



CHAPTER_2

THE FOUNDATION OF THE SHOT

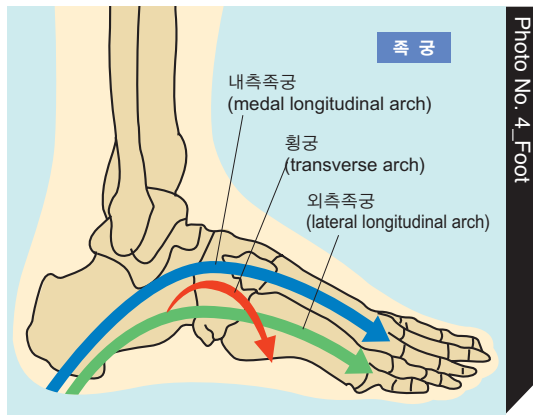
Success in archery depends on consistency and consistency starts with a solid foundation. Fully understanding and being able to apply the fundamentals is the key to successful performance. The fundamentals must form the basis of methodical instruction in order to prevent having to correct major technical faults at a later date.



THE FOUNDATION OF THE SHOT

1_The Feet and Ankles

The placement and distribution of pressure on the feet are important factors in balancing the body and can contribute greatly to generating power in a more efficient manner. Surprisingly, many archers are rather inconsistent when it comes to feet placement and pressure distribution when setting up the shot. However, recognizing this requires some further analysis.



The feet contain one quarter of all the bones in the human body; each foot contains 26 bones, 33 joints, 107 ligaments and 19 muscles. Additionally, the feet are formed by the medial, lateral longitudinal and transverse arches, which provide a flexible platform to support the body weight. As such, the weight must

be evenly distributed across the arches otherwise instability will result. Further, the ankle joint is held in place by powerful ligaments, which connects the foot to the tibia and fibula and is a rather complex structure. Therefore, correct footwear is very important to reduce fatigue.



As this structure is inherently unstable, a flat soled boot with a hard sole and with high enough sides to increase lateral support for the ankles would be beneficial. It would reduce the muscle power required and not only improve stability but also reduce fatigue.

The suggested weight distribution on the feet is about 60-70% on the balls (front) of the feet, and about 40-30% on the heels. This weight distribution is very important, as the balls of the feet control the stability of the body and most effectively, positions the center of gravity slightly in front of the ankles and away from the heels in the stance. In turn, this will allow the generation of power in a more efficient manner. This topic will be explored in greater detail under 'Biomechanics'.

The feet position in the stance should be closed, square or open. The common approach is to start the beginner off with the square stance, also known as the classic stance. This stance will line the body and shoulders up in a natural line to the target. It is easy to repeat and it is easy to tell if the archer is square to the target or not. However, the downside of this stance is that, in windy conditions, it promotes more back and forth body sway. The open stance provides for a biomechanically stronger stance offering a more solid feel and as such promoting increased confidence.

Research shows that the majority of the world's top archers use an open stance, generally with the feet about shoulder-width apart. As in other sports, this open position, with the weight evenly distributed between the two feet, has been found to create a feeling of being balanced. In addition, the shoulders being rotated in line with the target will create some torque, thus reducing the tendency

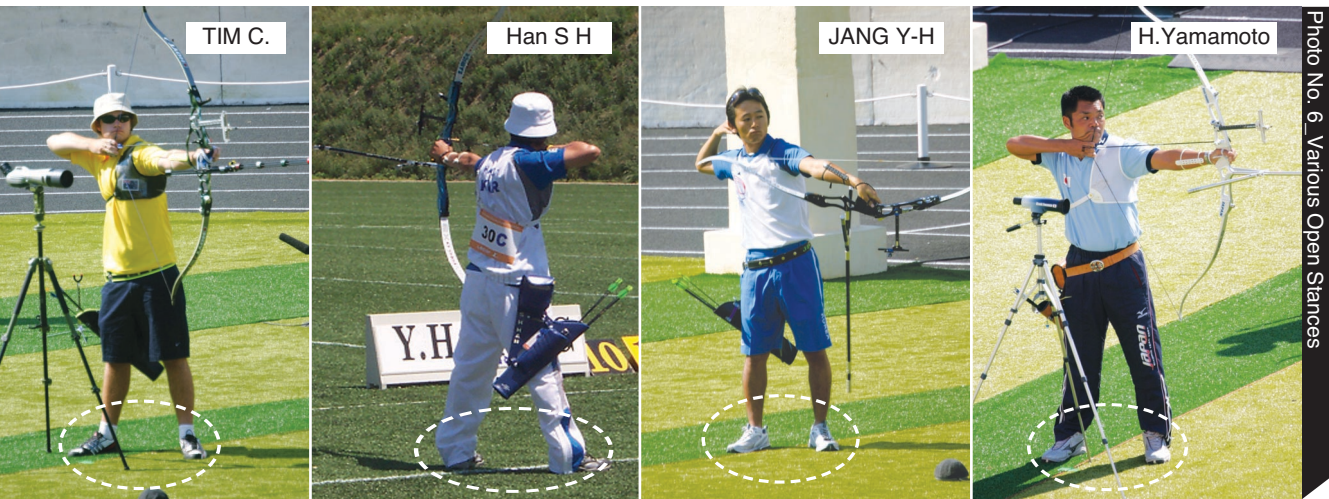
to sway, especially in the wind. Overall fitness in general and upper and lower body strength in particular, plays a large role in being able to maintain a consistent and stable body position from shot to shot.

