Shot Put & Discus
Technique and Training

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SHOT PUT

THE GLIDE
Various styles of the glide

The glide style of shot putting has many outstanding technical throwers since the days of Parry O’Brien started facing the opposite way of the put. Two technical styles have survived over the last several decades.

The first style, known, as the long-short technique is best modeled by the great glider from the 1970’s, Al Feuerbach. The long phase is the glide, occupying half of the 7-foot circle, the power position being the short phase, taking up the other half of the circle.

Most European throwers, especially those of the old Eastern Bloc countries, employ the other style, the short-long technique. This style has a wider throwing stance for the release of the shot; usually 55-60% of the ring is used in the power position. For example, Ulf Timmerman’s power position is 30cm or one foot behind the center of the circle.
The chart below compares in the two styles during key aspects of the throw-

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Of the top-level gliders in the world, most of the athletes are using the short-long style of throwing, although many coaches belief in the long-short method. Regardless of the style used, the coach and athlete must find what can work best of that individual.

**Coaching Points for the Glide**

**Getting Started**
The shot is raised over the head; the wrist is bent facing upward, the ball rest at the base of the fingers. The shot is then placed on the neck, under the jaw with the thumb touching the collarbone.

The ideal path of the shot is straight as possible from starting position to the release, with a gradual increase in the height of the ball from the start of the glide.

**Across the ring**
The start varies from thrower to thrower, but some basics remain constant. The purpose of the start is to enable the thrower to get in to a good power position with more speed on the ball than from a standing put. A good technical thrower with the glide can gain 10-20% from the stand throw.

The thrower faces the rear of the ring in an upright position with the feet together, from this position several different starts can be used:
The upper body is bent slightly over the right leg, knees are together and the left foot is slightly behind the right foot at the starting position. The lower body falls back or unseats from the waist, then the left leg is stretched and kept low as it extends across the ring. The right heel leaves the rear of the ring after the left leg is extended. The left arm is down and relaxed, the upper body remains passive, the thrower’s eyes and head remain back.

As the thrower gains experience, the thrower can lower the upper body into a crouched position.

Advanced Start: Active left leg start
The upper body is bent slightly over the right leg, the left foot starts in the middle of the ring, and the legs are brought together at the knees as the upper body is dropped down slightly. Then the lower body unseats and left leg is either stretched or aggressively driven to the toe board, depending on the thrower’s skill level. The right heel leaves the rear of the ring after the left leg is extended.

World Class Variations
Most top-level throwers use the advanced start, some world-class throwers add to this technique.

Ulf Timmermann and many other European gliders, rise up on the right toe in the back of the circle as the knees are brought together. A longer path of acceleration on the ball and added momentum out of the back of the circle are the main factors for this variation.

Across the Ring
Most of the force to get across the ring is generated by unseating and driving the left leg to the toe board. The right leg is picked up and place near the center of the ring. The upper body remains passive and back, for most throwers the left arm will remain back and over the right leg.

Once the athlete starts the glide across the ring, the thrower must keep the ball and body moving toward the throw. Shot-putters need to increase the speed of the throw during this movement and set up a proper throwing position.

The Power Position
The shot-putter lands on the ball of the right leg, the left foot touches down after the right foot, the feet will have a right heel to left toe relationship, so the hips can open during the putting phase. The throwing stance varies in width depending on the technique employed by the athlete. The long-short technique has a narrow base, with the left foot landing on or past of the mid-line of the circle at a 90-degree angle from the throw. The short-long style utilizes a wider throwing stance, generally behind the middle of the circle with the right foot turned slightly from the starting position in the back of the ring, approximately 100-140 degrees from the throwing area.
The shot remains over the right leg, the upper body is still passive, and however, some athletes actively open the left arm as the athlete reaches the power position, but the shot is always kept back over the right foot with good technical throwers. The shot put should down, the right elbow below the right hip when looking at a side view. The lower the ball, the greater the pull and the longer the path to apply force on the shot.

The longer base has an advantage because of the wider base of the power position, there is a longer increase in the acceleration path of the shot will travel when the athlete applies muscular force. However, the longer path of acceleration must be over a short period of time because the velocity of release is such critical factor for the shot putter.

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The Release
In the long-short technique, the athlete pushes then turns with the right side of the body. With the short-long the thrower focuses on lifting the ball first then turning into the throw.

