Dear Colleagues

**Speculation and experimental evidence in rifle shooting**

**The Problem:**  some sporting organisations appear to have no interest whether competitors and organisers function through speculation. Neither does there appear to be concern as to whether shooting techniques in wide use are supported by experimental evidence. As a result, the vast majority of rifle shooters can be seen at a Queen’s Prize shoot using techniques based upon speculation. Of greater concern, shooters appear to not distinguish techniques from others based upon experimental evidence. This is fostered partly as a result of new shooters being encouraged to copy what other shooters do.

There are however important functions in every community such as the law courts, which clearly disallow evidence submitted if it is based upon speculation rather than verifiable fact. Not surprisingly, the medical, scientific, engineering, accounting and many other professions, only condone procedures supported by experimental evidence.

As a result, the thousands of rifle shooters who each year compete in major events, such as HM The Queen’s Prize at Bisley, the Commonwealth Games, the Bisley Meeting of each British Commonwealth Country and the Queen’s Prize of each Australian State, inadvertently use techniques which are not supported by experimental evidence. Techniques which illustrate this, involve the:

* nervous system, which extends throughout all parts of the shooter’s body and as a result, enables a minute movement of a foot (or other bodily component) to shift the foresight sideways and unwittingly alter or intentionally correct ***the natural point of aim*** (TR)
* the recoiling rifle as a system in contact with the body (forward supporting hand, the hand on the pistol grip, cheek muscles and shoulder), which must be held so that **tensions do not change between shots** (TR, F Class)
* need for a shooter to position the rifle with **vertical support by the skeletal structure of the forearm**, rather than the less-steady angled support of arm muscles (TR)
* need for a rifle to be supported by **a sling, which binds the skeletal structure of the arm,** so that limp muscles and bones of the arm support the rifle vertically instead of at an angle (TR)
* adrenaline rush within the shooter’s body, which **causes the** **rifle muzzle to move**, so that if carefully controlled the tremor may occur **completely before release of a projectile**, that is, avoiding simultaneous movement of the muzzle and enabling the group to measure less than 1 MOA instead of 2 MOA (TR, F Class)
* continually occupying the mind upon the steady increase of tension being applied to the trigger until the point of release, **overcoming a tendency of the mind to cease such activity and begin thinking about the next task**g. unloading the spent cartridge or looking at the electronic screen (TR, F Class)

This article describes the need by shooters to ensure that each shooting technique is not speculative and can be verified with experimental evidence.

**Discussion:**  an observer at an important shooting competition may find that the majority of shooters are unable to distinguish between techniques, which are based upon speculation rather than experimental confirmation. Hence, it is common to observe most shooters:

* **changing their natural point of aim** between shots, when they move a foot, leg and buttocks, even sliding the whole body forward and backward [experimental evidence: indicated by sub-groups of shots which occur anywhere across the target]
* **changing bodily tensions** between shots as **the rifle recoils**:
  + where the forward hand is hard against the front sling swivel or hand-stop [indicated by a high-left to low-right pattern of shots for a RH shooter]
  + rear thumb pressing directly against the direction of recoil [indicated by 7 o’clock shots for a RH shooter or 4 o’clock for a LH shooter]
  + little or no anchoring of the trigger hand, aided by palm muscles bearing against the pistol grip [indicated by shots anywhere out of the desired central group]
  + thumb bearing against the forward edge of a thumb-hole stock [indicated by shots at 7 o’clock and otherwise not within a central group for a RH shooter]
  + cheek muscles bearing against a carved cheek-piece [indicated by shots at 8-10 o’clock out of the group of a RH shooter]
  + butt plate too short and unable to effectively duct recoil energy to the shoulder [indicated by several shots out of a group]
* **angular instead of vertical support of the rifle**, due to the elbow being incorrectly positioned alongside the rifle, hence requiring unstable arm muscle tissue for support instead of the skeletal structure [indicated by the foresight periodically wandering away from the target and hence in need of regular correction]
* release of shots when the **sling has insufficient tension** [indicated by a vertical group of shots above and below the V-bull and bullseye]
* **release of each projectile** **without ensuring it occurs only after the adrenaline tremor has ceased** [indicated by the group being the size of the 2 MOA bullseye instead of the 1 MOA V-bull or 1.0 MOA rather than 0.5 MOA (TR, F Class)]
* failure to follow-through for each shot, indicated by the shooter’s **head starting to move before shot release** [indicated by occasional wide shots out of a developing group].

If shooters were aware of the need to experimentally verify that their techniques are not speculative, then a brief mention of this by a coach should be enough for a shooter to immediately apply a correction. Hence, the appearance or non-appearance of the above diagnostic shot patterns may confirm the origin of a shooter’s technique difficulty.

**Practical:** a small number of rifle clubs in Australia have already begun to put into practice the necessary coaching procedures to overcome the damaging effect of speculative techniques. At one rifle club known to the writer, each shooter’s weekly performance is examined by the club coach, who is able to immediately recognise what the shooter did which gave rise to his diagnostic pattern of shots. At the 2019 Sydney Queen’s a shooter was observed having each of his scores plotted by a coach seated behind the scoreboard.

The most important coaching feature for the shooter at the Sydney Queen’s was timing of the release of each shot correlated with its distance from the V-bull. When the time of release was too rapid, i.e. before the adrenaline tremor had ceased, the moving muzzle tended to send shots out toward and beyond the bullseye ring. However, if the timing was extended to 4 or 5 seconds, from the moment the trigger began to bite, then shots were usually within the V-bull. This coaching system was applicable to both TR and F Class shooters.

**Conclusion:**when shooters become aware of the need to ensure that techniques are based upon experimental verification rather than speculation, then scores will cease being accompanied by the well-known group changes described above for each speculative technique. The most common speculative technique is when a TR shooter’s supporting elbow is out to one side of the rifle. The most common improvement sought by TR shooters is a group within the V-bull and in the case of F Class shooters, a group within the X-ring.

Best regards

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