The width of the stance should be about shoulder-width apart, as this will generally distribute the body weight in a straight line through the body joints and subject them to compressive forces only. The optimum width recommended is shoulder width. A stance too much wider than this, will result in increased torque forces on the joint, which is not as efficient and will cause more fatigue during a day of shooting. A narrow stance with the feet closer together will result in a more unstable platform, as here the archer can sway in any direction, which, for the sake of consistency is not recommended. Stances of extreme width should also be avoided.

Remember, if you can put ‘too’ in front of it, “too wide” or “too narrow” or “too...”, then it should be avoided.



Photo No. 5_ Open Stance



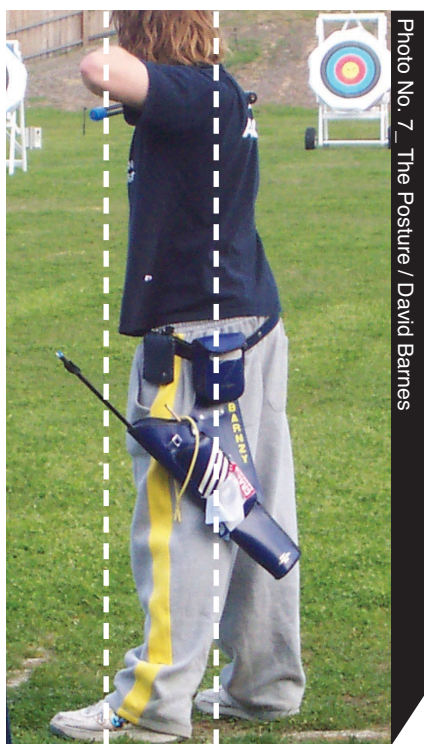
2-The Knee Joint

The knee joint is passive and forms a firm connection between the femur (thigh bone) and the tibia (shin bone). The knee is basically a hinge-type of joint, its main movements being flexion (bending) and extension (straightening). A small amount of extension occurs at the end to “lock” the knee and at the beginning of flexion to “unlock” the knee. It is recommended that the knees be fully extended, as any flexion (bending) will result in loss of stability and the muscles that are trying to take the strain, will fatigue. However, muscles in the back of the legs must not be tightened by creating extra tension in the calf or hamstring muscles. In other words, do not create rigid legs.

It has been found that, for archery, the hamstring muscles (at the back of the upper leg) that bend the knee and the quadriceps muscles (which run on the front of the upper leg) that straighten the knees, would benefit by being equally and

evenly developed in both legs to provide an even body balance.

3_Upper Body Positioning



The upper body must be aligned with the lower body. To create the recommended 60/70%-40/30% feet pressure distribution, the whole body has to lean slightly forward. Visualize a straight steel rod right through the body, exiting through the top of the head; the bottom of the rod being stuck solidly into the ground. This should keep everything lined up in the same place. The center of gravity must be kept in the same position and must be positioned approximately between the insteps of the feet, just slightly in front of the ankle bones.

The sternum should be kept in and down to give more clearance at the front. The buttocks must not stick out, as this would result in a hollow back, which in turn would push the chest out and as a consequence alter the center of gravity. It also would reduce string clearance. If the body is positioned correctly, the archer should be able to squeeze the buttocks together.

