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### E43 Analyzing Law Enforcement Officer Reaction Time in Shooting Events Using 3D Computer Animation

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After attending this presentation, attendees will understand how 3D computer animation can be used to demonstrate officer reaction time in lethal force situations.

This presentation will impact the forensic science community by demonstrating techniques for illustrating, and thus better understanding, how reaction time affects law enforcement officers' performances in shooting events.

Bullet paths in shooting events are routinely analyzed by 3D computer modeling. Computer-Aided Design (CAD) and 3D-animation software are excellent tools for the analysis of such events because of the software's ability to demonstrate spatial relationships between objects and people. When a model of a scene is created, bullet paths can be depicted as lines through space, from their point of origin to the objects they strike. When reviewing dynamic shooting events, animation software can be used to analyze the event in terms of motion and timing, which can be helpful in explaining why an officer's recollection of the event is not consistent with the forensic evidence.

A typical example of such an event is when a suspect in a motor vehicle attempts to run over a police officer. The officer, in fear for his or her life, remembers shooting at the driver through the windshield of the vehicle as it approached; however, examination of the physical evidence shows that the bullet entered through the side of the vehicle and not the windshield. How can this discrepancy be explained? If one were to diagram just that instant in time when the bullet left the gun, one might draw the conclusion that the officer was no longer in mortal danger since the vehicle had already passed by. And, that being the case, was the use of such lethal force still justified?

Law enforcement officers often have to make split-second decisions on when to use lethal force. A failure to take appropriate action could cost them their lives or the lives of others. When confronted with a threat, the officer must mentally perceive, process, and react to that threat, which requires a certain amount of time. Thus, there is a reaction-time delay between when the threat occurs and when the officer pulls the trigger on a gun. The same is true when a threat has abated. Once an officer starts shooting, it takes a certain amount of time for an officer to realize that he or she is no longer in danger and to stop firing.

This presentation will look at three shooting incidents where officers fired at moving vehicles and provided statements that were in some ways inconsistent with the physical evidence. In each case, the speed and path of the vehicle, as well as the location of the officer relative to the vehicle, could be accurately defined, and thus could be modeled and animated with a high degree of precision. Once the animated model was created, it was then possible to go back and look at what the officer saw at various points in time, prior to actually pulling the trigger. Correlating that information with data from reaction-time studies helped to explain why the officers fired when they did.

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#### **Computer Animation, Shootings, Reaction Time**