Firearms at the scene

Guns are primarily carried as a status symbol in criminal circles. They indicate a lethal threat and induce fear in enemies and victims. Occasionally they are used with deadly consequences. A bullet, however, creates a trail of subtle but persistent clues linking the victim, the weapon, and the shooter. And the trail begins at the crime scene.

When criminals fire guns, evidence flies in all directions. The first and most lethal is the bullet itself. The second is the spent cartridge case—the jacket that retained the bullet—which usually ejects from the gun. The third is part-burned powder spraying from the barrel, and from gaps in the gun's mechanism and casing. Finally, the sound of the gunshot can be heard by witnesses.

Each of these components can help investigators, and their work at the scene of a shooting is concerned with collecting as many of them as possible. But to understand how they do this, it is necessary to know a little about how a gun works.

Types of gun

All firearms work in a similar way. Pulling the trigger makes a firing pin strike the back of the cartridge, igniting a tiny pressure-sensitive charge called a primer. The primer in turn detonates the explosive powder in the cartridge, forcing the bullet (or, in a shotgun, the pellets) down the barrel toward the target.

The simplest guns require reloading after firing once or twice. Most, though, have some sort of magazine holding five or more cartridges. In semiautomatic weapons, the force of the explosion that powers the bullet forward also ejects the spent cartridge case, loads a new one, and cocks (pulls back) the firing pin ready for the next shot. In automatic weapons, holding back the trigger fires the gun repeatedly until the magazine is empty.

Where did the bullets go?

Professional assassins who kill with a single bullet are rare. Most shootings are more hit-and-miss affairs involving several shots. To reconstruct the crime, it is necessary to determine where each bullet went and exactly how it got there.

So an investigator's first task at the scene of a shooting is to figure out how

THE GIVEAWAYS

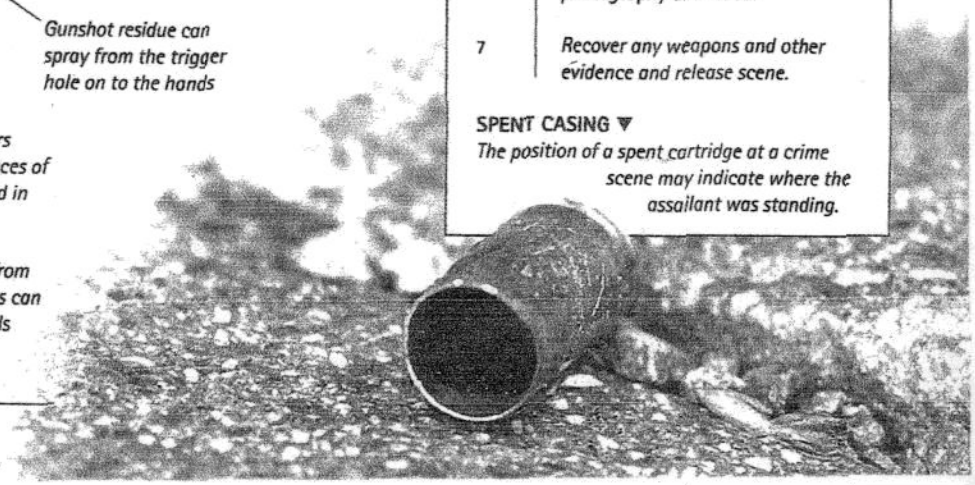
Loading and firing a semiautomatic pistol leaves a wealth of forensic evidence that can help identify the shooter.

SHOOTING SCENE PROTOCOL:

1. *Swab suspects for gunshot residues.*
2. *Mark the position of cartridge cases.*
3. *Account for every shot fired.*
4. *Search the scene exhaustively to locate and retrieve all bullets.*
5. *Reconstruct bullet trajectories.*
6. *Document the scene with photography and video.*
7. *Recover any weapons and other evidence and release scene.*

SPENT CASING ▼

The position of a spent cartridge at a crime scene may indicate where the assailant was standing.



TYPES OF FIREARMS

Guns not to scale

REVOLVER
Pulling the trigger turns the cylinder, positioning a cartridge before the barrel, then cocks and releases the hammer.

