

The Big Bang Theory



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During a recent outing to the local range with students, I had the opportunity to observe a phenomenon that I have seen repeated on numerous occasions...

The students were two couples with minimal handgun experience, including the ladies, neither of whom had ever fired a handgun before. Excited by the opportunity to test one of my favorite handgun instructional theories, I took them through the basic familiarization sequence of stance, grip, sighting, and administrative manipulation. We passed a variety of handguns around from student to student, each one opening the action to check its load condition.

I teach the simple, but critically important rule that every gun is loaded until you have personally examined it to ensure that it is not, no matter how many people have checked it before. In the history of the world, no one has ever been shot with an unloaded firearm. Countless people have been wounded or killed with a firearm that somebody thought was unloaded, but didn't bother or know enough, to check.

Before commencing live fire drills, I told them it was time to discuss "the Big Bang." "What's that?" I told them I wanted them to understand what was happening when they touched off each round. The recoil, and the sharp report, what it is, and why it does that. "These things can be intimidating to new shooters, and that can interfere with your ability to operate the handgun effectively." I believe that if new shooters understand big bang they can move beyond the intimidation factor quickly and get down to the task of improving their operating efficiency with the firearm.

The most important aspect of big bang is an understanding of the bang itself. The new student needs to understand that there is no explosion occurring inside their

handgun. “But I can hear the explosion!” Wrong, what you hear is the thunder.
“Huh?”

Modern handgun cartridges are loaded with smokeless powder. Smokeless powders burn. They do not explode (in the normal sense of the term). Although smokeless powders are typically classified as division 1.3 explosives under ATF and other national regulations, upon ignition they undergo “deflagration” and not “detonation.” Deflagration is a technical term which is used to describe subsonic combustion that propagates through thermal conductivity. A hot burning material heats the next layer of cold material and ignites it. For example, the logs in your fireplace burn as a result of deflagration, and so does the powder in your pistol cartridges.

Smokeless powder does not explode, it simply burns rapidly. This rapid burning releases a huge volume of expanding gases. If these gases are confined in the chamber of a firearm, it will also create high levels of pressure which will force the bullet sealed in the cartridge case out of the casing and to accelerate down the barrel, out the muzzle, and downrange toward the intended target at a very high rate of speed. For example, most center-fire rifle bullets will accelerate from zero feet per second to a speed equivalent to Mach 2 in just 26 inches. That’s fast, yes it is.

Newton’s First Law of Physics...says that for every action there’s an equal and opposite reaction. Applied to firearms, this means that as the bullet and gases are expelled from the barrel, an equal amount of pressure is sent directly back to you.

This high pressure gas is also very, very hot. Despite some differences in burn rates due to design characteristics and other properties, flame temperature is very close to the same for all smokeless powders and runs about 3300 degrees F. This superheated gas is pushing the bullet down the bore. When the bullet leaves the muzzle, the gas is released behind it and meets the much lower temperature air outside the firearm's barrel. When that happens, the sudden increase in pressure and temperature produces a rapid expansion of the surrounding air.

This, in turn, creates a sonic shock wave, which our ears pick up and transmit to the brain, which interprets this impulse as a bang or a crack. In just the same way, a bolt of lightning produces the sound of thunder by superheating the surrounding air. Of course, lightning bolts create an average temperature of around 36,300 F. So, you're going to get a bigger bang there, but when you hear the report of a firearm, what you are actually hearing is thunder—but, no explosion.

At the same time, those hot gases pushing the bullet down through the bore of the handgun obviously do so as a result of pressure. Newton's First Law of Physics (Oh yes, you did too study this, in 8th grade science class) says that for every action there's an equal and opposite reaction. Applied to firearms, this means that as the bullet and gases are expelled from the barrel, an equal amount of pressure is sent directly back to you. The shooter experiences this as recoil.

Different handguns, made with different materials, and firing different caliber bullets and a varying powder load will produce felt recoil to a greater or lesser

comparative degree. For example, the .40 S&W cartridge has an average recoil of about 21.3 foot pounds, while the .357 Magnum has an average recoil of about 14.3 foot pounds, but again, no explosion.

The loud report of the handgun can, and should be (at least in all practice fire, range applications) controlled by ear protection. Learning to control felt recoil is part of the task of learning to shoot a handgun accurately and rapidly. However, that process is a lot easier to control if you first understand what is happening in the chamber and at the business end of your handgun while you fire it. “Any questions?” “Wow, I didn’t know that! That’s cool!”

Armed with that simple explanation, the students began work on the range. As I have seen countless times before, the ladies progressed rapidly from .22 semi-auto through .38 Special and 9mm up to .45 ACP—both women qualifying with the venerable 1911—and outshooting their husbands in the process. Both the ladies admitted that they really liked the 1911 a lot.

Two days later, my wife Lynne and I had supper with one of the couples. Lynne, who is also a firearms instructor who specializes in working with women, asked the husband about the handguns the couple owns. The husband rattled off a string of popular calibers and models, all well made and reliable. The wife interrupted to add, “But we don’t have a 1911 ... yet.”

The husband laughed and said, “Yeah, you’re gonna have to go shopping with us. She wants a 1911 of her own. Getting her past big bang is going to cost me some money. But it will be worth it. She has totally lost her fear of handguns, and now she wants to go out and shoot.” Add four to the growing list of handgun enthusiasts who understand the Big Bang Theory.

