

# Through the eyes of Champions

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*By Konrad Powers*

Back in 2001, on a popular internet forum called Shooter's Talk, a member started a thread asking a very simple question: *"What does a High-Master see when he's shooting the 200yd?"* A number of people chimed in with their opinions as well as some of the top shooters in the country. Of course, just like many other internet forum threads, this one degenerated into arguments after briefly touching on the original question.

Each of us know what we see when we look through our own sights but that internet poster wanted to know what better shooters were seeing. Over time my mind kept coming back to that original question. Was there a way for the average highpower shooter to look through the sights of a top shooter when they are shooting offhand? With technology, there may be.

## The electronic trainer

Technology affords us the opportunity to use a computer to see what takes place when shooters line up the sights and squeeze the trigger. Electronic trainers vary by manufacturer but basically they are devices that attach to a rifle and record the movement of the sights relative to the target. They can also can tell when the shooter fires by detecting the hammer falling.

The trainer that I use is called a NOPTTEL and comes from Finland. While this particular unit is getting a bit dated, I have been using it for years and am very familiar with its operation.

The NOPTTEL consists of three parts.

1. An optical unit that mounts to the rifle barrel. This unit sends a light signal to a target and receives the reflected signal.
2. A reflective target that bounces the light signal back to the optical unit.
3. An I/O box that sends the data into a personal computer for viewing. The computer stores the shot data and displays the traces of each shot.

## The Experiment

While I have been using the NOPTTEL for years and have all kinds of data for myself and other local shooters, I wanted to get data for the really good offhand shooters, the shooters that fire the good scores and win championships. So I contacted some of these shooters to see if they would help me answer that question from 2001. At the 2012 National Rifle Matches at Camp Perry I gathered a group of some very good offhand shooters to assist me in showing the highpower community what they see when their rifles are pointed at the target.

Generously allowing me a peek into their offhand processes were the following:

- Carl Bernosky
- SSG Tyrel Cooper, USA
- SGT Sherri Gallagher, USA
- SSG Brandon Green, USA
- Norman G. Houle
- CPL Matthew Rawlings, USA

So that no one doubts the skills of those named, consider that the average score for all of these shooters in the three standing matches of the 2012 NRA Highpower Championship was 196.7. Scores that the rest of us would certainly like to emulate.

To avoid pre-judgment of a shooter's hold on the NOPTTEL by noting their past accomplishments, I randomly assigned letters (A-F) to represent the shooters. Also, even though not all the shooters were male, I reference all as "he" to further separate their identity.

For comparison I also wanted to analyze the holds of shooters that better represented the general highpower population. For this I added traces from the following:

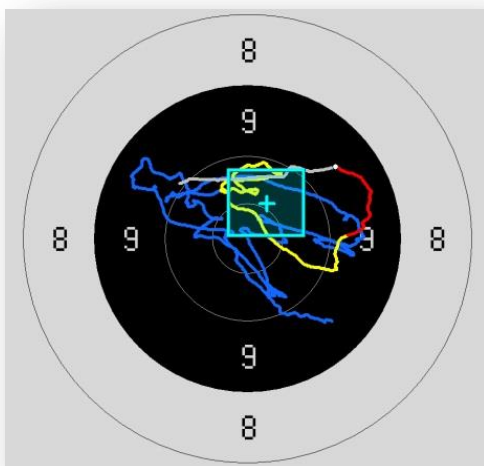
- G. High Master shooter with typical scores of low to mid 190s.
- H. Upper Expert to lower Master shooter normally firing mid to upper 180s.
- I. Recently turned Expert shooter with score varying from the 160s to 170s.

## Reading the traces

While seemingly straightforward, there is considerable information on the image of the shot replay. I just want to give you an overview of what you are seeing when you look at the images.

The NOPTTEL is constantly recording the movement of the rifle. Only when it detects a shot being "fired" does it capture the movement for 4 seconds leading up to the shot. Viewed on the replay screen this starts as a blue colored trace. As time goes on and the trace continues on the screen we get closer and closer to the shot break. At 1 second before the shot the trace turns from blue to yellow. This is when the NOPTTEL starts measuring the data behind the hold. At 0.2 seconds before the shot break the trace color changes from yellow to red. This represents the "trigger control" phase when the shooter has already decided to shoot and the shot process has started. At the end of the red trace is a small white dot that represents the hit location. After this a gray colored trace indicates the rifle aim after the shot.

