Van Webster

Towards an Understanding of the Predraw

One of the prerogatives of editing a magazine is the opportunity to use the publication as a platform for inquiry and dialogue. Such is the case with Archery Focus *editor Steve Ruis' exploration of the predraw in the recurve shot sequence. The gauntlet having been thrown, I will attempt to address his observations on the subject of the predraw with the goal of enlivening the discussion.*

The abundance of new information, research, and practical experience have brought new focus on the process of making the archery shot. Coach KiSik Lee's book, *Total Archery* is a step-by-step guide to an approach that is coming to be known as the Biomechanically Efficient Shooting Technique or BEST Method. In an un-credited article in November-December 2005 issue of *USA Archery* magazine, the BEST Method was also described. With *The Heretic Archer* Vittorio and Michele Frangilli have offered their own views.

This new information is added to the literature of established techniques described in books such as Rick McKinney's *The Simple Art of Winning* and Ray Axford's *Archery Anatomy*. It's easy to be confused both as a coach and as an athlete. There is some value, I believe, in looking at various shooting methods with the goal of finding an approach that works optimally for each athlete.

The predraw is the stage of the shot sequence during which the bow is raised from a low position, with the arrow pointed towards the ground, to an elevated position in preparation for the draw. The goal of the predraw is to position the bow and body in such a way that the draw can be executed with minimum effort and maximum consistency.

The core of the geometric problem of the predraw movement is that the shoulders of the left and right arms are separated by the rib cage and chest. This separation, averaging about 16″-18″ in an adult, means that hands as the bow is raised, the arcing path of the bow arm and draw arm pivot around two different axes. Given that there is an average brace height of 8″-9″ on a typical recurve bow, the difference in these two dimensions needs to be resolved in some fashion (*see Figure 1*). Each of the predraw

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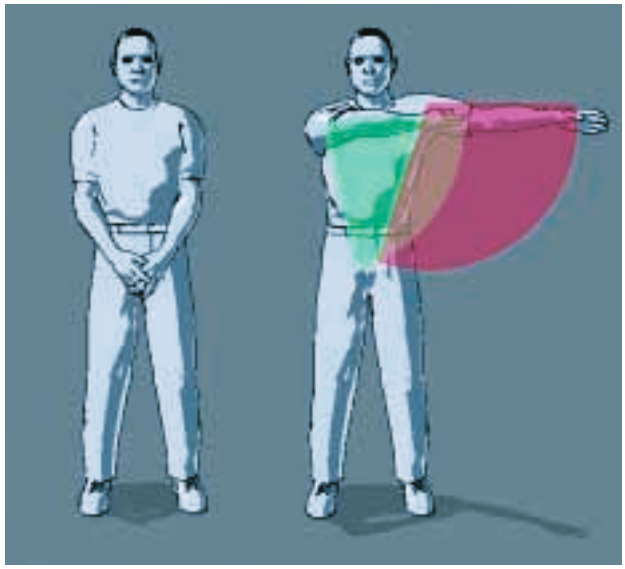

Figure 1 Raising both arms to one side causes the hands to be separated by the approximate width of the shoulders.

techniques described addresses this problem in a different way.

To explore the geometric relationship between the bow and draw shoulders try this exercise. Stand straight up and place your hands together below your waist directly in front of you. Raise your bow arm as if towards a target while allowing your draw hand to slide along the bow arm as it moves. When your bow arm reaches a horizontal position to your side, your draw hand will be resting on your bow arm with your fingertips at about your bow arm's elbow. You may observe that your draw arm is bent at the elbow as it passes in front of your chest. The distance between the fingertips of your bow hand and your draw hand will be about the same as the distance between your two shoulders.

This exercise illustrates that all skeletal motions are angular in origin, rather than linear. All the joints of the body pivot about a point. The cascading of joints in a limb (arm or leg) permit the end of the limb (hand or foot) to move linearly but the action causing that movement is a combination of angular deflections. Any discussion of the body's movements in an archery shot needs to be viewed in the light of this angular movement.

The Traditional Predraw

The traditional shot sequence is illustrated in McKinney's book on pages 12-15. The predraw is initiated with the bow arm down and the draw arm bent at the elbow. The upper body is rotated towards the target and the draw shoulder is pulled well across the chest in order to bring the draw hand to the string. As the bow is raised, the string is slightly drawn to make up for the angular distance between the two shoulder pivot points. When the arrow is level, the chest remains slightly open towards the target. As the draw arm begins the draw, the chest is rotated so that the shoulders align along the path to the target (*see Figure 2*).

