Pistol Shooting: The Art (Part 12)

by Edwin C. Hall

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A dozen, how about that? Well this time it wasn't as long in between, so let's mention the last article: I "focused" on red dot scopes, assuming of course that you are reading these in order. If so, I hope you were able to "see" the differences in how to use them, and how great they are for dry fire practice. On to this part... Lately I've been wrestling with a mathematical nightmare. It seems quite simple, but for some reason, I just have trouble with the answer. What happens if you tip the gun while shooting?

Two things transpired to send me off on this track. First, I was visiting a local gunsmith, who showed me his black powder rifle. At the bottom of the front sight was a leveling bubble. Apparently in long range shooting this is important. Second, I had an opportunity to shoot a laser equipped gun at a computerized target which tracked my shots on a screen and displayed information about them. One individual watching told me that I had been canting the gun different amounts throughout the 15 shots. I thanked him, thought about it for a moment and went to lunch. I've been told the same at the range, and am quite aware that even during a string of fire I may start out vertical and by the time I finish the string, I have a 45 degree cant. Since I figured that the laser would be in coincidence with the sights at the target no matter how the gun was held, I didn't think it had mattered a great deal...

But wait a minute! Bullets aren't lasers. They don't fly straight. They travel along a parabolic path due to gravity. What affect does canting have on live shooting? From my first note above, it must have an effect at long ranges. What about handgun distances? This started sticking in my head almost to the point of obsession. Way back in the first article I mentioned, "In order to have a projectile travel through the same hole in the same fashion, it must be propelled in the same manner." How much difference could tipping the gun more or less make?

Well, in my frantic attempts to make my brain ache, I decided that it could be considerable. At 50 yards, if gross enough, it could take me out of the black. Additionally, the placement, analyzed at the target, could be misinterpreted as a trigger jerk. Do not misread what I'm describing. A cant that is always the same, is all right. In other words, if you always place the gun at a ten degree cant to the left, consistently, it is fine. In fact some of the best shooters have a cant toward the non-shooting side. Sometimes this makes up for cross-dominance in vision. It is used often in trying to keep the head position straight. If your cant is always the same, you have sighted in for it. A lot of shooters even counter their gun's cant by mounting their scope with an equal but opposite cant. The problem comes in when the cant is changed from say 10 degrees to 45 degrees, while shooting.

Why does it matter? Because bullets don't fly straight. Gravity affects them. In fact, it affects them more than I had realized. At 50 yards, a bullet fired at 850 feet per second (fps), will drop around 6 inches. In other words, if you drew a straight line through the center of the barrel out to the target, it would intersect about six inches above the sighted in point.

How did I get to this conclusion of a six inch drop? Well to start with, I left out minor issues, like whether the bore is level or not, the fact that the bullet slows during its trip, and any other of these types of "minor" factors. In other words, this is the "best case" scenario. This left me with an object travelling

at a fixed speed of 850 fps, for 50 yards. How long would it take to get there? Well 150 ft divided by 850 fps gives approximately .176 second. How much does gravity affect something during that short amount of time? The formula is "distance = (1/2) X (the rate of acceleration (32.17ft/s/s)) X (time in seconds) X (time in seconds)" or ".5 X 32.17 X t X t." Calculated with the above time we get (.5) X (32.17) X (.176) X (.176) equals .4982 feet. This gives us about 5.979 or roughly 6 inches when multiplied by 12.

So, what's the problem? Sights adjust for the variance. Why all the math and interest? Because, the sights, whatever they may be, are adjusted for the drop to be along a definite path, at a particular angle relative to the sight/bore relationship. To illustrate, let's assume a gun is held with a red dot scope directly above the bore. Looking from the back, if we drew a line from the dot to the center of the bore, it would be along the same path as the bullet drop. If the same gun is now tipped to the left by 10 degrees, the drop is no longer in line. In fact, by calculation, if the gun is tipped 90 degrees from where it was sighted in, using the above numbers, the error on paper can be as much as 8.5 inches from the sighted in point at 50 yards. Let's show how: First we'll assume the tilt is counterclockwise from the shooter's perspective. There is no longer a six inch drop in line with the sight/bore. Now the drop is six inches in a direction 90 degrees from the sight/bore, or to its left (still toward the ground, of course). By moving the angle of the sight/bore to the drop, the hit should now be six inches left and six inches down, from the original point. By calculation, six inches over by six inches down gives about 8.5 inches diagonally from the original point.

Granted, only movie characters shoot their guns sideways by 90 degrees, but any tipping from the normal hold will affect the placement of the shot. At shorter distances it is not as great; at 25 yards the same 850 fps calculates to only around one and one half inches for a 90 degree tip. Incidently, I chose 850 fps because this is what a ballistic chart showed for Federal's C45A ammunition (.45 Hard Ball). Additionally, that same chart showed the 850 fps had dropped to 810 fps by 50 yards. A bullet starting slower, as most wadcutter/handloads do, will fall even further.

Looks like time to go. I've reached that length border I established in the beginning so I could try not to ramble too long. Remember to keep the same cant throughout your shooting.