

Recoil Management – A Primer

By [David Tong](#)

I believe that one's ability and *willingness* to manage recoil is key to enjoying the shooting sports. Willingness is italicized because it is the matter that cannot be avoided, only mitigated. Recoil can surely be uncomfortable and it's an unusual sensation for the uninitiated. What is recoil? Simply put, it is the force you feel due to the action of launching a projectile down a barrel. This is basic Newtonian physics. Heavier bullets, higher velocities, larger powder charges and higher operating pressures will cause more recoil.

A dedicated trap or skeet shooter may fire hundreds of rounds of 12 gauge shotgun ammunition in a day without much thought. Others may grimace at shooting one twenty round box of equal recoil level rifle ammunition.

From the outset, the author will make an assumption that the shooter has sufficient experience that he or she does not flinch or anticipate recoil by jerking the trigger. This willingness to shoot really is a mind over matter issue, as one can condition the mind to work through recoil.

In my experience, it was my absolute desire to embrace the sport in all its facets that my will was sufficient to overcome recoil. I simply loved to shoot right from the get-go. It is the philosophical, physical and moral desire to intelligently wield power that is fascinating. I learned, literally the hard way, by acquiring a series of steel butted military surplus bolt-action rifles as my first long guns. Those short stocks with excessive drop at comb were a bear off the bench. Comes from reading too many history books, I guess.

Learning to deal with recoil does not come naturally. It is why every beginning shooter should start with a .22-rimfire rifle or pistol to learn the fundamentals, before transitioning to a gun with more noticeable recoil.

Recoil tolerance depends, to an extent, on one's age, overall physical condition and experience. Factors such as old age, arthritis, carpal tunnel syndrome and lack of shooting experience can diminish one's ability to tolerate recoil. Most of these factors cannot be helped, other than through ergonomic changes to one's firearm, shooting very light loads and not shooting many rounds per session.

One should consider what sort of use the firearm is *for*. Firearms have a purpose. This purpose requires an adequate amount of power to do whatever job the piece is intended for. A blacktail deer hunter does not need an elephant rifle, nor would someone seeking pachyderms normally find a deer rifle adequate, no matter how much more comfortable it is to shoot. The wing shooter after upland birds might only want a 28 gauge shotgun, while the International Trap shooter or duck hunter is probably going to need a 12 gauge. Some handgunners might find any pistol that kicks more than a .380 ACP or a .38 Special "too much," while others delight in shooting their .44 Magnum.

Let's return to the discussion of Newtonian physics. If recoil is an overwhelming factor for a particular shooter, that person must select firearms that are small enough in caliber *and* sufficiently heavy to mitigate recoil. Gun weight is both a friend and an enemy to shooters. While action type, ergonomics and caliber selection are also factors, more gun weight means less kick. Even an otherwise mild caliber can feel pretty snappy on the shoulder or in one's hands if the gun is too light. This means that even a .243 scoped rifle should weigh about 7.5 pounds and have a good quality recoil pad. The stock should be of sufficient length of pull (distance between butt and face of trigger's center) to fit the shooter properly. The cheek rest on the rifle or shotgun must allow the shooter to firmly yet comfortably place the cheek on the comb of the stock and allow fast alignment of the sighting system.

The larger the buttplate's contact patch on your shoulder, the better. The buttstock of a rifle or shotgun can be dimensioned somewhat larger than normal to spread the recoil force over a greater surface area. Unyielding or, even worse, highly curved ("rifle") buttplates on rifles can be very uncomfortable to shoot. The latter, primarily found on vintage lever action, single shot and muzzle loading rifles, are downright painful if not placed properly on the shoulder. That heel (bottom) point can be a very memorable pressure point, even when shooting relatively mild calibers.

No solid type of butt assists in softening the recoil blow and should be shunned by anyone interested in long term shooting comfort. Unless the piece is a potential collector's item, a recoil pad is your number one friend to help manage kick. Please note that a pad does not reduce or eliminate the actual foot pounds of recoil. What it does is spread the force that hits one's shoulder over a slightly longer time period, because it is constructed of an elastic material.

Another area of buttstock design that should be addressed is the dimension known as "drop," measured at comb and heel. If the comb is too low from the bore's geometric center or if it has a pronounced downward slope from nose to heel, recoil can drive the comb into your cheek bone. This is uncomfortable and can be painful with hard kicking guns. It is like being punched in the face.