When the shot has been completely replayed a blue rectangle is overlaid onto the trace. The center position and size of this rectangle relate to the holding phase (yellow trace), or 1 second – 0.2 seconds before shot break. The horizontal and vertical dimensions of the rectangle indicate the relative horizontal and vertical size of the shooter's hold and the cross in the middle shows the center of that holding phase.



In the example at left you can see that the trace started as a mid-ring 9 at 4 o'clock. The sights moved back and forth in the 10-ring for a few seconds. Then, 1 second before the shot, the trace turned yellow high in the 10-ring and then moved across the X and out into the 9. The red trigger control trace started in the 9-ring signifying that the shot is only 0.2 seconds away. The actual shot is a mid-ring 9 at 2 o'clock with follow-through back into the top of the 10-ring.

My guess is that the shooter saw that he was moving out and didn't want to stop and start over. The delay caused by seeing the movement, processing that information, deciding to shoot, and executing pulling the trigger all added up to a lost point that he will never get back. This has happened to me more times than I care to count. My bet is it has happened to you too.

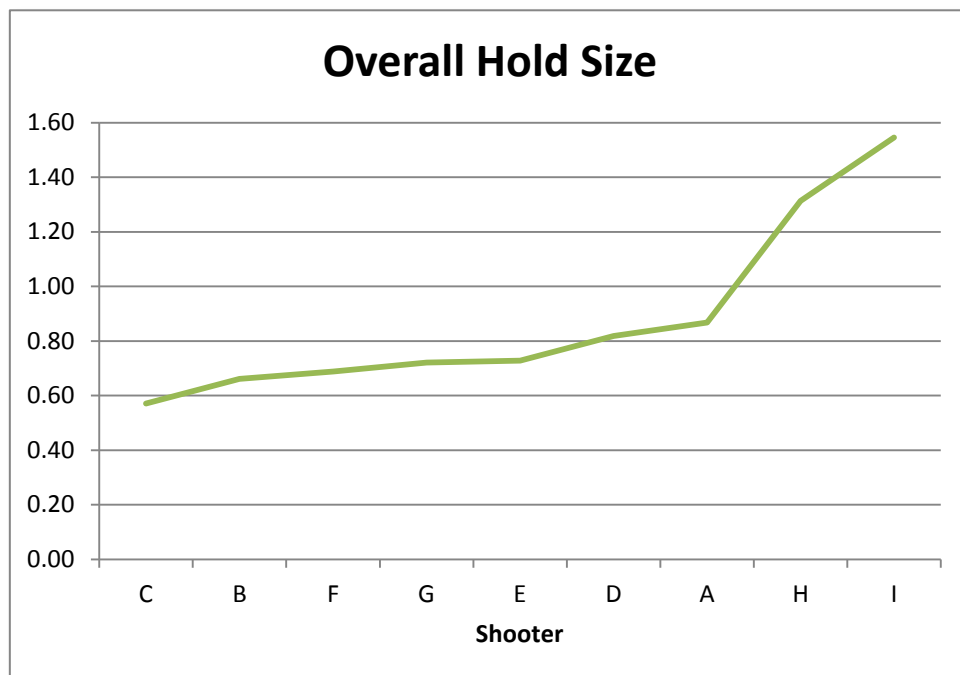
As you look at the traces that follow remember that the blue trace starts 4 seconds before the shot breaks. That's a lot of time and potentially a lot of movement. Most shooters will use this time to settle their wobble before they start the final part of their shot process. When looking at hold, look more at the yellow and red traces and the size of the blue hold box. These are better indicators of a shooter's actual hold at the point when they have lined up the sights.

Since the center of the hold box is the center of the hold, another good performance indicator is to see how far away from the hold box the shot actually broke. This gives you an idea of how clean their trigger control is.