Further, as the vertebral column (spine) supports the weight of the body and



head, as well as anchoring the rib cage, it should be kept in as natural a position as possible. This will provide for the strongest and most stable configuration.

Proper upper body positioning is essential in being able to develop good back tension.

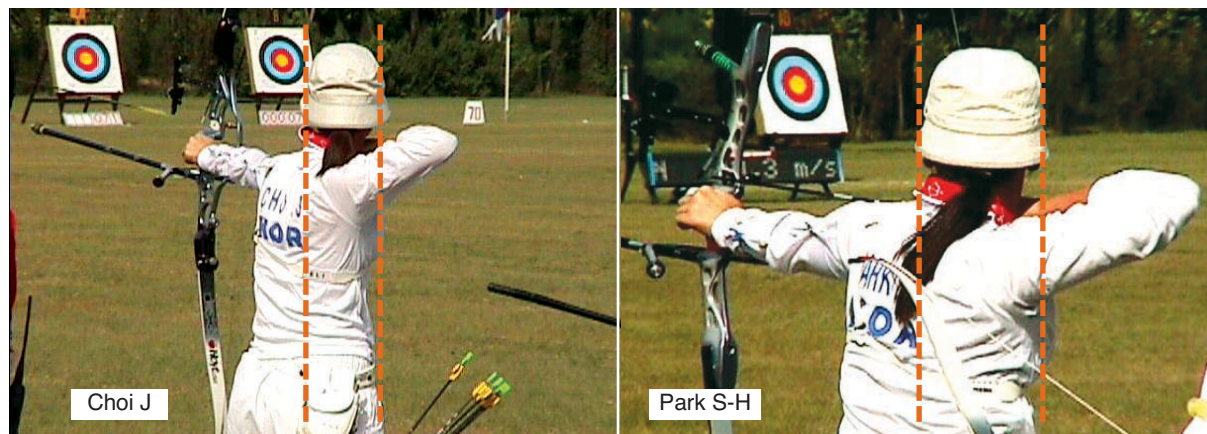


Photo No. 8_Proper Upper Body Positioning

4_The Head Position

The head should be in a natural vertical position. The string should touch the center of the nose. In most cases this will result in an anchor slightly to the side of the face. The anchor should not be too far along the side of the face, as the chin could interfere with the string on release, in turn affecting the string harmonics.

Due to the large variety of facial structures, the most commonly recommended

position for the string has been to touch the tip of the nose and the center of the chin. However, in most cases this would result in either having the head tilted back or forward. Additionally, it would be difficult, if not impossible, to get the draw arm in line with the arrow. As such a slight side anchor is recommended.

Further, the neck supporting the head has many muscles assisting in holding the head steady. The blood for these muscles and for the brain itself flows through arteries embedded in the muscles of the neck. Therefore, an exaggerated head position through over flexing, rotation or extension could compress these blood vessels, reducing the blood flow to the brain and neck muscles, impairing the efficient utilization of both.



Photo No. 9 _Head position

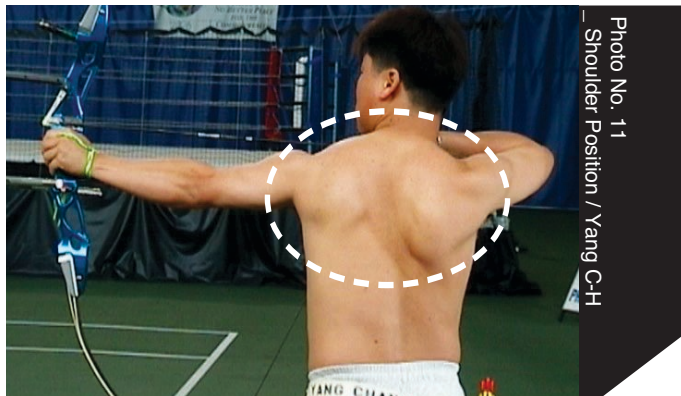


Photo No. 10
Maintain Head position / Simon F.



5_The Shoulders

Both shoulders must stay down as much as possible. Refer picture no.11 below.



6_The Bow Shoulder

When raising the bow, the bow shoulder must be kept in an as low position as possible. This is the most biomechanically efficient position, because it uses both, the bone structure and muscles most effectively. When drawing the bow this low shoulder position must be maintained. Reaching out towards the target, while raising the bow, will ensure the full extension of the shoulder and simultaneously firm up the bow arm triceps, allowing for a more relaxed bow hand.