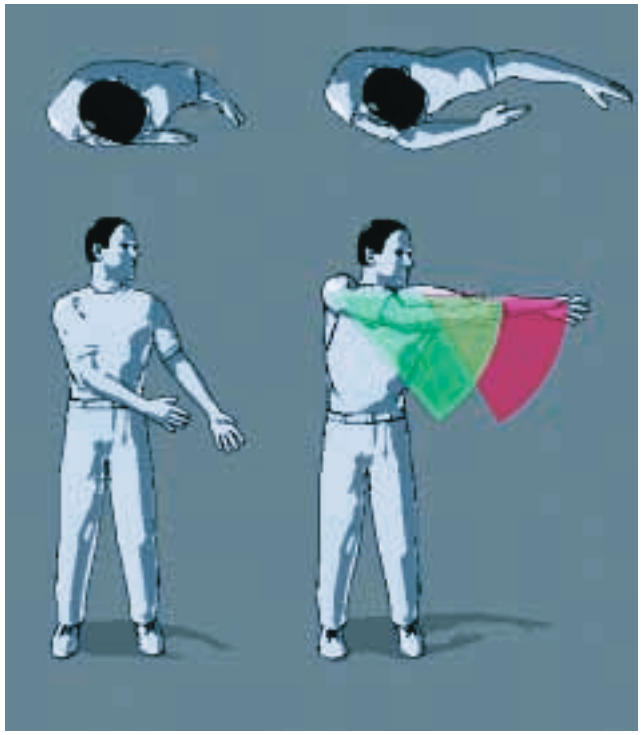

Figure 2. The pivot points in the shoulders of the bow and draw arms are moved closer together through a combination chest rotation and the movement of the draw arm shoulder around the rib cage. Note that the arcs of the two hands separate somewhat as the bow is raised causing a slight draw of the bow.

This shooting approach uses a combination of chest rotation about the spine, forward movement of the draw arm shoulder and a slight drawing of the string during the rise of the bow to make up for the difference in space between the pivot points of the bow and draw arms.

The advantage of this approach is that the motion is intuitive and minimizes the stress of the body during the setup phase. There is also very little motion of the arrow on the arrow rest during this predraw, helping to keep the arrow on the arrow rest.

The disadvantage is that there is a lot of movement of the shoulders and chest during the predraw and draw. The combination of movements in the torso combined with attempting to set the bow shoulder under load can lead to inconsistency from shot to shot and has the potential to cause injury from repetitive motion.

Predraw postures need to address the positioning of the draw arm elbow in anticipation of the draw. Remembering that all skeletal motion is angular, the

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upper draw arm pivots around the shoulder joint, causing the elbow to travel in an arc towards the side of the body. Traditionally this arc is in a plane parallel to the ground with the elbow moving in an arc away from the body. Axford proposes, on pages 96-99 of *Archery Anatomy*, that moving the draw arm in an upward arc, perpendicular to the ground, keeps the forces in a line towards the target and minimizes the rotation of the torso.

Larry Wise illustrates on pages 36-42 of *Core Archery* that compound shooters draw with the elbow moving in a plane parallel to the ground. The linear motion of the draw hand, caused by the angular motions about the draw shoulder and draw elbow, is directly in line with the force along the arrow.

Coach Lee's Approach

The National Archery Association's National Coach, KiSik Lee, resolves the differential dimensions between the shoulders in a different way. The predraw that Coach Lee calls "Setup" is illustrated on page 50 of *Total Archery*. Coach Lee advocates a distinct open stance with the hips rotated open to the target. The effect of this stance is to increase the body's resistance to lateral wind forces. The shoulders are kept in a line towards the target during the initial phases of the shot. The resulting spiral in the torso also stiffens the shooting platform and reduces core body movement (*see Figure 3*).