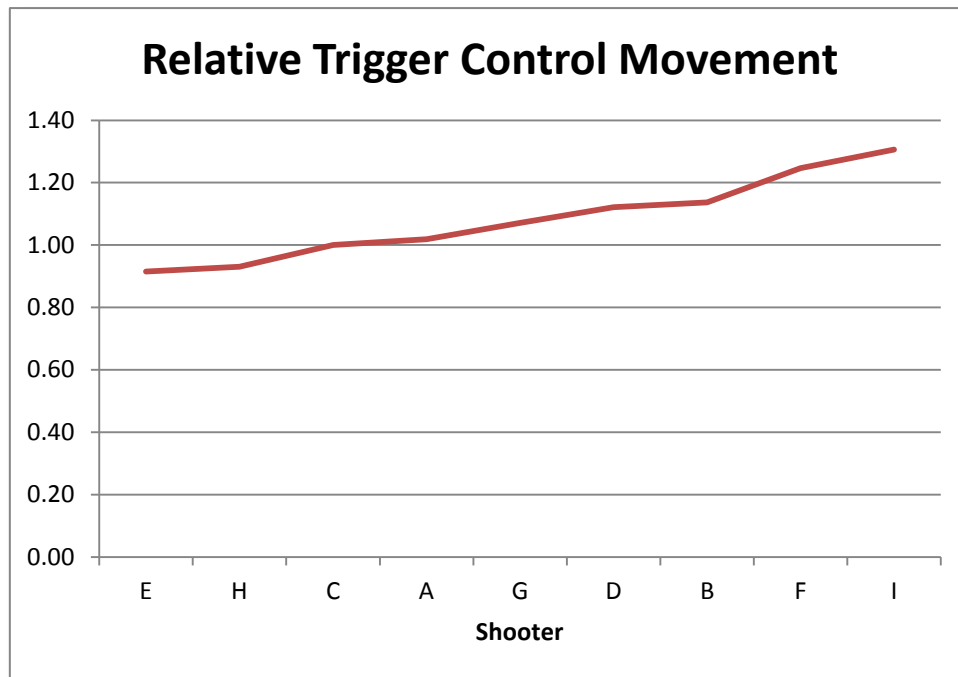
## By the numbers

The NOPTTEL will output raw numerical data for each shot. I put together these numbers as a general way to illustrate two aspects of offhand performance.

The hold number is a relative number based on the hold size for 1 second - 0.2 seconds before the shot breaks. Generally speaking, the smaller the number the smaller the wobble during this time.



The trigger control value shows if there is more or less rifle movement right before the shot breaks. A number greater than 1.0 means that the wobble got bigger as the shooter prepared to pull the trigger than it was during the regular hold. Like hold, smaller numbers are better.



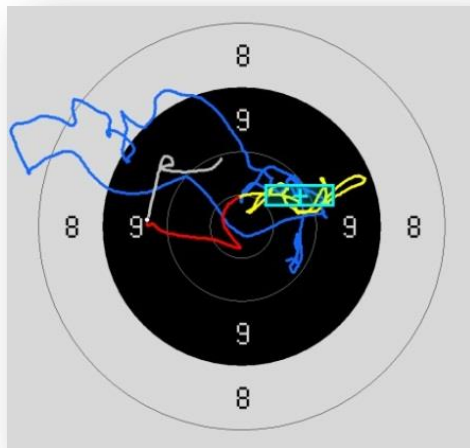
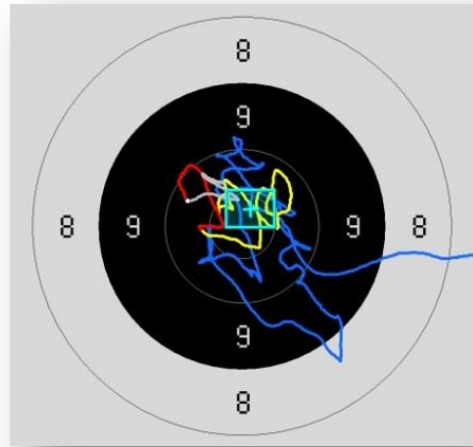
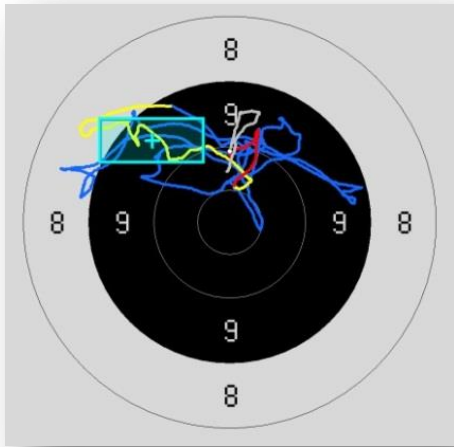
## The Shooter's shots tell their stories

What you will see below is that like a fingerprint, each shooter's hold and their shot process is unique. What works for one may not work for another. I didn't have a perfectly regimented process for each shooter. I just asked them to shoot the number of shots that they felt comfortable with as I didn't want to take up too much of their time. Some shooters wanted more time on the NOPTL as they wanted to see if they could improve their holds by trying different things. What I found was that even when a shooter made some alterations, you could still tell whose hold was displayed on the screen.