This particular point is highlighted when viewing most elite archers from the side. This is further illustrated in the photograph above, where the arrow at full draw can clearly be seen above the bow shoulder.

Archers shooting with a high bow shoulder have to rely on muscles to hold the shoulder in position. This will result in the bow shoulder starting to rise, especially when fatigue sets in later into a round. In turn, this will bring the bow closer to the body, which makes it increasingly more difficult to come through the clicker. The consequences are that the archer will lose back tension and will try to come through the clicker either by excessive pulling and/or pushing. Besides causing inconsistencies in the release, it can also cause shoulder injury and alignment and expansion problems.

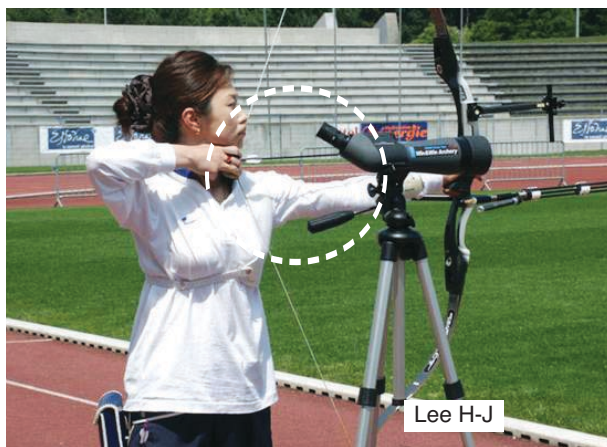


Photo No. 12_Bow Shoulder

7_Draw Shoulder

When setting up the shot, the rear shoulder must be kept down as low as possible and must remain down during the shot.

The drawing hand and forearm must rise as one unit when coming to full draw. The tip of the elbow should be in line with the arrow or just slightly above it



when viewed from the side. When viewed from behind, the elbow should be in line with the arrow. This will keep the force triangle formed by the bow hand, the scapulae and the tip of the draw elbow to a minimum. This type of set up will also maximize the use of the bones to hold the load.

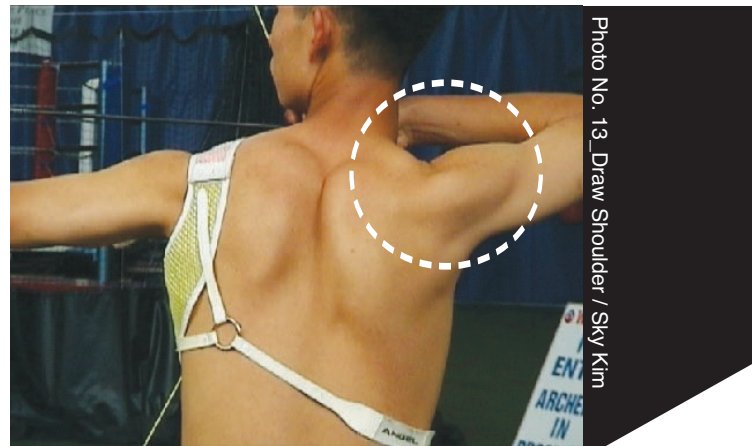


Photo No. 13_Draw Shoulder / Sky Kim

8_The Bow Arm

All top archers, even though they might have very different styles, have one thing in common; all have extremely strong and steady bow arms. However, even with strong and steady bow arms, nobody can hold the sight pin on the target without moving. As the archer becomes more proficient the sight will move less and less, but it must be accepted that there will always be movement. The bow arm is the link that transmits the load of the drawn bow to the shoulder and as such, the strongest possible connection must be found. Again, the bones and muscles must be positioned in the best possible biomechanical way to transmit this load.

Essentially, the inner surface of the elbow joint must be vertical or as near to



Photo No. 14_Bow arm

vertical as achievable. This then permits alignment of the bones in the arm to form the strongest arrangement. However, some archers do have a different bone structure of the arm than normal and as such the coach must determine the best arm alignment for these cases. Refer to photo no. 9, on Page 35

During the shot, the muscles in the forearm must be as relaxed as possible.

9_The Grip

The proper alignment of the bow arm will also allow the hand to be set in a natural position with the knuckles at approximately 45 degrees. The hand should be placed high into the throat of the bow handle, ensuring that, whether the hand gets sweaty or wet in rain, it will stay in the same position as when it is dry.