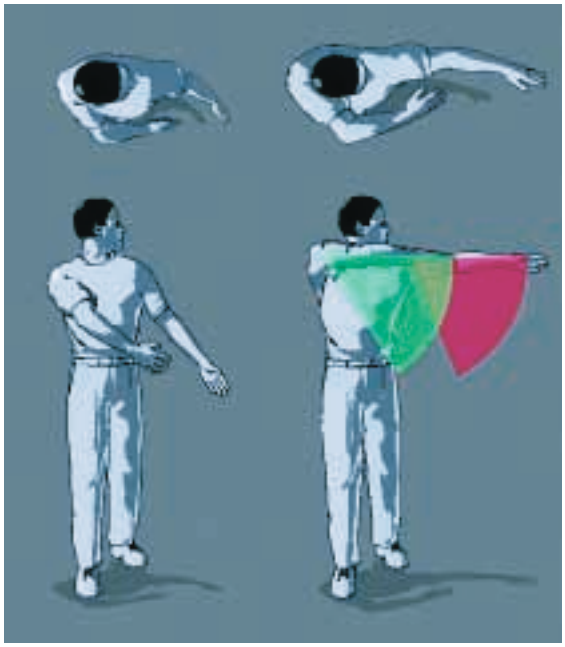

Figure 3 In Coach Lee's approach to the BEST Method, both the bow and draw shoulders are in line with the target prior to raising the bow. The resulting separation of the two shoulders causes a substantial difference in the paths of the two hands, causing a partial draw as the bow is raised.

Once the hands are on the bow handle and string, the two arms rotate about their respective shoulders to raise the bow without moving the angular position of the draw elbow. The result of this action is that the bow is about half drawn by the time the arrow is parallel with the ground. It's important to note that the draw arm is only moving upward and that the angle of the elbow remains constant during the entire predraw. The raising of the bow is completed when the top of the draw hand is level with the nose.

The draw proceeds with the draw hand moving on a downward path towards the collar-bone. At the completion of the draw, the draw hand is then raised to a position along the jaw. The objective of this draw path to the jaw is to keep the head steady during the entire shot. Drawing directly towards the chin will usually require some head movement to bring the string to its anchor point. A downward draw path also allows the archer to use the back muscles more effectively to aid in the drawing process, and helps to keep the draw side scapula low on the back.

Coach Lee emphasizes that both shoulders need to be kept down during the entire shot sequence. As the draw is completed and the load is transferred into the back muscles, the draw arm shoulder and scapula are lower than the bow arm shoulder.

The advantage of Coach Lee's approach to predraw is that the torso is kept very stable and that the relationship between the bow shoulder and the rib cage remains constant during the predraw and draw. In addition, the downward path of the draw hand towards the collar-bone during the draw phase further emphasizes the lowering of the draw arm shoulder. This motion also allows more of the draw load to be carried by the *latisimus dorsi* muscles in the back. The draw motion itself is as much a movement of the draw shoulder around the rib cage as it is a bending of the draw elbow.

The disadvantage of this approach to the predraw is that there is a lot of arrow motion on the bow as it is raised. It takes discipline to only raise the bow without adding an additional pulling movement of the draw arm. Teaching this approach to the predraw will require lots of practice with a string bow and then a stretch band to isolate the correct motions and elimi-

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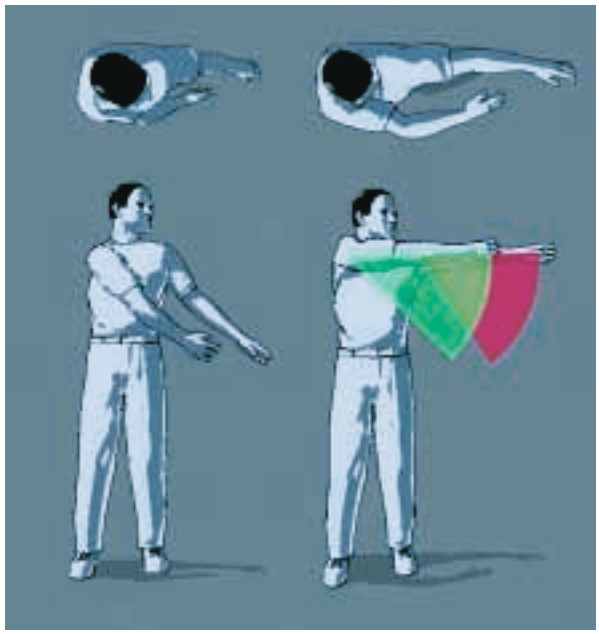

Figure 4 In this approach the bow arm shoulder and torso are preset in line with the target. The draw arm reaches for the string by bringing the draw arm shoulder well in front of the chest. The resulting arc of the two hands as the bow is raised separate a bit more than the traditional approach but not as much as Coach Lee's.

nate unnecessary movement. Combined with the open stance, beginners will have a long period of adaptation to this method.

It is also notable that the half draw, created by the geometry of the movements of the bow and draw hands in Coach Lee's approach, is not appropriate for compound shooters. The resulting position of the hands at the conclusion of the predraw in this approach is at or very near the peak draw weight of a compound bow.