Months after conducting these sessions I finally delved into the details behind the traces. I looked for patterns and anything else that was unique to how that shooter performed. Sometimes the traces told the full story. Other times I had to look deeper into the statistical data and other charts. After going through all the shots for everyone, I pulled out some sample traces that were a good representation of that shooter's style. These are what I have shown in this article.

### Shooter A

For all the success that this shooter has had in highpower, I found his hold size to be larger than I anticipated. While others had a starting point where they would begin their shot process, shooter A did not seem to have one. Within the overall hold was an irregular, erratic movement. This sub-part of the hold would dart away and back toward the middle. The advantage for this shooter is that while the pre-1 second hold was pretty big, the hold in the final second is much better. This is borne out by the size of the yellow trace compared to the blue.



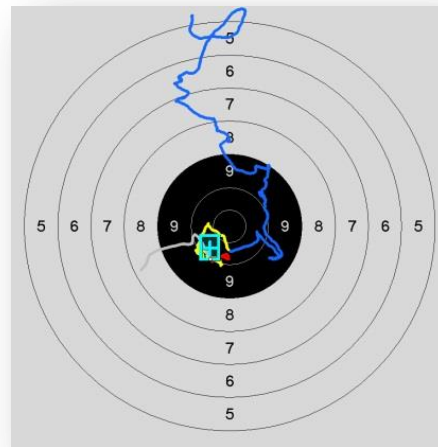
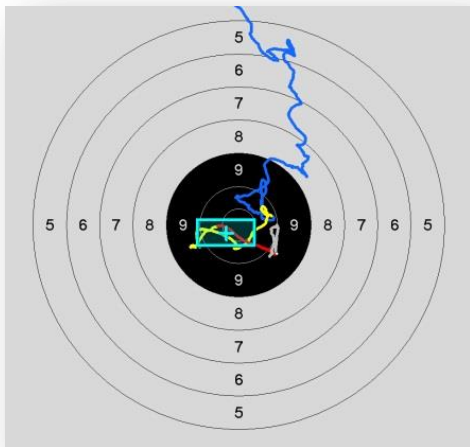
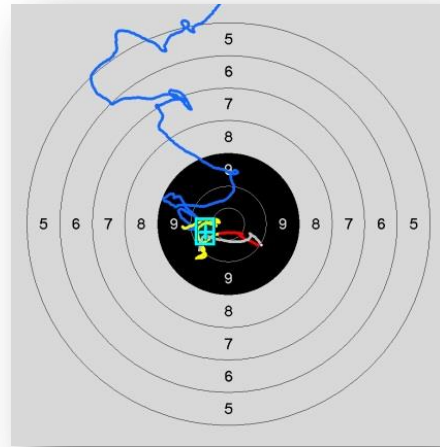
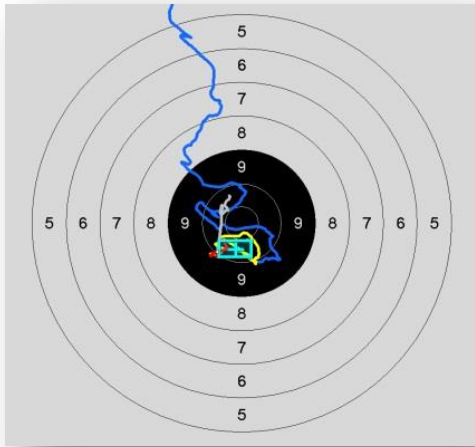
### Shooter A

#### *Shooter B*

The most noticeable part of this shooter's hold was his consistent, methodical approach from above the target down to the middle. Shooter B commented that he starts at the same place and follows a procedure to the target. If that procedure is interrupted he starts over again. That way he knows when things are right or not.

I did notice that this approach to the target is not a constant movement to the middle where the shot breaks during the downward travel. On several shots when he got to the middle the movement became more side-to-side before the shot broke. Essentially he was stopping his downward approach and pausing. This seemed to be an effort to center up his horizontal position.

Despite the large looking vertical movement into the target, the size of the hold once entered into the black is very good.

