Calculating a downswing angle

How to create an elite swing shape

In order to maximize energy transfer to the bowling ball, a bowler must establish a strong hand position into the release. To obtain a great hand position at release, the index finger should be pointing at the pins. This requires the wrist and forearm to be supinated/open.

In this issue of Slowinski at-large, I introduce the concept of the downswing angle and how to measure it for instructional and evaluation purposes. For elite bowlers, the downswing angle is measured from behind as the ball path travels from the top of the swing through the downswing. For the best players, the ball moves inward toward the player's body and is one of the most important movements of a top notch player. An efficient downswing angle is a result of the movement of the player's torso, forearm, and wrist. Specifically, a great downswing is a product of lateral spine tilt (lateral flexion) and supination/opening of the forearm and wrist to establish a strong position into the release.

For many amateurs and underperformers, the downswing moves to the outside, rather than to the inside. This movement prohibits good direction toward the intended target line as well as eliminating energy transfer to the bowling ball. Moreover, the outward movement lends itself to an early release with the elbow moving to the outside of the wrist.

During the downswing, the elbow must move to the inside of the wrist. This allows the fingers to maximize the arc line the swing travels as it moves under and around the ball from the start of the release movement until the ball leaves the fingers. This position is directly correlated to a good downswing angle.

From a professional coaching perspective, measuring and evaluating this angle enables precise quantification of the actual downswing movement. Assessment of biomechanical changes during a coaching session or over

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time after extensive physical game drill implementation can also be achieved. Most importantly, this perspective of the downswing is a reality on video during coaching sessions implemented throughout the globe when bowlers are evaluated during lessons or training.

Why does the elite downswing actually move inward?

A world class downswing is the result of spine tilt as well as specific movement in the wrist and forearm. The combination of these elements leads an elite bowler to establish the best position to maximize the transfer of energy to the bowling ball.

As a coach, I always stress that great bowling is best understood as efficient energy transfer from the bowler to the bowling ball. One of these fundamentally important factors associated with energy transfer is the lateral spine tilt position as the bowler's swing moves from the top of the swing to the finish. Elite bowlers are generally in a position of 35 to 45 degrees of lateral flexion (lateral spine tilt to the outside) as they move into the slide and finish. This allows the elbow to move toward the hip and the hand to potentially be inside the ball at the point of release. As a result, the downswing moves inward toward the body.

To feel and see this movement, stand up and place your bowling arm at your side

with the forearm and palm facing forward. Now, lean to the ball side. I refer to this as the "elbow in lateral flexion spine tilt" test. (See above photos) Look at the difference in your head position relative to your arm (space creation) as well as how the elbow has moved to the inside and closer to your hip. The elbow should now be inside the wrist. To see this best, do this test in front of a mirror.

In addition to lateral spine tilt from the top of the swing through to the wrist, elite bowlers also supinate/open their wrist and forearm which further moves the elbow inside of the wrist as well as moving the fingers to a strong position on the inside of the bowling ball. This movement of the forearm and wrist establishes a hand position that maximizes the potential of the fingers to travel a further distance under and around the bowling ball, generating more rotational velocity (RPMs) in the release.

This movement also moves the arm in the downswing to the inside and closer to the body. Think about a great release as maximizing the arc line that the fingers travel under and around the bowling ball. Specifically, this is a function of the hand position into the release ending with a long extension (flat spot creation) in the follow through (long, down, and remaining low as long as possible). Energy transfer to the bowling ball should always be conceptualized as a vector (magnitude and direction).

Defining a new evaluation measurement – calculating downswing angle

The downswing angle is defined as the measurement of lateral displacement of the bowling ball in the downswing movements. The neutral or zero position will be the location of the ball just

before it moves to the inside or outside, relative to the bowler. A ball that moves inward will be defined as a negative downswing angle. A ball that moves to the outside will be defined as a positive downswing angle. Finally, a ball that falls straight down from the top of the swing would be defined as a zero or neutral downswing angle. With a video analysis software program, the angle will be measured through the center of each bowling ball in the downswing.

