Dear Colleagues

**A common confusion of groups – origins and remedies for vertical sub-groups**

**The Problem:** TR and F Class shooters experience small sub-groups which are vertically-aligned across the middle of the V-bull or X-ring, i.e. just above and just below it. These are additional to the 9 to 3 o’clock or lateral sub-groups discussed in another article.

A shooter can be seriously misled upon the appearance of a group of 2 or 3 vertically-aligned sub-groups, close to the V-bull or 6-ring i.e. 12 to 6 o’clock. There are quite different factors which lead to vertically aligned sub-groups. If a shooter is unable to immediately identify the factor, e.g. arising from the tremor effect or different body positions, then he/she may be unaware of the required remedy.

This article describes vertically aligned sub-groups and their origins. They are shown to not all be related to the numerous patterns that result from the tremor effect. The shooter is as a result, likely to make an unfortunate choice on the means of converting a multiple vertical sub-group into a single group, i.e. in the centre of the X-ring or V-bull.

**Discussion:**    lateral sub-groups commonly arise from the tremor effect and changes in tension of the loading hand returned to the pistol grip after each shot. The tremor effect leads to both lateral and vertical sub-groups. It may result in several characteristic patterns of shots, i.e. a 1.0 or 0.5 MOA group within the V-bull or X-ring, accompanied by:

* 2 to 6 sub-groups across the V-bull or bullseye (i.e. lateral and vertical)
* a circular string of shots around sections or the complete 6-ring, bullseye or inner (i.e. lateral and vertical shots, not sub-groups)
* a 1.0 MOA sub-group located at 3 or 4 o’clock near the boundary of the bullseye (i.e. lateral)
* a halo of 3 to 6 shots located above or below the V-bull (or 6-ring) (i.e. vertical)
* a straight line of shots that runs across the magpie, inner and bullseye rings (i.e. lateral or vertical).

The large number of these characteristic shot patterns can confuse a shooter, particularly if simultaneous patterns occur from other sources.

Perhaps the most common source of vertical sub-groups (other than the tremor effect) is the unwitting failure by a TR shooter to notice that the brain has allowed muscular tension to accompany that provided by the sling. Note that the sling is used to enable the skeletal structure alone to support the weight of the rifle and arm. The shooter needs to check whether this is occurring and make a conscious decision for muscles of the supporting arm to go limp, i.e. rely entirely upon the sling (or let the sling do all the work). When arm muscles are used, they tend to work well then break down when this tissue can no longer support the weight. An inert sling material may on the other hand provide the same tension throughout a shoot.

**Practice:**a shooter capable of grouping well inside the 6-ring or V-bull, may in several ways obtain a wider group that extends out into the bullseye ring or further. The writer has each week, routinely examined every group by shooters from 3 rifle clubs, i.e. 50 or 60 members who shoot a total of 100 or 120 groups. This has confirmed that more than 90 percent of these TR shooters experience the tremor effect, producing a small number of V-bulls and a large number of shots that follow around the bullseye boundary, or accompanied by a 1.5 MOA sub-group on the right. Many TR and F Class shooters experience one or more of the dot-points shown in the Discussion list. There is no doubt that the tremor effect must be overcome by every shooter, as has been the practice in small-bore for the past century.

As well, TR shooters need to consciously command the mind to let arm muscles go limp, allowing the bones and sling to do all the work. Otherwise, small sub-groups (often only 0.2 MOA) will occur from top to bottom of the V-bull and even as wide as the bullseye.

The distance of sub-groups above and below the bullseye may be great if the tension required from the sling is insufficient. The shooter should confirm this before starting every shoot, i.e. by applying the test of sling tension (come onto aim and consciously allow arm muscles to go limp. If the foresight drops even slightly, then take up the tension one notch of the sling. Keep doing this until no drop occurs).

Both TR and F Class shooters (RH) may unwittingly score vertical shots (enough to score an inner at 7 o’clock) if the thumb is firmly positioned through a thumbhole stock or around the rear of the woodwork surrounding the tang of the action. The thumb may in this way absorb recoil. A LH shooter will find this shot occurs in the inner ring at 5 o’clock.  Elevation shots may also occur when a shooter releases a shot using the trigger-pinch technique, which relies upon the thumb pushing forward against the rear of the trigger guard.

A TR shooter’s inability to control the effects of heartbeat may also create small sub-groups above and below the V-bull. Many shooters attribute this vertical pattern of sub-groups to inexact control of breathing and even heartbeat. However, the latter should never occur. When a pulse becomes noticeable, simply ensure that the sling at the upper arm applies even pressure to muscle tissues on each side of the humerus. This can be felt while shooting and overcome within a few seconds when reloading. Reach through under the rifle and slightly rotate or move the sling. This will balance sling tightness and uneven blood flow on each side of the arm and quickly relieve pulsation movement of the foresight.

Another major difficulty experienced is due to placement of the hand at the pistol grip, avoiding inadvertent absorption of recoil (F Class and TR). A TR shooter’s forward hand may also absorb recoil if it touches the front sling swivel (throw away the smallbore hand-stop used in fullbore). Ensure that no part of the hand at the pistol grip applies a forward-directed or sideways-directed tension during recoil. The thumb must be set so as to not impede rearward movement of the pistol grip. The hand and fingers should afford a carefully controlled trigger release, anchored upon the two large palm muscles and the large muscle behind the trigger finger. Each should bear lightly and uniformly on the pistol grip, with the same tension for each shot of a shoot.

For TR shooters, the butt must bear firmly against the shoulder using the thumb as a shoe-horn to position it. Butt placement and tension is critical for ensuring uniform recoil against the shoulder from shot to shot. If the rifle can be dropped down or taken out of the shoulder in the aim position, then it is too loose.

Ensure that Perce Pavey’s use of cheek muscles is done correctly. He did not apply face pressure to the butt. Instead, at 300x he gently located the cheek-bone against the butt so as to be sure his head was at the same place for each shot. The writer used the thumb joint against the cheek at 300x, then against an upper canine tooth at 600x, the base of the jaw-bone at 900x and at 1100x and 1200x the head was in mid-air. Head pressure against the butt is a source of unwanted shots. F Class shooters should consider no contact with the butt.

**Conclusion:**  vertically-aligned sub-groups above and below the V-bull can be entirely avoided. TR and F Class shooters should:

* master the tremor effect
* use the mind to consciously control arm muscles to go limp
* ensure sling tension is the same on each side of the upper arm
* avoid absorbing recoil by any part of the forward hand or the hand at the pistol grip
* lever the butt into place at the shoulder using the thumb as a shoe-horn
* anchor the hand at the pistol grip with the three largest palm muscles
* use the cheekbone, upper canine tooth and lower jaw-bone to locate the butt exactly, without applying cheek pressure
* consider shooting with the butt free of contact with the shoulder
* try it out, then forget pinch-trigger release of a shot.

Best regards

Geoff