SEMIAUTOMATIC
These are quicker to fire and load than revolvers: a quick-change magazine in the grip holds up to 30 cartridges.

SUBMACHINE GUNS
Assault rifles and submachine guns can switch between automatic and semi-automatic fire. Rifles use larger ammo.

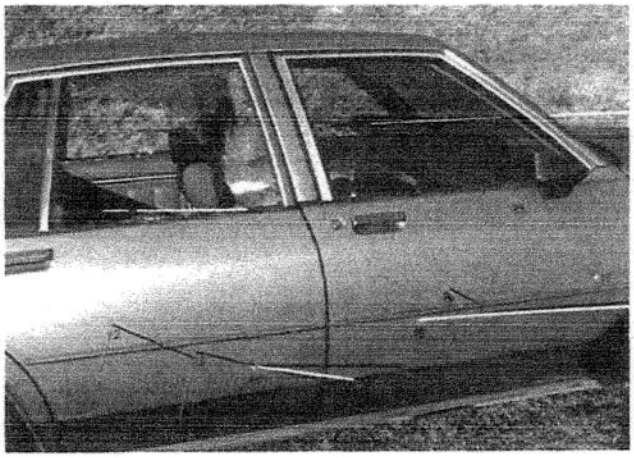
HUNTING RIFLE
These have a hand-operated lever or slide to eject the cartridge after firing and load a fresh one into the chamber.

SHOTGUN
A shotgun fires a handful of small lead pellets that spread, rather than a single bullet. This reduces the need to aim.

many shots were fired. Witnesses may have counted them, or if the assailant dropped the weapon, it is possible to deduce the maximum number of shots by counting remaining cartridges. Spent cartridge cases are also counted, as explained below.

The next step is to find the bullets. Shooting victims are routinely X-rayed, and lead lodged in their bodies shows up as distinct shadows. Investigators search the crime scene exhaustively for the rest. A bullet found embedded in soft materials is especially valuable, since markings on it can help identify at least what type of weapon fired it. If a weapon has been recovered, bullet markings may also prove conclusively that the suspect weapon fired it, as explained on the next page.

Even when bullets are squashed against a hard surface beyond the possibility of analysis, finding the point of impact is important. It enables investigators to trace the trajectory—the path from gun barrel to final resting place. This is traditionally done with lengths of rod and string, or by sighting through a succession of holes pierced by the bullet. Lasers may sometimes be used but can only be seen and photographed in certain light conditions.



TRACING TRAJECTORIES ▲
Highly visible string or doweling are used to reconstruct the shooting scene. These are then photographed for use as evidence in a court of law.

Cartridge cases

Scattered around the crime scene, cartridge cases not only help to identify the weapon used, they can also indicate where it was fired from. Most weapons eject cartridge cases to the right, and experimentation with a similar weapon on a range may suggest how far and in what direction the cartridge cases fly. However, the posture and grip of the person firing can affect this.

Markings on cartridge cases provide valuable information linking them to the weapon that fired them: impact with the breech stamps a unique pattern on the end, and the ejector mechanism also scratches the metal in a characteristic way.

Gunshot residue

Investigators look for primer gunshot residues on the victim, in a circle around the bullet wound, and on the suspect, usually on the hands and clothes. When victims are shot at close range, the entry wound is typically ringed with soot and "tattooing"—stippled marks where partially burned propellant has been driven into the skin. The appearance of the ring can give some indication of range.

Residues found on certain places on a suspect's hand indicate that they have recently fired a weapon, but absence of residues is not proof of innocence. Not all weapons discharge residues, and washing removes deposits. For this reason, investigators sometimes test a suspect's clothes and face as well as their hands.

A suspect may also bear traces of other materials that suggest gun use. Loading a magazine, for example, transfers gun oil and metal on to the fingers.

SWABBING DOWN
Each part of a suspect's hand is individually swabbed because the location of gunshot residue can indicate that a suspect handled a gun, but did not fire it. Below is a highly magnified image of primer gunshot residue.