Dear Colleagues

**Compacting a wide group into a single, solid group exactly in the centre**

**The Problem: o**n examining the group pattern at the end of a shoot, a TR shooter may find that it is larger than 1.0 minute of angle (MOA) and centred anywhere within the bullseye, e.g. on the edge of the V-bull, with many shots not scoring Vs. Likewise, an F Class shooter may find it difficult to prevent the 0.5 MOA group from expanding while trying to centre it exactly within the X-ring. The end result is often far from a possible of 10 Vs or Xs.

A coach will often find that F Class shooters in a teams’ match are able to score higher numbers of Xs than when shooting alone. This can be seen however, only if the coach has responsibility for moving the telescopic sight. That is, higher numbers of Xs occur when a coach uses correct sight adjustments and the shooter is required to not aim off!

This article describes a statistical approach to centering a group, whether in TR or F Class. This enables each of these shooters to score far more Vs or Xs. As well, an F Class shooter needs to keep all shots of a group within 0.5 MOA, exactly in the centre of the X-ring.

**Discussion:**many shooters have never been taught how to move a group from the X-ring line to the centre, i.e. moving the sight according to statistical principles. It appears that the vast majority of both TR and F Class shooters have little idea how to adjust the sight and at the same time, take into account the likely size of the group. As a result, most F Class shooters aim off. This inherently assumes that the size of the group is the width of the projectile!

Shots fired at a target form a group with a size that depends upon factors affecting the shooter’s techniques. Nearly every shooter takes insufficient care to minimise the size of his/her group. For TR or F Class shooters, the factor which expands a group most, is the release of shots without the necessary care to avoid generating a nervous system tremor. If the shooter does release shots with the necessary care, the TR group will be less than 1.0 MOA. The F Class group will be less than 0.5 MOA.

If the TR shooter takes no care to avoid a tremor, then the group will be far larger than 1.0 MOA, closer to 2.0 MOA. This group for some shooters is often a circular shape, just within or outside the bullseye. It will often consist of two different groups with centres wide apart. Many shooters wonder at the fact that this outer group can be hollow, i.e. does not hit the V-bull. However, it is more common to find that the group contains a mixture of bullseyes and inners, which encircle a single centre within the V-bull.

The TR shooter may also produce from 2 to 4 sub-groups, which split off the main group as a result of change of the natural point of aim. This occurs as a result of repeatedly moving any part of the body during the course of a shoot.

On the other hand, if the F Class shooter does not know how to avoid a tremor, then the group will be far larger than 0.5 MOA and closer to 1.0 MOA. The group is often a circular shape and just around the 6-ring (or V-bull). It may also form a circle just around the perimeter of the bullseye with several shots crossing into the inner ring.

Adjustments to the rear sight (TR) or telescopic sight (F Class), are made in MOA and the shooter needs to know whether the group is likely to be small or large, depending upon whether care is sufficient to avoid a nervous system tremor. If the shooter is not aware of this, then a sight adjustment can be far too large or completely inadequate. That is, an adjustment can result in a group being wound right through to the other side of the bullseye.

An approach used by some coaches is to let the shooter fire 2 or 3 shots, so as to form a group, which will reveal its distance from the V-bull or X-ring. The coach may then wind the sight to move the group into the centre of the target. Unfortunately, this can only be done a very few times before the shooter has used up all the shots in his/her shoot. It is therefore not practical unless the coach is working with a new shooter who has a wide group.

It is however possible to fire one shot, upon which the coach may make a statistical estimate of the likely size and place of the group. A single sight change may then be made so as to statistically move the group a significant distance toward the centre of the V-bull or X-ring. Usually this takes no more than two shots to move the group close to the centre. The group in this situation may even consist of a 50 percent mix of both the small and large groups.

To make these rear sight or telescopic sight adjustments, there is a need to move a group by:

* 1/8 MOA if the shot is close to the X-ring line; this circle is actually about 0.5 MOA across, so there is no risk of winding the group clear through to the other side of the X-ring
* ¼ MOA if the shot is close to the 6-ring or V-bull line; this circle is about 1.0 MOA across, so there is no risk of sending the group through to the other side of the V-bull
* ½ MOA if the shot is close to the bullseye line; this circle is about 2 MOA across, so there is no risk of winding the group clear through to the other side of the bullseye.

Needless to say, if the shooter chooses to aim off, to the same point on the opposite side of the bullseye, 6-ring or X-ring, then the shot will be sent 4 times as far as one of the above sight corrections. There is then a good likelihood that the resulting shot will go clear through and out the other side of the bullseye. Worse still, a shooter who aims off is generally not aware of the size of the group being adjusted, i.e. whether a 1 MOA or 2 MOA group

**Practical:**in a teams’ match the coach should have worked with each shooter beforehand, to ensure that the shooter knows how to avoid generating a tremor, which may send a shot well outside the desirable group of a TR or F Class team. Nevertheless the coach will monitor signs of the group expanding to greater than the size of the V-bull, i.e. the 6-ring. An immediate action may be taken by the coach to avoid this. The most effective action is to ensure the shooter releases each shot with**a quick early pull**followed by**a very slow release**. While doing this, the mind is focussed entirely on the pull until release occurs as a surprise.

The coach must maintain complete control of the rear sight or telescopic sight adjustments. Depending upon where the shot hits, the coach winds on MOA according to the values listed above. The shooter is required to load and prepare to release by quickly taking the start of the pull. When the coach quietly indicatesgo, the shooter slowly releases the shot, taking**about 3 seconds for this**. The shooter has his hands full when doing this and so has no time for discussion. The coach continues to make sight corrections according to the list above. If the group is well within the X-ring or V-bull, the coach will still be making corrections, asking the shooter to release shots without delay if the flags remain at the same position.

**Conclusion:**in a teams’ match a coach should assist monitor and advise the shooter to release shots to form a small group, i.e. less than 1 MOA (TR or F Class). The coach should make all sight changes and do this in order to avoid disturbing the shooter’s rhythm. The coach should make such adjustments based upon the century-old principles of statistics. The shooter has an absorbing task to release shots slowly, but within 3 seconds of being given the wordgo. The shooter should never be allowed to release a shot by aiming off.

Best regards

Geoff