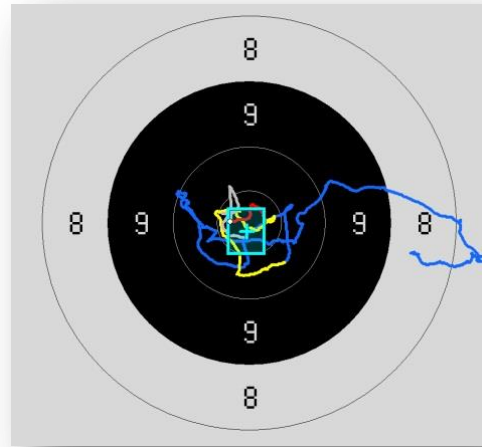
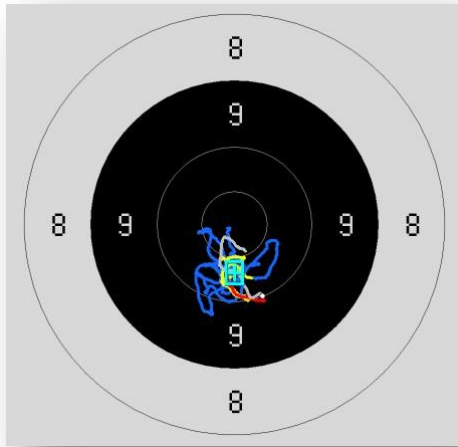


### Shooter B

#### *Shooter C*

Hold size is what I noticed first about this shooter. Not just the hold in the final second before the shot breaks, but the size of the hold for a second or two before that. It was certainly the smallest hold out of everyone. Within the overall wobble was also only small movement towards and away from the center. This means that even when the sights drift around this is still a very small movement.

I noticed that when this shooter approaches into the target he would reach the middle, or the 10-ring anyway, and then drift back out before coming in again. In talking to him about this he said that he feels more comfortable seeing that first 10 and coming in again. He prefers to shoot the second 10 rather than the first.

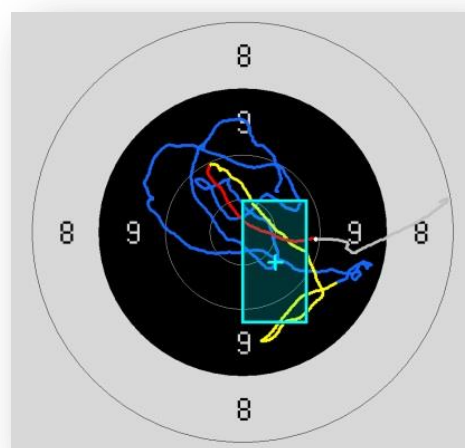
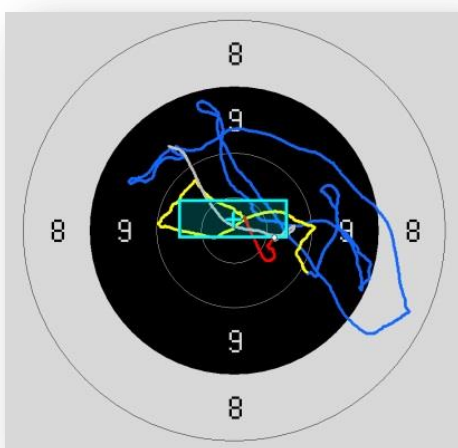


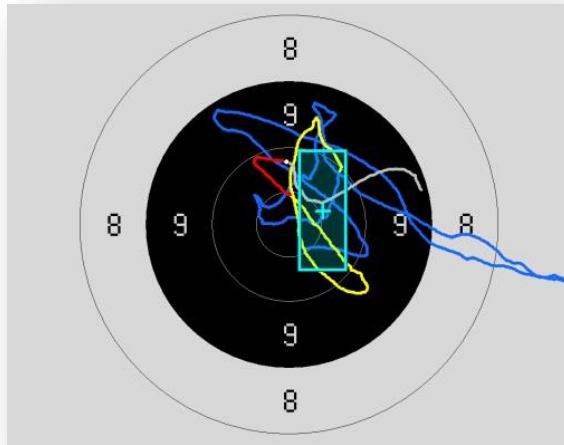
### Shooter C

#### *Shooter D*

This shooter was probably my biggest surprise of all the champion shooters. At first glance I was shocked at the overall size of his hold since I know the scores he can shoot. After a while though, I began to look closer at the details of the hold and his shot sequence. The overall movement was from upper-left to lower-right about the size of the black or maybe a little bigger. Whereas some shooters, like Shooter A, will have a large movement for a while and settle into a smaller hold before the shot breaks, Shooter D still had the same back and forth movement right up to the time of the shot.

