



D22 Shooting Dynamics: Elements of Time and Movement in Shooting Incidents

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After attending this presentation, attendees will have an understanding of the times involved in shooting a handgun and become familiar with some of the significant human performance factors associated with shooting.

This presentation will impact the forensic science community by providing baseline data on shooting performance and related dynamics.

In the analysis and reconstruction of shooting incidents, a key element is often the timing involved in shooting, reacting, and moving. These data can be significant because they may be helpful in defining significant elements. These elements can include: how much movement or distance a person could have achieved before or during the shot sequence. Other determinations can relate to perception, reaction, and response before and during the shooting.

Specific data on the ranges of typical, average, or expected rate of firing do not exist in the literature. Although there is much available data on the mechanical firing rates of automatic weapons, there is very little data on basic questions as "How fast could someone have shot," "How fast could the officer draw and fire?" "How could the person have been shot in the back?" or certainly, "Why were so many shots fired?"

This paper addresses these and other questions.

Primary Issues Examined:

1. Shooting performance baselines.
2. Time to draw a pistol from a holster and fire the first shot.
3. Time intervals between shots.
4. Time required to stop shooting.
5. Time required to move from standing erect to a prone/supine position

This paper discusses the human performance dynamics involved in shooting and it presents an analysis and of several experiments:

Time Required to Stop Shooting: Most people have experienced instances in which they decided to inhibit or stop an action but were unable to do so. Clicking a computer mouse just after you noted that the dialog window closed or tossing an object (like a pen or candy bar) at someone just after you noted that their head turned away and would not see it coming. You know you shouldn't do it, but you can't stop your action.

There are psycho-physiological mechanisms which limit the time in which a human action (motor program), once begun, can be stopped. This experiment was designed to test the perception and the stop reaction time of a group of police officers.

Shots Fired at a Falling Person: The falling movement – whether a rapid collapse or a crumple resulting from incapacitating wounds – cannot be distinguished from a deliberate tactical maneuver of someone who has decided to go to ground to avoid being shot or to assume a less exposed position while returning gunfire. Falling to the ground itself cannot be a reliable indicator that a threat is no longer active. Even a mortally wounded person can fall to the ground and fire one or more shots before becoming incapacitated and/or unconscious.

The goal of this experiment was to measure the amount of time required for a person to fall to the ground from a standing position and to determine the number of shots that could have reasonably been fired during that period.

Time to Draw & Fire, Shooting Speed: The goal of this experiment was to determine the minimum, maximum, and average time required for a group of police officers to draw their handgun from a holster and fire one shot.

Experienced & In-Experienced Shooters: The shooting speeds of experienced and in-experienced shooters were measured. The purpose being to establish performance rates which can be used as reference baselines.

Rates of Fire (Shooting Intervals): Historical and empirical data was used to establish the fastest shooting rates measured during highly skilled professional shooting events and by experienced shooters.

Shooting Reconstruction, Human Factors, Reaction Time