

GOLF AND VIDEO....

*Why we need to adopt a standardized method of viewing golf swings.

I learned early on as a golf instructor, I needed to be careful about how I interpreted what I saw on the video screen when filming my students. I realized I could only give them the accurate information they deserved by standardizing my camera positions relative to the target and the ball. Otherwise, I could not really tell them if they were indeed on plane, if the ball position was the same as last time, and most importantly be able to show them accurate comparisons of their progressing swing, day to day, week to week and month to month.

As a player I too wanted to compare and evaluate myself and the evolution of my own golf swing, by a standardized comparison method that accurately showed the fundamental state of my golf swing at any given moment by capturing that particular swing and being able to accurately compare it to any other I make or have made that are recorded on video.

I would also like to compare myself to other players, particularly the most successful, by this same standardization. In addition, I would also like to have a saved version of my golf swing when I am playing and striking the ball my best, and use this documented saved version of myself to refer back to and measure where I have wandered off track while comparing versions of my best swings against my current swings when I am having troubles with my ball striking. Apples to apples comparisons so to speak.

These views should also tell me if my ball went left or right because of a faulty plane angle, a faulty club face position or a variation in the arc of interception.... Or maybe some combination of these three elements. This can only be determined by an accurate and standardized view of my swing. The world in which we live in is three dimensional and viewing a golf swing should take that into consideration and be able to monitor each of the three dimensions and there interaction effectively as the club moves on its path...down, out and forward for example. I will call the combination of views outlined below the "George Views" in honor of someone who helped me understand these views. I feel as he, that every degree and half inch we can be more sure about is a worth the effort to find. I feel it is my concern as an instructor to put out my best effort and give the most accurate information I can to my students. I also realize it is not practical or needed to go these lengths with every student. It is also only practical to use these views in a controlled set environment like and indoor or covered facility. The better you are and higher your goals, the more the small differences are important.

What things are important in understanding what you are seeing when viewing images from cameras as they relate to a golf swing?

It is often said that a picture is worth a thousand words and that pictures don't lie. Unfortunately, just short of a lie pictures can be dramatically deceiving. Because of these deceptions, pictures may well be the reason for such inaccurate perceptions of how to swing a golf club most efficiently and effectively. For instance, a student may view his golf idol in a magazine or television broadcast and tries to mimic the positions. Unfortunately he is likely to be sadly mistaken about what is really happening and in fact is viewing an illusion. This can be especially harmful when a player spends many hours trying to adopt his swing to what he thinks he sees in his model player. A common example of this is a view of the set-up from across the golfer on a Driver. The word across is a very loose term when describing a camera angle. Depending on what angle the camera was set up at the ball may look to be positioned toward the back of the stance, the front, or exactly in the middle. 1) Where in fact is the ball? 2) Why is this critically important to know where the ball sits? 3) How do you quantify this assessment?

Let's answer these questions:

1) Where in fact is the ball?

Well, you don't really know unless you have a base knowledge of where the camera is positioned relative to the ball and target. If the camera is angled away from ninety degrees to the target and directly ninety degrees across from the ball, the ball will appear to be more in the middle of the body of the golfer. If is positioned in the other direction, the same picture will make the ball seemed to appear in the front of the golfers body. When you put the camera always in the same relative location, you can measure where the ball really is only because you have a relative constant to compare to use in the comparison.

2) Why is it critically important to know where the ball sits?

It is critically important to know this so that you can tell if your swing is really changing from swing to swing or is it variations in the camera angle due to changes in the ball position which would be the same as camera movement away from a constant.

It is equally important to set the correct camera angles from behind the golfer to properly view the plane of motion of the golf club. The club head is of course moving three-dimensional on its path and strategically placed cameras with respect to the ball, the target and the club can measure and monitor its motions in these three dimensions accurately. This is also very valuable when comparisons from one swing to another or one golfer to another are desired. If you want the comparisons to be accurate and more meaningful, the more you know the more you can compare. It elevates your knowledge from generalizations towards precision.... And precision is the goal of golf shots

3) How do you quantify and qualify data?

A: Camera angles must be standardized in order to compare one swing to another and one day to the next etc. If there is no standard by which to measure and view with, then interpretation becomes general conjecture and subjective when it could be quantitative and objective.

B: The standardization would advantageously relate to relative goals in the golf shot, the target for the golf ball and, the plane of motion for the golf club. so that information is quantifiable and comparable. With proper camera angles, it is possible to quantify all movement, and help interpret what actually is happening in a golf swing in an accurate way. Understanding that information can then be put toward better improvement, adjustment and comparison. Understanding a golf swing is much aided when seeing a swing from a proper standardized vantagepoint. It is also advised that the image created take up the full viewing radius of the golf clubs head in motion. This way, the view is optimized for the allowed space and will best relate to the varying differences in camera qualities i.e., curvature of the lens, focal qualities etc.

