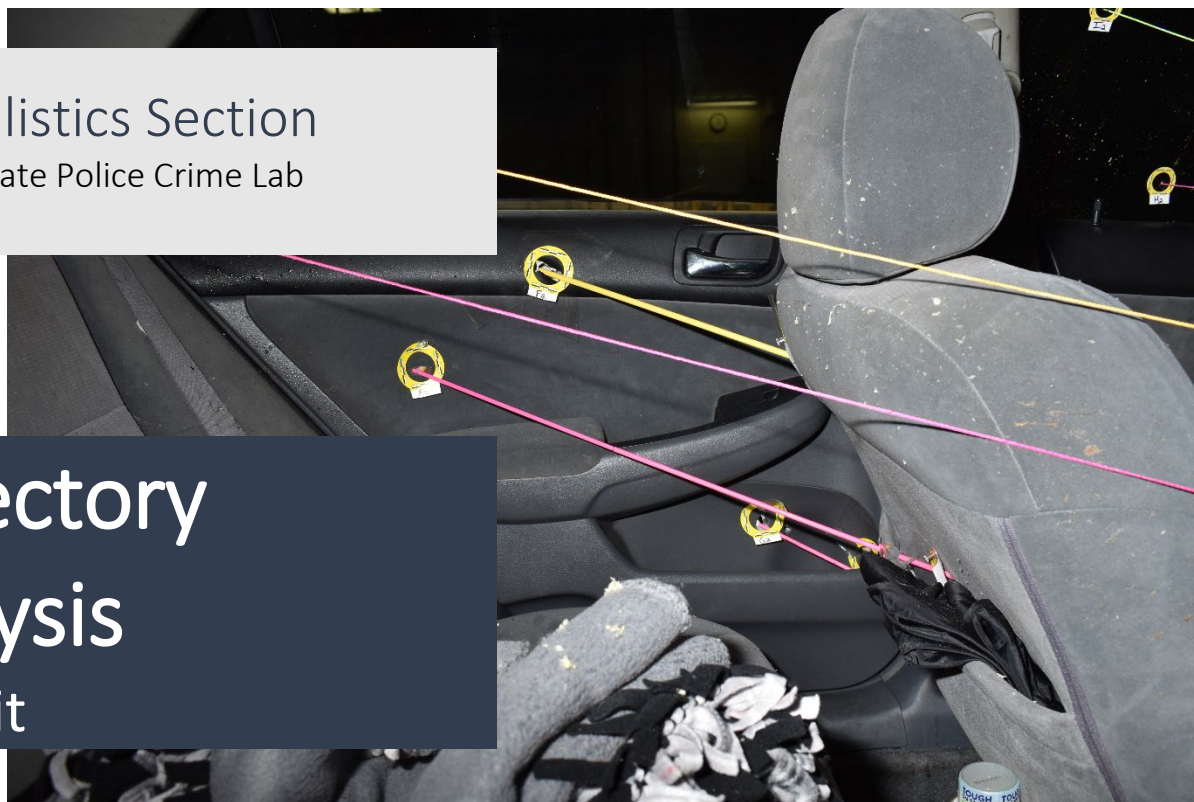


Criminalistics Section

Louisiana State Police Crime Lab

Trajectory Analysis

CSI Unit



WHAT

Trajectory Analysis is the examination of bullet holes and strikes in an attempt to reconstruct what occurred during a shooting event and who shot from where. Sometimes, a definitive determination can't be made, but the number of possible events can be greatly reduced.

HOW

Trajectory Analysis is performed by scene investigators who are trained and responsible for determining the approximate path each bullet took during a shooting event. This analysis is done by examining surfaces for possible bullet impacts and observing physical characteristics that show directionality, entry vs exit through a surface, and change in impact angle. Once directionality of each impact is determined, rods, lasers, and string can be used to connect related impacts and demonstrate the path that each bullet traveled. The locations of other firearms-related evidence, such as cartridge cases, bullets, and bullet fragments are examined in relation to the rods, lasers, and string to approximate the location(s) of the shooter(s) and the direction of the shot.