The left leg braces with a blocking action, as the left arm opens to the middle of the throwing sector. Then, the right side begins the throwing action with a high arm strike, the elbow up near the ear, the left arm pulls in toward the chest. The left hip remains behind the knee to increase the blocking action during the put; the legs extend and remain on the ground as long as possible. Finally, during the final putting action, the legs lift off the ground and the put is finished at a throwing angle between 37-41 degrees.

The right leg lands against the toe board, with a flat foot parallel throwing area, and then the center of gravity is lowered for added stability and balance after the release of the shot.
**Teaching Progression for stand throws in the shot put**

Two handed chest pass: The athlete steps forward with the left leg and throws a light medicine ball. The thrower has the elbows out and the thumbs down for the chest pass throw.

Next, the thrower can twist to the right and throw with more force from the right side.

Crunch drills:
1. The thrower faces the front of the ring with feet forward, shoulder width apart and the knee slightly bent. The thrower places the shot into the neck and holds the left arm straight and toward the center of the throwing sector. The athlete then drops the right side of the upper body down so the right elbow below the hip. The athlete drives the right side up to complete the throwing drill; the throws are completed without a reverse.

2. The next progression the crunch drill the athlete places the left hand to the forehead.

3. The final progression in the crunch the shot-putter places the left arm down over the right knee to create some separation from the upper and lower body.

All the crunch drills can also be done with a medicine ball.

Stand throw
The shot-putter sets up the upper body similar to the crunch drill with the left arm down. The left leg is lifted up 4-8 inches off the ground to simulate the right to left action in the throw. The delivery phase is the same as the full throw.

The width of the base will depend on the type of technique used.

Stand throw-Glide
The thrower gets into the power position, for most gliders the right foot will be placed in the back half of the circle. Once the left leg touches the ground, the thrower focuses on lifting up with the upper body.

**Teaching progression for the glide**

Unseat into wall
The athlete gets into the starting position about one foot from a wall; the thrower lets the body fall back into the wall. This drill teaches the first movement in the glide, the unseating or falling back of the hips.

Unseat with left leg stretch
The shot-putter unseats the body, and then stretches the left leg slowly across the ring. The right stays in the back of the circle, the right heel will remain on the ground. The upper body stays down and over the right leg.
Unseat with left leg stretch and right leg step
The thrower executes the previous drill then pauses and picks up the right leg and places near the center of the circle.

Step across throw
The thrower gets into the starting position and instead of gliding steps in the power position. The thrower will unseat, then step back with the left leg to the center of the circle. The right leg is brought up next to the left leg then the left leg moves toward the toe board to the power position.

This drill can be executed slowly at first with a stand throw, then the thrower can progress to a step back with the athlete constantly moving forward and execute a put.

Glide pause stand throw
The shot-putter glides and pauses, then completes a stand throw. This a great drill to combine the glide action and the stand throw. As the throwers technique improves this drill is not used very often because the timing is different than the full throw.

Straight leg glide
The start is the same as a glide expect the left foot is placed the middle of the circle. The left leg is straight and as the athlete unseats the left leg is stretch to the front of the ring.

Full glide-no reverse
Throwing from a full glide without a reverse is an excellent drill for developing a powerful block and helps the athlete to apply force over long period of time to the ball.
The Spin Technique
12 o’clock is the back of the circle.

The greatest advantage of the spin technique is the superior development of momentum and the application of force over a great distance.

Many smaller throwers have achieved great success using the rotational technique, however many of the larger throwers use the spin as well. Coaches of novice throwers today often work on both the glide and the spin to see which is best suited for each individual.

The Start
In each of the throwing events the start is very individualistic. The spin technique in the shot put is not any different. However, there are many common aspects to the start that are part of a quality technical throw.

For beginning throwers, a wind up can cause problems with balance and consistency; therefore, a static start is recommended for novice throwers in the spin technique.

Static Start
The athlete should go into a slight squat straddling in the center of the ring at the rear of the circle, with the flat feet about shoulder width apart. The thrower’s body weight is evenly distributed or has slightly more weight on the left side.