C: In golf, it is good to be able to see the swing in every one of the three dimensions. For instance, on the downswing the club is moving down, out and forward. Each of these dimensions has an effect on direction, energy transfer and how the body coordinates in moving the club head through its three dimensional path with relation to the target. One should monitor in three dimensions, the simultaneous movement of a plane of motion. If you are indoors, you can use a point of reference that is drawn to perspective of the vanishing point to substitute for where the target would be in an outdoor situation. A picture of a golf hole in the forward view is a nice way to accomplish this directive.

d. So, where are the most advantageous positions to set cameras? There are 3 relative views of camera positions included in this article. Each angle is designed to best accommodate certain information we would like to know about the golf club and the players body as he moves the golf club through space to and past impact of the ball.

- 1) A Camera angle that is set at ninety degrees to the target line that split the back of the golf

ball in a vertical line to the camera view are of the most useful to measure the forward motion as relative to the target and low points.

- 2) A camera view set up from behind that intercepts the sweet spot plane line of the particular desired impact plane of the club used at 45 inch driver grip height when the club is in plane is the most useful for the back view. (*We can talk more about the intricacies of that position with further explanation later).

- 3) A camera-mounted overhead set at ninety degrees to the selected clubs plane is desirable. In a perfect situation, however because of the movement and idiosyncrasies of most golf swings, a camera opposite the ninety-degree ball position can also be helpful to verify the accuracy of the first camera. *One has to keep in mind that the true arcs and positions of motion relative to moving centers on a horizontal plane equivalent are not all seen accurately from any angle other than from directly above the center of their particular arc. This overhead is a lesser used and rare view, but when used properly can detect rhythm quite well from plotting time relationship positions of moving parts, and pie graph comparisons such at the club head, hands, left hip, and left shoulder. It can also be used as a verifier to lock the across view camera (1) in with the overhead so they read the same relative impact point of the ball. This angle also has the advantage of best seeing the important arc of the club head around the hands. This is probably the most important of the arcs to observe.

Let's start with some simple examples as below:

Take these two images presented below and it will be easier to understand the above statements. In a most basic of illustrations, these are two views at the same moment in time of the same person setting up with a Driver for a tee shot. They are viewed from the 2 different angles as mentioned above.



Nathan from Angle 1



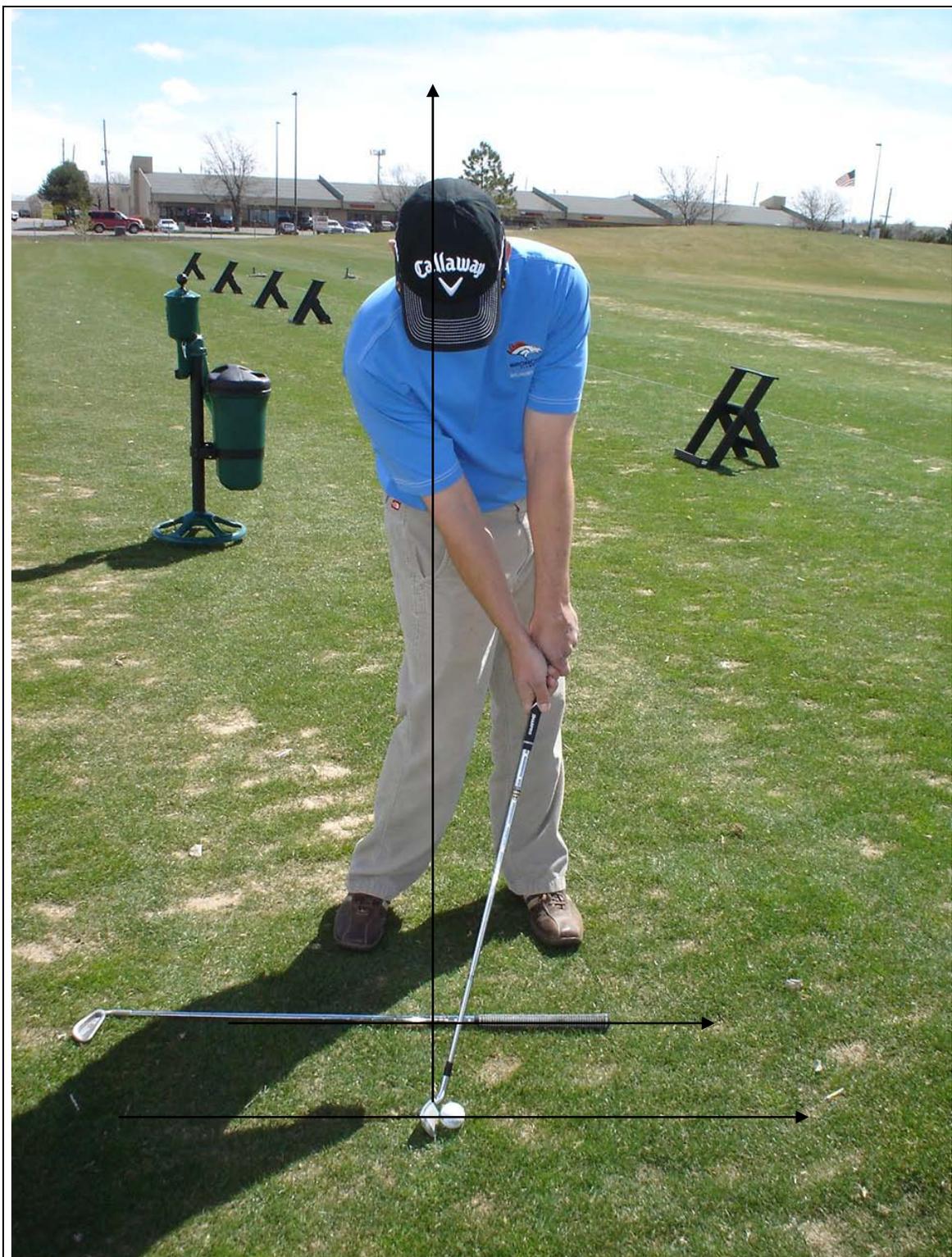
Same player frozen in position from angle 2