Downswing angles of PBA players

In an effort to establish a normal range of downswing angles of elite players, I have assessed a number of players. From my analysis of a number of PBA players, the downswing angle of the majority of elite players ranges from -4 to -12 degrees. From this evaluation, here are the downswing angles of many top players:

Amleto Monacelli	-8°
Wes Malott	-7°
Jason Couch	-12°
Sean Rash	-6°
Tommy Jones	-11°
Pete Weber	-5°
Norm Duke	-4°
Kim Terrell	-5°

As the above chart reveals, many of these elite players' downswing angles remain in the -4 to -8 degree range. This is just a start. More analysis needs to be completed in the future to establish a better understanding of this concept as well as the direct cause and effect sequence of a great physical game. In particular, I want to explore more closely the relationship of the lateral flexion angle to the downswing angle.

Tommy Jones

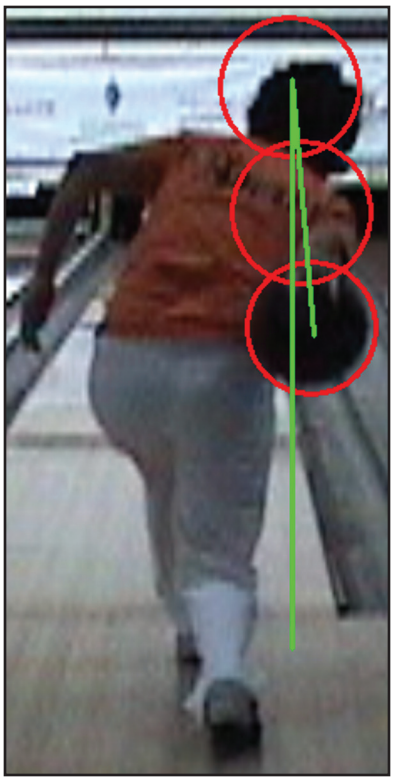
Jason Couch

From observations of thousands of hours of video, there is a direct correlation. For those with more lateral spine tilt, it appears that the downswing angle is larger. But, I want to know more precise information about this relationship.

How to capture and assess the downswing angle

Since we are assessing relative lateral swing displacement, the video camera should be placed directly in line with where the bowler's downswing starts. After capturing and saving the video in your analysis program, From the top of the swing to where the elbow passes the hip, create circles for the downswing path. After drawing the circles, draw a straight line from the start of downswing movement to where the movement stops. This line, through the center of the circles, will assist you in better and more accurately drawing the downswing angle measurement. After the line is drawn, use the angle tool in your analysis software to determine the angle.

If the ball moves inward toward the body, record this as a negative downswing angle. If the ball moves away from the body, it should be recorded as a positive downswing angle. If the ball starts outward for several ball movements and then moves inward, record it as multi-movement downswing with



Positive Downswing

the actual angles and the location of this change (e.g., +3 degrees to -2 degrees). For an accurate assessment as well as to determine downswing repeatability, calculate the angle on ten consecutive shots. The example of the positive downswing angle represents a +4 degree downswing angle.

How to improve your downswing angle in practice

As a coach, I always advocate physical drills that promote body positions that aid a bowler in holistically altering their physical game leading to significant improvement of position and improved biomechanical movement. Several of my drills, which can be viewed online at www.bowlingthismonth.com/extras, can help you improve your body position leading to progress in your downswing angle.

The Swing Slot (October 2010) includes the video of the Shoulder Collapse or "Swing Slot Drill". This aids in a bowler becoming comfortable with increasing lateral flexion (lateral spine tilt). In addition, completion of the backup drill will also help a bowler move the elbow to the inside on the downswing. Finally, the Through the Face drill (November 2011) will assist a movement to an improved body position and better downswing angle.

Conclusion

As a professional coach, my goal is to constantly improve my understanding of the cause and effect relationships involved in the physical game as well as to better educate players about these relationships during lessons and the training of teams. After implementing the downswing angle analysis process discussed in the article, I was able to more quickly and accurately convey body position change and the relationship of the hand position into the release to those I was working with at that time. Moreover, it enabled me to be more precise in the analysis of physical changes to downswing angle.

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