The shot is raised over the head; the wrist is bent facing upward, the ball rest at the base of the fingers. The shot is then placed on the neck, most spinners hold the shot closer to the ear then the chin, and the ball is further back on the neck when compared to elite gliders. The left arm is straightened and held out near the mid-line of the body. The torso inclination can vary, however most beginners have only a little forward lean. As the thrower develops, a deeper squat at the start and more upper body slant may be adopted.

The Wind up
The wind up should be with the upper body turning to the right, with little weight shift of the lower body. The athlete executes the wind up with the feet flat or slightly up on the toes.
During the early development of the spin, a big wind up was used by many of the top throwers, similar to the discus wind up in the 1970’s when the spin shot put technique was starting to evolve. It is more common today to see a minimal wind up with little to no weight shift in the back of the circle.

Out of the back

At the back of the circle the thrower’s weight is shifted to left leg, then the right leg is picked up. As the right leg is picked, the thrower sinks or drops onto the left leg. Mike Turk in his article “Building a Technical Model for the Shot Put” states “As soon as the thrower is facing 3 o’clock, I want him to sink on the left leg and drive the right leg ahead by lifting the right hip and knee over the left side to the middle”.

The right side sweeps across the body, the knee and foot lead the lower body. For the advanced thrower, a long sweeping action of the right leg will create a greater distance between left toe and right toe during the sweep in the back of the circle, resulting in greater rotary momentum.

The left arm should stay inside the knee and the shoulders are all to keep the body on balance. The left leg should stay low and flexed, ready to push off toward the front of the circle.

Into the middle

The right foot leads the sprint to the middle and an active push from the left leg helps to speed up the lower body. As the right foot makes contact, it should land just past the centerline and land between 7 o’clock and 9 o’clock and the left leg will be airborne near the 3 o’clock position. In addition, the knees are brought close together in the middle of the circle to help speed up the throw and help create more torque in the power position. Some advanced throwers wrap the left arm across the body as the right feet lands, creating additional separation.

Once the right foot has made contact just past the middle of the circle, the right foot must continue to rotate and the shot should remain behind the right hip until the left foot touches in the front of the ring, with the same heel to toe relationship as in the glide technique. Once the right foot touches down the main acceleration phase of the throw begins.
Delivery
After the left foot has made contact the shot-puter is ready to finish the throw. The thrower should keep the body weight back over the right side as the right foot continues to turn. The momentum created by driving across the ring is now converted into vertical lift.

The thrower’s body lifts upward off the ground, the left side blocks as it is elevated off the ground and the put is finished at a throwing angle between 37-42 degrees.

The right leg lands against the toe board, with a flat foot parallel throwing area, then the center of gravity is lowered for added stability and balance after the release of the shot.
Teaching Progression for the Spin

Stand throw-Spin
In the stand throw for the spin shot, the thrower gets into the power position with a narrow base; usually the feet are within the front half of the circle. The shot-putter focuses on turning then lifting with the feet, which is the opposite of the glide technique.

½ turn throws
The thrower’s right foot is placed six inches past middle of the circle, the right foot is placed at 9 o’clock and the upper body is facing the center of the sector, the left arm is up and facing the center of the throwing sector. The thrower starts the throw will the right foot turning, as the upper body stays back as long as possible. The thrower turns the right side then lifts the body with both legs driving upward.

Another variation with half turn is multiple ½ turns with a throw.

As with the standing throws, the throw is often completed without a reverse.

Slow full throws
The athlete executes the full technique but a slower pace focusing on body positions, usually with lighter implements.
Non-throwing drills for the spin shot put

Step-out
Without a wind the thrower steps out with the right leg, tapping it on the ground at the 3 o’clock position. The left side should point at 3 o’clock with the shoulders level, the left leg will support most of the body weight (90%+).

The wind from the full throw can added after the drill is mastered.

Turn to the middle
The athlete executes the first half of the throw, but the left leg remains in the back of the circle. The shoulders and left arm face the center of the sector (12 o’clock) and the right foot lands at 9 o’clock near the middle of the circle.

Step out, turn to the power position
The thrower performs a step out, and then works on sprinting from the 3 o’clock position, landing in the power position. The drill should simulate the actual body position in the full throw, keeping very little weight on the right leg on the step out.

Turn to the power position
The athlete executes the initial throwing motion, landing in the power position. The emphasis is on balance and landing in a good throwing position with most of the body weight over the right leg.