Many folks are enamored of very lightweight arms for their ease of carry. I am not one of them. Most folks shoot calibers that offer at least some "power surplus" for the task at hand, rather than choosing something that merely meets the minimum requirements set by law. In my home state of Oregon, for example, any .22 centerfire caliber is legal for deer hunting, yet no one I know actually uses one. The .243 Winchester can be taken as the *practical* minimum among common deer cartridges.

Americans typically love their .30's, whether the traditional .30-30, .303 British and .30-'06, the short action .308 Winchester and .308 Marlin, or the .300 Magnum of your choice. While none of these calibers are essential to successfully hunt deer, or even elk, they *are* the most common and a great deal of tradition makes this so. The ammunition manufacturers have been very busy ensuring that the products they develop for them work in the field.

While weight of an arm can be a burden for even the physically fit, and let us not diminish the needs of the even slightly infirm, greater weight does have multiple advantages. Steadiness of aim is one big one and the heavier barrel typical of heavier guns is stiffer and more intrinsically accurate. When one is huffing and puffing after a long stalk, busting 25 straight at the trap range, or shooting a handgun for

personal defense, the steadiness of a heavier firearm is a good thing. Germane to the subject of this article, recoil is reduced in direct proportion to gun weight; additional poundage simply means less rearward slam.

Another recoil mitigation idea is to use a mechanism that, like the recoil pad, spreads the force out over a longer time period. This can be a shock absorbing stock like the old Hydra-Coil or, far more common, a gas operated self-loading firearm.

Many semi-automatics weigh more than a manually-cycled long arm, due to all the internal plumbing. The spring controlled rearward bolt motion of an autoloader means that, while the total recoil force is the same for manual and auto firearms of equal weight, the way it is distributed over time makes the gas operated semi-automatic a good choice for those who want less felt kick. Often the felt difference is so great that the semi-auto does not require the thick recoil pad of a manually cycled long gun. Newer autoloading designs are lighter, due to aluminum receivers and light barrels, but still average about a pound heavier than an equivalent bolt-action rifle.

Early semi-automatic rifles and shotguns used John Browning's "long recoil" action. The famous Browning Auto-5 shotgun, and the Remington Models 8 and 81 rifles typify these. Both arms used both a recoiling barrel and bolt to function and that additional reciprocating weight adds to the recoil, resulting in an uncomfortable "double slam" to the shoulder.

I vividly recall a recent shooting session with an eight pound Model 81 in .300 Savage, a cartridge of somewhat less power than the .308 Winchester. That rifle, fitted with a checkered steel buttplate, kicked fearsomely, even though I typically have no issue shooting heavy caliber rifles. I thought the rifle was cool and it was in splendid 98% original condition, but it was ridiculous to shoot, even for short zeroing sessions from the bench, and I passed on it.

Modern semi-automatic long guns typically use gas operation, which bleeds off a tiny percentage of the gas to power a piston that drives the bolt rearward. This cycles the action and reloads the chamber and mitigates the recoil pulse in the process.

One noteworthy exception is the Benelli recoil-operated shotgun. (Benelli ad copy calls it "inertia.") While it does not have the recoiling barrel of earlier designs, it also uses both an aluminum alloy receiver and a lightweight bolt, and kicks harder than an equivalent gas operated arm.

Another strategy used to reduce felt recoil includes fitting lead weights or liquid filled recoil reducers into the butt stock. These work by making the gun heavier. Trap shooters sometimes fit spring loaded, hydraulic, telescoping stocks to their competition shotguns.

Another recoil control strategy is to vector the expansion propellant gas near the muzzle to provide downward/rearward thrust on the barrel. Mag-na-port Arms in Michigan has for decades used electrical-discharge-machining (EDM) to cut small slots in the top of barrels to exhaust the high pressure gas and reduce muzzle rise. Add-on muzzle brakes do the same thing.

Several factory Weatherby rifles have a series of holes drilled into their hard-recoiling Magnum calibers. These muzzle brakes work and aid in control, but the price is literally deafening muzzle blast. This can make an already very loud rifle even worse. Some guides and outfitters refuse to hunt with a client using such a rifle, because of the resultant hearing loss, even for a bystander. Some African hunting countries have banned the use of muzzle brakes to spare the hearing of beaters and trackers.