This large movement is deceptive. Although the overall size of the hold is large, the movement is predictable and controlled, allowing the shooter to better see where the rifle is moving to next. This leads to the ability to time the shot so it goes off in the middle.



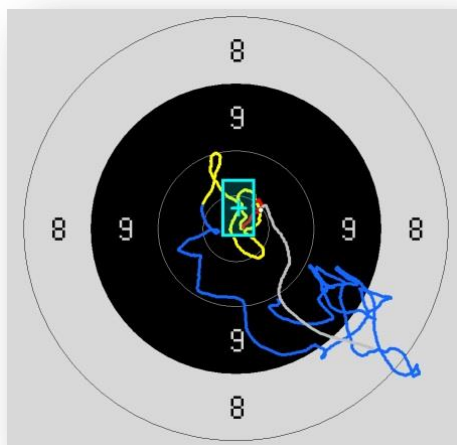


**Shooter D**

***Shooter E***

There wasn't really much that stood out about this shooter's hold or process. What I did notice was the trigger control. Whereas most shooter's movements expand during the final 0.2 seconds of the trigger control phase, Shooter E's movement actually got smaller during this time. To the point that he had the cleanest trigger break of everyone. Additionally, once he got comfortable in the string, Shooter E was able to time his shots very well and did a good job of breaking shots during the "inbound" portion of his wobble.

I would have liked to spend more time getting more shot data from him and finding out more about the details of his shooting.



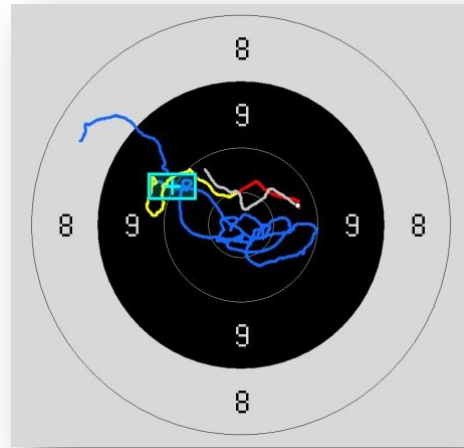
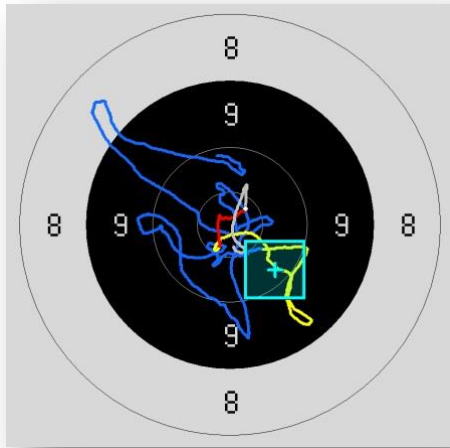
**Shooter E**

***Shooter F***

Here is another shooter with a pretty small hold once he settles into the target. The most noticeable thing about his shot process is how much time he spends in the 10-ring before the shot breaks.



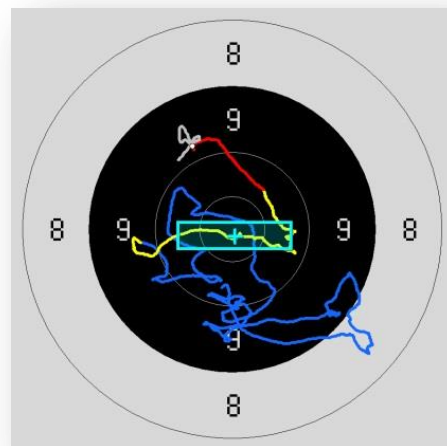
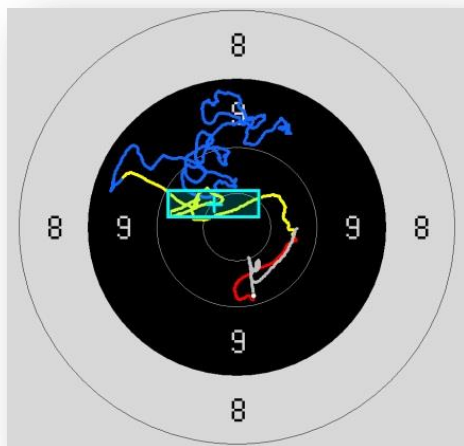
There are a number of reasons for this and if the shot breaks cleanly it really isn't a problem. But the extra time spent on each shot might affect other shots in the string. More time in the 10-ring means more time spent concentrating and more energy expended that might better be used on another shot. On the other hand, forcing a shot too early will, in many cases, lead to losing points.