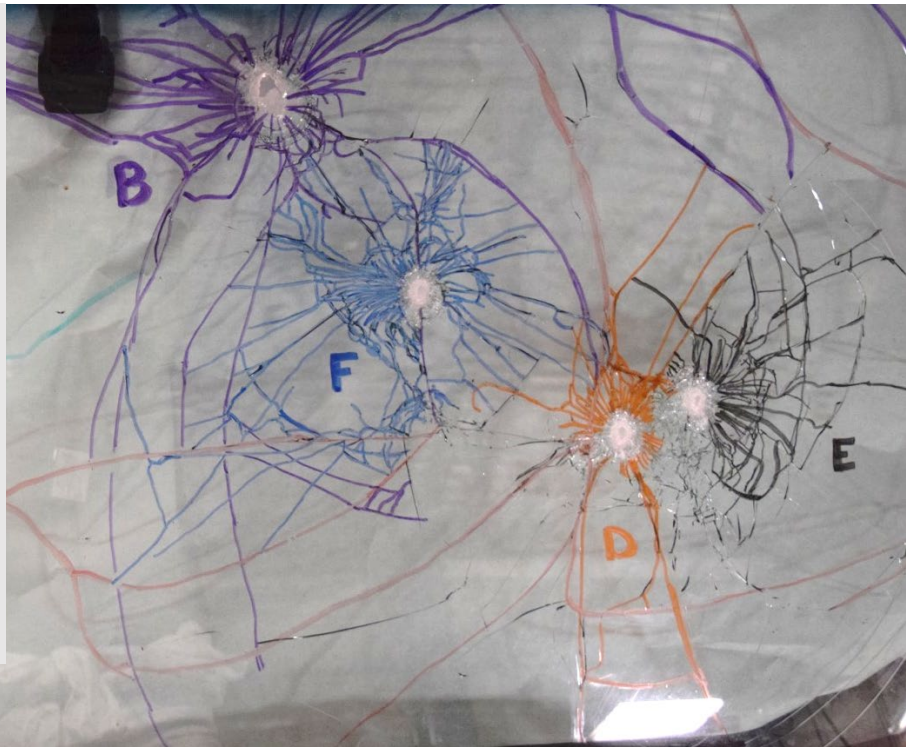
WHY

The lab's CSI Team aids state and local law enforcement agencies in Trajectory Analysis by responding to and processing crime scenes and vehicles involved in shooting incidents. This analysis aids the investigation by showing the paths of each shot, possible locations of shooters during the event, and corroborates or refutes witness statements.



Trajectory

Analysis



Staffing

Six analysts are currently authorized in Trajectory Analysis that is assigned to the CSI Unit. There are an additional analysts from multiple disciplines throughout the lab that are currently authorized to assist in on-scene documentation of trajectory. There are approximately 30 trajectory analysis cases requested each year. This averages to approximately 300 shots analyzed by the CSI team every year.

Classifications

When a bullet comes into contact with a surface, it can produce a hole (penetrating or perforating), a graze, a ricochet, an impact, a strike, or a more general classification of a defect. Bullet holes can be classified into entrance and exit holes, based on the characteristics observed in the surface when determining the path the bullet traveled.

Interesting Facts

Unless a bullet passes through a significant thickness of material, a single bullet hole will usually not allow useful reconstruction of a bullet path.

When a bullet passes through most objects and surfaces, the bullet hole has specific physical characteristics that aid in determining which side of the surface the bullet entered and which side of the surface the bullet exited. Typically, the entrance side is very smooth. The exit, however, is typically beveled or crater-shaped. These features are created when the force of the bullet pulls the material of the object in the same direction as the bullet is traveling. The entrance caves in with the force of the bullet, and the material is blown outward from the exit.

When a bullet passes through glass, typically both radial and concentric fractures are present. Radial fractures begin at the point of impact and travel outward. Concentric fractures present themselves as larger circular fractures surrounding the point of impact. If multiple shots are fired into a glass surface in close proximity, these concentric and radial fractures can help determine the sequence in which the shots were fired. The first shot into glass typically causes large, uninterrupted fracture lines. As additional shots are fired into the glass, their respective fractures will butt up against any preexisting fractures and cease to continue. By examining each bullet hole's fracture lines, it may be possible to determine the precise order in which each shot was fired.