In the first illustration, the ball appears to be teed up in the back portion of the player's stance and nearer the right foot and shoulder than the left ones. In the following picture, the ball appears to be teed up directly across from the player's left shoulder and across from the heel of the left foot. So, where is the ball really positioned and which picture is true and which is misleading?

Well, though all the pictures are true from the angle they were taken at, they cannot accurately be compared to each other. For a true comparison only standardized same angles should be used as a basis for understanding. This will give a quantifiable definition of where the ball really is in the player's set-up. This is critical for understanding the way the golfer must move his body and club to produce a flight of the golf ball at the proper direction, trajectory and spin into the target. Also it is critical toward assessing if the player can truly repeat his set up and impact positions constantly. It is critical for many reasons regarding comparisons.

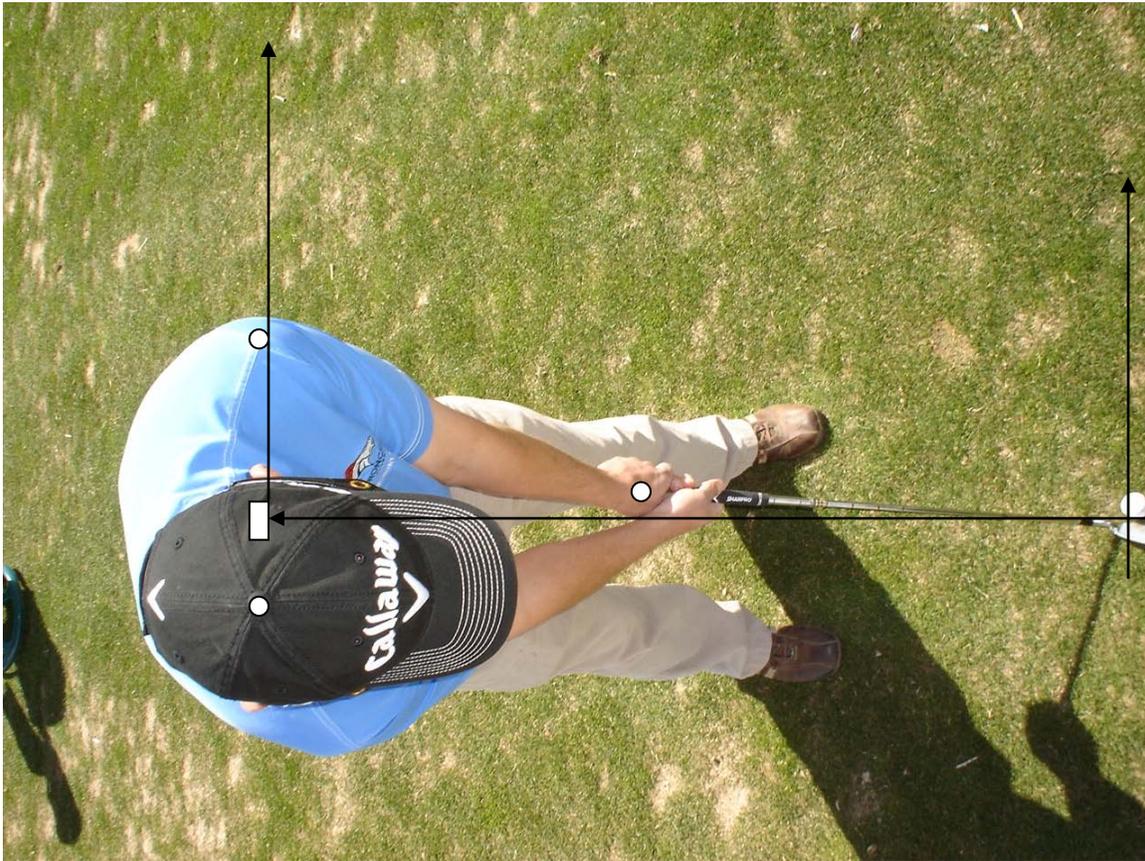
In most all knowledge, you must qualify and quantify your truth. The standard about how a golf ball flies is subject to a pre-determined set of laws in geometry and physics. The same laws of motion apply to all, men and women, slow and fast, weak and strong etc. It is from this base of laws that we can combine the kinesthetics and anatomy of people with the laws of science and view the common denominators of great players to best know how to effectively strike a golf ball from point a to point b. There is certainly room for some style preferences that a person can do within his personal technique to accomplish his goals. The laws of science are fairly rigid and serve as a boundary for style.