Finally, a little about handgun recoil. No sane handgun approaches the power level of a rifle or 12 gauge shotgun. There is no shoulder support, so all the recoil is felt in your hands and wrists. In addition, many handguns, such as the Thompson-Center Encore and all revolvers, have an elevated bore plane over the base of support, which are the bones of your arm.

Therefore, the higher power cartridges for which these handguns can be chambered will produce greater recoil and muzzle rise than the (typically) less powerful semi-automatic pistol. Centerfire autoloading pistols are typically used for self-defense and simply do not require hunting level power. Even a semi-auto with a relatively high bore center sits lower in relation to your arm than any revolver. This, coupled with their generally less powerful cartridges and the action of the recoil spring, makes shooting them more comfortable than a double action revolver of equal power. This is the primary reason that average police hit percentages generally increased with the adoption of autoloading pistols.

Double action revolvers' grip frames are usually designed with a "recoil shoulder" for the web of your hand. Originally devised simply to contain the extra parts required for DA operation, this recoil shoulder allows better control (less muzzle rise) under rapid repeat fire. On the other hand, the curved, plow-handled single action revolver grip, typified by the Colt SAA and Ruger Blackhawk revolvers, allows the grip to pivot upward in the hand under recoil. This dissipates energy that would otherwise be transferred to the bones of the hand, wrist and arm. Such guns feel softer in the hand, but you have to reacquire your shooting grip after each shot, hindering consistency somewhat, unless you are very well practiced with this type of arm. Obviously, in handguns of equal weight, regardless of type or method of operation, there is no difference in actual recoil, just in the nature of how it's distributed.

The Pachmayr firm offers a "Decelerator" grip for selected revolvers and they work like rifle and shotgun pads. By interposing a softer rubber compound between the web of your hand and the back of the frame, it cushions the blow and allows compression of the material to increase the amount of time over which the recoil force is distributed.

Porting and compensators (muzzle brakes) have been installed on both revolvers and semi-automatics. These also operate similarly to their long gun counterparts, with similar drawbacks.

Increasing barrel contour and weight, adding removable barrel weights, or increasing the poundage of the recoil spring of an auto can also help reduce the recoil's flip and lengthen the felt recoil's time. However, adding weight to what are the most portable of firearms is anathema to some. Lightweight handguns trade shooting comfort for carrying comfort. This is generally undesirable for hunting handguns, which are typically carried openly on wide, supportive gun belts. However, light weight is

an advantage for concealed self defense handguns that are carried for long periods in insubstantial rigs and very seldom or never fired in earnest.

While the conventional wisdom is the defense sidearm is carried far more than shot (true), a very lightweight arm also makes practice and achieving consistent rapid-fire accuracy under stress far less pleasant (also true). I might opine that practice and reasonable accuracy with a self-defense handgun is possibly more important than bagging a buck.

I recently had an opportunity to shoot two SiG-Sauer P-220 service pistols in .45 ACP caliber. One was entirely constructed of stainless steel and weighed 41 ounces, while the other was the more typical aluminum framed 33 ounce model. The heavier pistol was obviously much more comfortable to shoot, having less kick and muzzle rise. Both shot very well in slow fire, but while I liked the alloy-framed pistol, I preferred the all steel gun for self-defense purposes.

Even though it is lighter, a 29 ounce Colt Lightweight Commander .45 feels like it kicks less than the alloy P-220, because its geometric bore center is at least 1/4" lower. There is less muzzle flip and better recoil control. My friend's new Kimber Crimson Carry lightweight 1911 (5" barrel) was surprisingly comfortable to shoot, for an aluminum framed .45. Many thousands of handgun shooters are happy to carry a 22 ounce, plastic framed semiautomatic, but I think any of them would admit that something weighing a half-pound more would be more pleasant to shoot, caliber for caliber.

This said, I don't see much point in handgun cartridges such as the .45-70 (as applied to revolvers), .460 S&W, .475 Linebaugh, .480 Ruger and .500 S&W. The revolvers that shoot these behemoth cartridges are very heavy, kick like a mule and clumsier than a rifle that disposes of much more power.

To summarize, the factors that govern recoil management include the physical fitness and will of the shooter, ergonomic fit of the arm, caliber selection based upon fitness of purpose and technologies that can distribute the recoil force over a longer period of time. As regular readers of *Guns and Shooting Online* know, I am not particularly recoil averse. In fact, I actually enjoy shooting the big boomers: .44 Magnum in DA revolvers and up to .458 Winchester Magnum in magazine rifles. Each has its place, either practically or in the heart.