

BALLISTIC INTERPRETATION OF GUNSHOT TRACKS

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Abstract: *This article deals with Ballistic interpretation of gunshot traces by presenting the main theoretical and practical aspects, which are related to forensic ballistics, firearms, traces left by them and some elements of forensic tactics and technique.*

Keywords: *firearms, judicial ballistics, gunshot marks, ballistics expertise.*

1. The main tracks

The category of main traces includes: the weapon found at the crime scene, bullets, cartridges, burned tubes, perforations (bullet entry and exit holes), blind channels (penetration traces) and surface traces of ricochets.

a) The weapon found at the scene

In the situation where the crime was committed with a firearm, it is necessary to search for that weapon with which the crime was committed, because it is one of the main means of evidence. After the weapon is found, it will be identified with the help of burnt tubes and bullets, it will be fixed by photography, and then a description will be drawn up in the report. The preliminary examination of the weapon aims to emphasize fingerprints on the bed, trigger and trigger guard, on the barrel or sleeve of the bolt, in the case of pistols, on the magazine and on the cartridges in it, including hairs, blood stains and particles of soil and paint. It must be established whether the weapon has been blocked or not, because in this way the possibility of suicide can be excluded, and if the weapon has all the components, these things must be specified in the report.

Figure 1. The weapon found at the scene (.9mm Glock pistol) and the burnt tubes resulting from the shooting



b) The bullets

They will be looked for everywhere at the crime scene, on the floor or embedded in the floor, in the walls and ceiling, in the door or window frame, in the furniture, in the ground or on the ground, in the grass, in the corpse and in its clothing.

c) Burnt tubes

They will be examined to determine the marks of the recent shooting. In view of the examination, the fresh lustre of the metal and the smell of unburned powder will be followed, and in the case of hunting weapons, the muzzle will be analysed, this being proof of the fact that a hunting weapon was used. If the cartridge was self-made, with the help of graphic expertise, the person who made it can be identified. Burnt tubes will be preserved in the condition from which they were picked up, they will not be cleaned or deleted, being packed separately, specifying the date and place of their finding.

d) Perforations (bullet entry and exit holes)

The perforations are composed of inlet and outlet holes if the lens through which it penetrated is thin, and if the lens is thick the perforation will contain the channel between the two holes in addition to the inlet and outlet holes. The entrance and exit holes are differentiated by specific characteristics on the basis of which the direction of penetration of the bullet and the angle at which it penetrated will be determined. At the entrance holes will be found the friction ring, which is formed by the combustion products of the powder, the metal particles of the bullet and the grease deposits.

It is possible for the bullet to fragment or deform as it passes through the body, resulting in tissue and skin tearing in a manner different from that of an intact projectile. If the projectile penetrates the stomach, heart or other organs that are consistent with water it will tear these organs apart. In these cases, the exit hole will be very large, sometimes it may even be missing due to the explosion of the organ.

If the bullet passes through the glass, it will create a larger exit hole than the entry hole because the shards from the glassy material are pushed forward. The outlet in this case has a conical shape. Similar to these characteristics are those of the exit hole in a cranial bone.

Figure 2. Entrance through a glass pane



If the bullet passes through wood, the exit hole will have similar characteristics to the exit hole. If the wood is dry the exit hole will be larger than the bullet calibre and if the wood is green or wet the exit hole will be smaller than the bullet diameter. In a thin, flat board, the exit hole will have splinters and in the case of sheet metal, the edges of the exit hole will fold in the direction of bullet entry.

The Case of the Perla Hairdresser Massacre

On March 5, 2012 at 5:30 p.m. in the Perla salon on Ştefan cel Mare Road in Sector 2, Bucharest, Gheorghe Vlădan went armed to his wife's workplace and started shooting. As a result of the attack, two people died, six others were injured.

At 2 p.m. the attacker came to the salon, where after arguing with his wife, he threatened her that he would take revenge on her. Vlădan returned to the salon with a Glock semi-automatic pistol, calibre 9 mm, which he legally owned as a police officer. At 17:30, after a short talk with his wife, Felicia, and Mariana Bendre, the cashier of the salon, he opened fire, shooting 8 people. He unloaded all the ammunition from the gun's magazine, 11 bullets in total, one of which was fired through the window, which was later recovered by forensics from a children's playground. Vladan took out his Glock pistol and shot his wife in the chest, then fired 3 bullets into the cashier, one in the head and two in the chest. Later, he also shot three customers of the salon, two customers of the barbershop and an employee of the salon. Of the eight people who were shot, the cashier who was shot in the head died on the spot, and the attacker's wife, who was wounded in the chest area, died at the hospital. Three injured people each arrived at the Elias and Floareasca hospitals. A 32-year-old woman who was shot in the right thigh, a 56-year-old man who was shot in the left knee (the bullet remained in the leg) and another woman in her 40s arrived at Elias Hospital years old who had both calves pierced by a bullet, which left the body but which fractured the tibia. A 56-year-old man and a 54-year-old woman arrived at the Floreasca hospital, both with gunshot wounds to the chest and a 56-year-old man shot in the knee.