The Frangillis' Approach

The approach to the predraw illustrated by the Frangillis appears to be something of a combination of the Lee and traditional approach. The stance of the feet is strongly open and the hips are open to the target at well. The torso is rotated above the hips in order to put the shoulders, especially the bow shoulder, in line with the target. As the bow is raised, the draw arm shoulder moves laterally around the rib cage to minimize any drawing of the bow prior to setting the bow arm (*see Figure 4*).

Once the bow is raised, the bow arm shoulder is set and stabilized using the latisimus dorsi muscles in the back and the chest muscles in front. There is minimum muscle tension in the bow arm itself and the wrist is relaxed. It is also interesting to note in the photograph on page 85 (picture 71) of *The Heretic Archer* that the draw arm elbow position of each of the three archers pictured is at a different height.

The draw is accomplished by moving the draw arm shoulder around the rib cage by activating the *latisimus dorsi* and *rhomboid* muscles on the draw side combined with the action of the biceps to close the angle of the elbow. Again the draw action is downward with the draw hand coming up to the chin once the draw motion is fully complete. At the conclusion of the draw the two shoulders are in line with the path to the target.

The advantage of this approach is that the bow arm shoulder is firmly set before taking on the weight of the draw load. There is minimum movement of the arrow on the arrow rest during the predraw reducing the tendency of the arrow to come off the rest. This approach requires considerable flexibility in the draw arm shoulder to permit the shoulder to move towards the front of the rib cage as the bow is raised.

The disadvantage of this approach is that archers lacking shoulder position mobility will have difficulty in raising the bow without causing excessive draw during the raise. Some may also argue that the motion of the draw shoulder from predraw to draw makes it difficult to achieve consistent shoulder alignment at the holding and aiming phase of the shot.

Conclusions

So, what's to be learned by this exercise in form analysis? Is one approach right and the others wrong? Is there an elusive combination of approaches that is the Holy Grail of predraw?

If there is one universal skill included in all of the various approaches to the predraw it is the ability to raise the arms without raising the shoulders. Archers should practice this movement with a string bow doubled over to produce a hand to hand distance of about 12″-14″. Raise the hands together in a parallelogram motion to just above shoulder height. If necessary, have a coach or colleague hold the archer's shoulders down during this exercise until he is comfortable isolating the movement of the arms from any movement of the shoulders.

A second, near universal truth of the predraw is that any draw of the string should only be caused by the geometry of the arm-shoulder movement and not by the action of the draw arm biceps causing the draw arm elbow to bend. Drawing while raising the bow is a

common problem for beginning archers. Coaches should be on the lookout for any drawing motion during the predraw.

Finally, the bow arm elbow should be rotated outward to provide clearance for the bowstring. This rotation should occur before the shoulder is placed under load. Usually, the rotation happens just before the bow arm is raised.

The optimum predraw is the one that works best in the system that the archer is shooting. Body type will play a role in choosing the correct predraw approach. For example, archers with barrel chests will have to accommodate a larger radius of movement around the torso than archers with slim profiles.

Joint movement and flexibility are also a factor in choosing a predraw approach. Even with the fittest of athletes, there is a wide range of motion flexibility around the joints. Athletes with very tight shoulder muscles will not be able to move the shoulder joint around the rib cage as required in some predraw techniques.

The predraw is only one part of the shot sequence. Each of these experts has developed a shot sequence that works as a system. Coach Lee has emphasized that a systematic approach to the shot sequence has benefits both for the individual archer and for developing a pool of top competitors. For the talent pool, a systematic approach, based on scientifically-based shooting techniques, helps each athlete develop their skills quickly, without a lot of trial and error. For the individual competitor, shooting systematically improves consistency in competitive situations. The body will remember what the mind has blanked out.

Which system approach to choose? For the young recurve archer, and the coach of young recurve archers with visions of the USAT and the Olympics in 2008 and 2012, Coach Lee's version of the BEST method is going to be a strong choice. Unless a recurve archer is consistently shooting 1380s and above with another technique, it is unlikely that USA Archery will choose a team member who is not shooting with the BEST approach.

For adult archers with some experience, there is always something new to learn. Look at each of these approaches to shooting technique, both traditional and newly developed, and see what works best for you. Change may come slowly and experienced archers will have to unlearn old habits and build new ones in order to improve.

So, Steve, is the picture any clearer?

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