bloodstain pattern evidence from the crime scene, and its usefulness in resolving crimes, this article concentrated on the intricate understanding of bloodstain pattern analysis. In order to provide important insights into what happened at the time of a crime, this article highlights the crucial function that bloodstain pattern analysis and its forensic importance play, as well as the crucial role that BPA plays in crime scene reconstruction.

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