Now, back to these three pictures:



View from 90 degrees across the target line from the back of the ball. This particular set-up position is one that might be used to hit a low driving short iron punch shot. You can easily measure the positions and movement of the body relative to the ball, how much the hands are ahead of the ball and the angle of the shaft at impact. The camera is set at 36 inches high. You need not move this height for any club as long as

the ball sits 90 degrees across the target line and the view can capture the full arc of the swing. It also captures best the most important arc, that of the club around the hands relative to the ball.

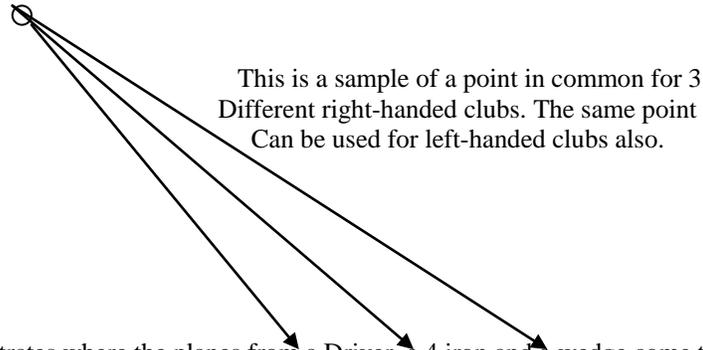


Basic golf shots are generally hit with one, two or three circular type motions. The spine is one axis that can be utilized alone, or not...the left shoulder socket is another center in motion that can be utilized or not and the shaft moving around the center of the wrist motion can be used alone or in combination with the other two axis. For this reason, since there maybe a variety of centers and elliptical motions in motion due to player movement and their combinations of spine, lead shoulder and hand stroke variations, the best place to set the camera from above is on a 90 degree angle opposite the plane the selected club will be at impact and additionally directly on the line 90 degrees across the target line and directly over the spine. Position the camera so the full arc of the swing can be monitored. From here we can measure arc of interception, center movements, rhythm and acceleration by comparing sequential pictures and their spacing variations from the previous pictures. We can also use it to verify the across angle position of the across view camera and lock the two together. It is best to have the above camera mounted on a movable pivot to accomplish this and a device to measure the 90 angle from the impact plane of the club to intercept the center of the lens.



This is a view from the camera sitting on and parallel to the sweet spot plane. The sweet spot plane of the club is the true plane of motion of the golf club head and uses the sweet spot point of the clubface as a point on the line between it and the top of the shaft. It is the longitudinal center of gravity of the club. (As opposed to the shaft plane, which you never really want to hit the ball on and is inside the sweet spot plane. The shaft plane also distorts with shaft flexibility) If you don't want to move the camera for each club a

player is swinging, then you can use a point in common to all the club planes of motion to place the camera behind and change the ball position on the ground (which is ideally a mat so the same spot can be used over and over) to allow a set camera position. (See example below.)



The circular spot illustrates where the planes from a Driver, a 4 iron and a wedge come together at 36 inches from the ground. This is the point the camera should be placed behind where the tip of the shaft of a 45-inch Driver at standard lie angle directly blocks the target base (the hole) on the ground. You can get a correct down the line view of most any golf club right or left handed by placing the camera from behind on this common point. What changes is the dot on the mat of an indoor facility where you position the ball for the player depending on the club the player is using. Just make sure when you place the club you would like to look at that club in its correct lie angle where the top of the grip goes through this common point. This also standardizes the view relative to the golf club and not the sizes of players and sets a standard from which all views can be set establishing a base reference point. Another helpful idea to check the consistency of your views is to have some strategic objects in the background of your viewing screen appear in their exact same relative places day after day when you turn your cameras on and look into the monitor. Have your camera sitting far enough away to capture the view of the entire swing arc for the student.