It is advisable to wrap some anti sweat bandage around the grip. This will assist in minimizing any movement and maintaining the exact hand and pressure point position from shot to shot. In addition, the direction of pressure must be consistent. This is extremely important. If the vertical pressure position on the handle varies from shot to shot, the dynamic tiller of the bow will vary also. This will then translate to either high and/or low arrows on the target. Likewise, if the hand placement varies in the horizontal plane, not only will the arrow placement be left or right, but it will also prevent the bow from jumping in-line towards the target.

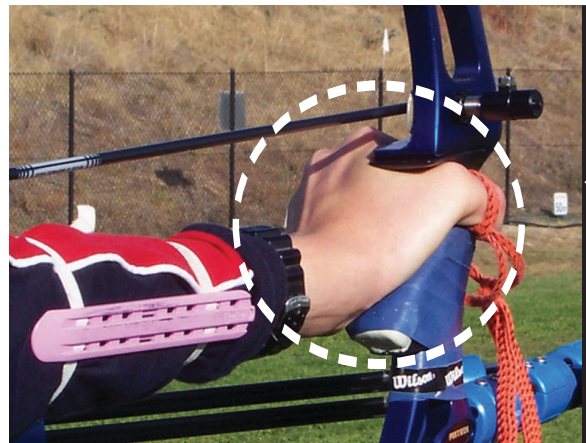


Photo No. 15_Grip



Further, the handle of the bow must lie along the fleshy part of the thumb, but must not touch the lifeline of the bow hand. The thumb should be pointed toward the target and the fingers curved in a natural position around the bow handle.



10_Grip Pressure Point and Wrist position

As previously stated, the bow hand pressure point is extremely important for consistent results. It has been found that a lower wrist position is more forgiving and consistent than a high grip when shooting lots of arrows as in a 144 arrow FITA round. Also biomechanically, it is a stronger grip.

However, it must be recognized that a too low or too high a grip can cause problems, as there is a greater possibility of variation in the pressure point on the grip, especially if the archer is under competitive pressure or tiring, when it is more difficult to relax the whole hand.

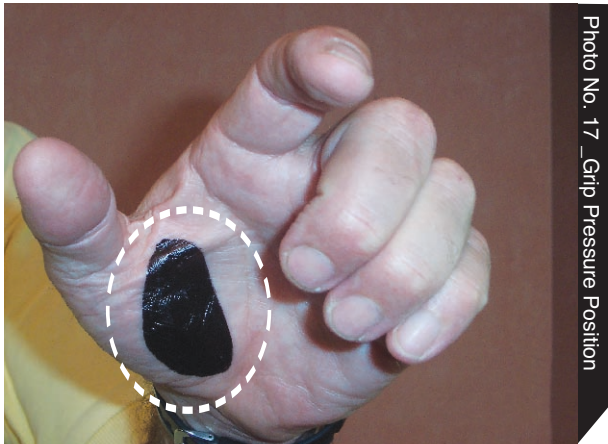


Photo No. 17 _Grip Pressure Position

Most elite archers nowadays use custom-made grips. These have been built up and generally vary between a high and a low grip; the grip should be tight to the touch and make contact with the base of the hand. This is recommended for Olympic Round match play of 18

and 12 arrows providing a wider and more consistent pressure point with the least possibility of pressure point variation.

The actual position of the bow handle and the pressure area on the bow hand should be in the area, as indicated in the photo.

This position will create the least amount of tension in the hand and is more easily repeated, translating into a greater consistency.



Photo No. 18_Various Grips



11_Relationship between Head Position and Shoulders

The consistency of the triangle formed by the two shoulders and the chin is very important for consistency. In the same way, the location of the bow hand pressure point, the chin, the eyes, scapulae, the elbow of the drawing arm, the string fingers, the center of gravity and the feet position will need to be the same from shot to shot, to create consistency.

As such, it is extremely important that all the components of the body are set-up biomechanically as strongly as possible. This will assist in creating a stable arrangement to form the basis in achieving this ever so crucial consistency.

12_Summary

In this chapter, the focus has been on preparing the foundation and arranging the body and its component parts into the strongest possible configuration, prior to the application of the internal and external forces, which will act on this structure during the actual execution of the shot.

In the next chapter, each individual component involved in making the actual shot will be examined in detail.