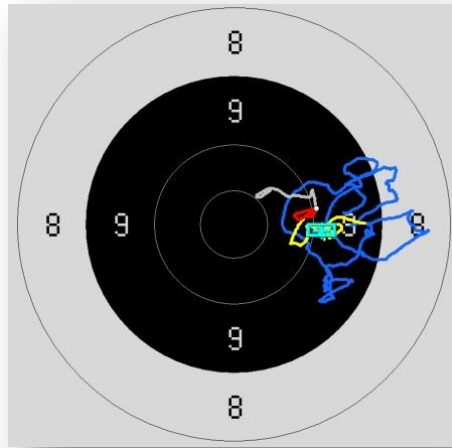
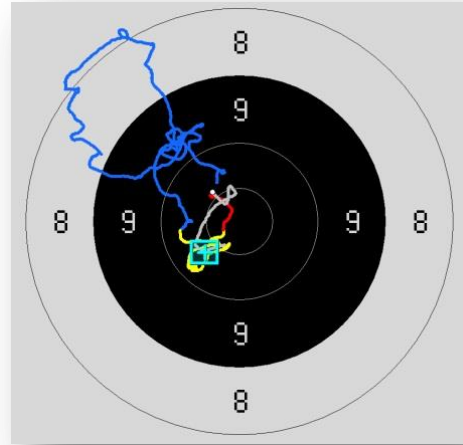
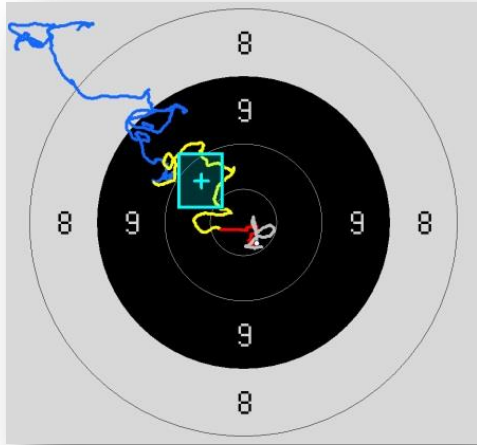


**Shooter F**

### *Shooter G*

This is the first of our non-champion shooters that I will use to give us a reference to the broader highpower community. This shooter's hold size was quite good, just as good as or better than half of our champions. This shooter's weakness starts with an inconsistent aim point. Either he is approaching the target from different directions or he lets the sights settle in various spots due to poor NPA. When aim is acceptable the other weakness is trigger control. Shooter G seems to come into the target, hold well, and then move out of the aim point when the triggering process takes place. The triggering isn't clean and may be too much of a conscious process.

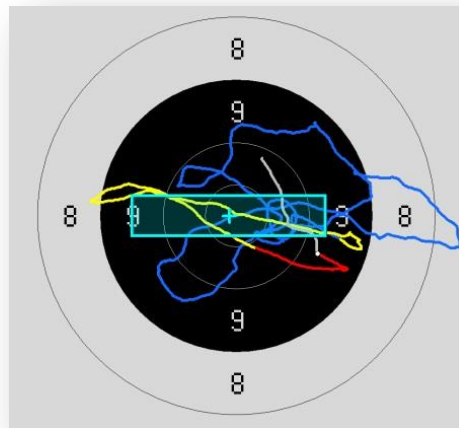
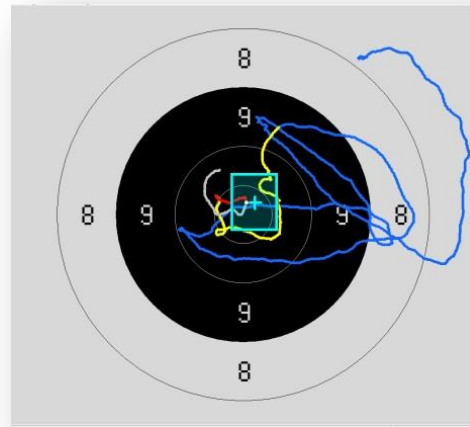
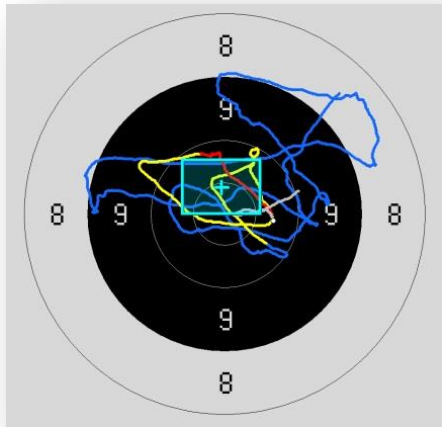