After unloading the charger, Vlădan left the hair salon and hid in a Transelectrica headquarters, where he was asked by the institution guard what happened, he replied: "Nothing happened, everything is over, you can call the Police. I did something stupid." Two police officers arrived at the scene and noticed that several people were injured and a man was armed, later disarming him, immobilizing him and handcuffing him. After the attacker was interrogated by investigators at the Transelectrica headquarters, he was sent to the prosecutor's office for hearings, and then to the National Institute of Forensic Medicine, where his biological samples were collected. On February 12, 2013, Gheorghe Vlădan was tried and sentenced to life imprisonment.

Figure 3. The entry hole through the hood of a car (metal)



Figure 4. Entrance hole through a wooden board



e) Blind canals (penetration marks).

They feature a large inlet and a plugged channel. The distinction between penetration marks and puncture marks is that in the case of penetration marks, the bullet always remains in the object hit. The entrance holes of the blind canals show the same characteristics as the perforation marks.

Depending on the density of the material penetrated, the angle of impact of the obstacle and the kinetic force, the shape of the entrance holes is determined. In the case of materials such as brick, concrete, porcelain, pronounced breaks and even the breaking of the object will be created, and in the case of plastic materials, wood, processed leather, metal, holes with a diameter close to the diameter of the projectile will be created. If the materials are elastic the inlet and channel will be difficult to see.

f) Bounce marks.

Ricochet is a repulsion of the projectile from the surface of an object, due to the small angle of incidence. Repulsions are greater the lower the density of the object, and the distance the bullet travels after ricocheting is greater the smaller the angle of ricochet and the higher the bullet's speed. These traces are in the form of a groove that presents a final turn to the left or to the right, depending on the rotational movement of the bullet. The ricochet leads to the modification of the trajectory of the projectile, thereby making it possible to hit objects or people who were initially on a different firing trajectory. This must be taken into account by judicial authorities when determining the place of origin and direction.

2. Expertise of the main traces

By the examination of the main traces of a shot we mean the research of the entrance and exit holes, and the channels formed by the human body or by the objects with which the bullet comes into contact.

The first question that arises when examining the holes is whether or not the holes are due to a firearm. To answer this question, it will be necessary to study the general characteristics of the hole at the entrance of the bullet, these characteristics being different depending on the type of object in which it was shot. The shape of the entrance hole must be taken into account, because it can be quite easily confused with the traces of other objects that can pierce, therefore certain individual characteristics will be taken into account, which have features close to the secondary factors of shooting: rings of friction and metallization, traces of soot, tattoos, burns and tears caused by gases.

If there are several entrances and exit holes, it is necessary to clarify certain aspects regarding the type of bullet or bullets fired, the weapon or weapons used, the direction and distance of the shot. These aspects will be clarified with the help of the comparative examination between the traces in the case and the traces of the experimental shots, the latter being carried out with weapons similar to the one found at the scene.

CONCLUSIONS

The ballistic-judicial expertise is a part of the forensic ballistics that deals with the identification of the type of weapon, the calibre, the model of the weapon, as well as the related ammunition, in the case of committing a crime in which such a weapon is also

involved. Ballistics expertise is ordered, either by the criminal investigation body, or ex officio by the court, according to the Code of Criminal Procedure.

In order to carry out the ballistic interpretation of gunshot traces, the mastery of specialized knowledge in both the legal and forensic fields is required, as well as general knowledge in multiple fields of technique and science.

The most important part of the study of firearms is the one related to ballistics, because it deals with the identification of the weapons and the means used.

This expertise is carried out by an expert, who is part of specialized laboratories or Institutes, and it is the person who carries out the expertise and who is not responsible for it in his own name, but the laboratory or institute of which he is a part.

The most important part of the forensic ballistics' examination takes place in the forensic laboratories where the expert is assigned to perform it. There are cases when the expert does not have enough information and data, then he will have to turn to the criminal prosecution body, which is obliged to provide the expert with the data at his disposal so that he can carry out the expertise in the most efficient way.

With the help of some laboratory techniques, through comparative analyses, specific methods and going over certain steps such as checking the integrity of the packaging and the seals applied to the weapons received from the criminal investigation body, the contents of the packaging with the mentions contained in the act by which the expertise was ordered, studying the questions addressed to the expert, careful research of the materials, in order to establish the nature and order of the examinations to be carried out and the methods to be used, the carrying out of experimental firings, the separate examination of the marks in dispute and of the comparison models, the comparative examination, and at the end formulating the conclusions, the expert performs the expertise.

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