### Shooter G

#### *Shooter H*

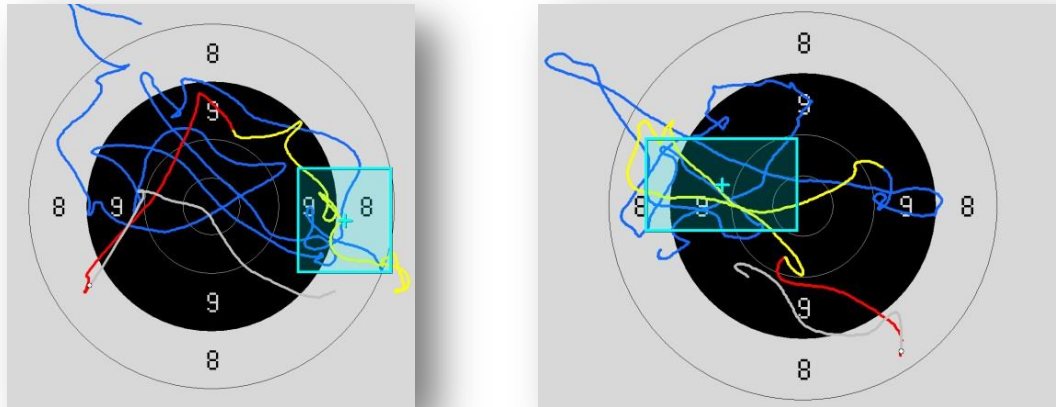
Here is an example of a shooter that has gotten the basics down of the standing position but is still advancing his craft. Overall hold is large which decreases the amount of time in the 10-ring. This means that the opportunities for a good shot are diminished. Trigger control looks good on paper but this is deceiving. Large hold tends to mask equally large movement during trigger control and make the trigger control value look better than it really is. Despite the larger hold, this shooter has learned to attain good, centered NPA as evidenced by the light blue hold box centered on the target.



### Shooter H

#### *Shooter I*

This is a shooter that is still getting the hang of the position. Hold is very big and any time spent in the 10-ring is short and fleeting. Shooter I snatches at the trigger when the sights flash past the target and already on the way out. His hold never really settles and the sights weave in large, quick movements. Notice how the yellow and red traces are just a big as the earlier part of the hold.



Shooter I

## What have we learned?

Putting aside any technical discoveries, at the very least we were able to deliver on that original question from 2001. From the traces we peered through the eyes of the top highpower offhand shooters in the country to see what they are seeing. That peek can be a surprising one.

This can put to rest any expectation that these shooters have perfectly still holds and can break the shot without any disturbance to the rifle. Most of the holds are good but they never actually come to a stop. Even the shooters with the best holds will not have the same small wobble on every shot.

These shooters have spent many years working on being the best and this shows. We cannot expect to shoot the same scores without putting in the time and effort. But this experiment also shows that we don't need to be perfect to shoot 197+. These shooters are evidence of that.

Even within the group of champion shooters there is plenty of variation in wobble size and technique. What's significant is that despite these differences the shooters can fire very similar scores. They have found differing paths that still lead to a similar destination. The rest of us can work on our own paths and hopefully get to that same destination.

## Acknowledgements

I am very grateful to the individual shooters that participated in this endeavor. They took time away from their busy Camp Perry schedules to allow us a peek into their offhand routines. In addition, they also gave me feedback on their shot processes and answered any questions I had.

In addition to the shooters named earlier, I would like to thank the following people for helping to arrange this experiment.

- SFC Emil Praslick III, USA, for assigning and coordinating the AMU shooters.
- Dennis Willing, Director, NRA Competitive Shooting, for providing the facilities where this experiment could be conducted.