Spin versus Glide

Brief review
The spin technique was first practiced in Europe in the 1950’s but did not receive much attention until the 1970’s. In 1975, Brian Oldfield threw a world best 75’0” and Aleksandr Baryshnikov of the Soviet Union won the bronze medal in the Montreal Olympic Games in 1976.

The spin technique started as an alternative for smaller athletes or athletes with injuries preventing the thrower to execute the glide properly. However in the new millennium, many different sized spinners use the technique. Adam Nelson is more than traditionally sized spinner at 6’0” (1.83cm), 260 pounds (120 kg) where as Christian Cantwell measures in at 6’6” (1.98m), 330 pounds (150kg), both have put over 73’ (22.50m). The spin has developed into a technique for athletes of all sizes but is dominated by North American trained athletes. Many of the top spinners outside of the U.S.A. have been apart of the N.C.A.A. system. In the Olympic Games, gliders have dominated, but Olympic Champions were produced with the spin
in 1996 and 2000. There has never been an Olympic medalist for the women using the spin technique.

The positives and negatives of each technique
The glide seems better suited for tall, largely built athletes. The glide has more consistent results and is easier to execute. On the negative side, the glide has a limited force application and speed development across the ring. For example, a good technical glider thrower may add 10% from the standing throw to the glide where as a good technical spinner by add over 20% from a stand to the full throw.

Athletes of all sizes and strength levels can use the spin. The greater and longer application of force and momentum produces further throws in the spin. The ball is constantly moving in the spin technique, setting up a more explosive finish. However, the rhythm of spin technique is a difficult to master especially for athletes with limited practice schedules. Also, the path of the shot is not as linear as the glide causing inconsistent release patterns.
DISCUS THROW

For positioning, 12 o’clock is used as the front of the circle

Preparation of the throw
The start and the wind up are critical to set up the throw. The wind up is very individualistic, but for the beginner, the simpler the better. One preliminary swing is enough to establish a rhythm to start the throw and should be simple and consistent. Most the speed developed in a throw is in the other phases not the wind up. Higher turning speed in the back of the circle means a higher risk of the delivery phase not being executed properly.

The discus throw has two common starting positions, left foot on the centerline or with the feet straddling the centerline.

After establishing the starting point, the thrower gets into an athletic position and drops down into ½ half-squat with the legs shoulder width apart or slightly wider. The discus thrower’s body weight is evenly disturbed or the thrower can have more weight on the left leg.

The upper body will lean forward slightly with the chest over the knees, the right arm should be at the side of the athlete holding the discus. To begin the wind, the right arm moves toward the left side, between the left hip and shoulder.

As the discus is brought to the left, the left arm aids in the wind by catching the discus as it moves to the left side.
The left arm should be long and straight at shoulder height inside the left knee as the athlete brings the discus to the right side during the wind.

Novice throwers should maintain even weight distribution or slightly more weight on the left side with little weight transfer from left to right during the wind. Only the upper body should rotate during the wind for beginning throwers. Some advanced throwers use a longer wind up to the right to gain momentum and additional torque between the upper and lower body at the start of the throw.

Getting out of the back
After the wind up, the throw is initiated with a shift in the weight to the left side.

The right foot is picked up and the right foot sweeps past the left side of the body and leads the throw. The right leg should be long and out away from the thrower. Individual differences dictate the spacing between the thighs out of the back of the circle, a quicker athlete may want to keep the feet tighter and the taller athlete may go with a wider right leg.

Creating the power position
The right toe should clear past the left foot before the athlete starts the sprint to the middle. The left leg should stay low and flexed, ready to push off toward the front of the circle. The left arm will remain inside the knee and with the shoulders level to help keep the body on balance.

The discus should remain behind the hip when the right foot touches down near the middle of the circle, the discus will be 360 degrees from the center of the throwing sector if proper torque is maintained during the drive or sprint to the middle of the circle.

When the right foot touches down near the middle of the circle, the left leg is kept close to the right leg. The right leg lands between 1 and 3 o’clock, the left foot is airborne at 9 o’clock. Keeping the knees together in the middle helps to create even more torque in the power position.

The sooner the athlete can get into the power position the faster force can be applied to the discus to create more release velocity. The discus thrower’s main biomechanical source of speed is rotary momentum, which is created from the back of the circle to the power position during the throw.

The main focus of this phase is to set up a good throwing position and increase the speed of the throw.

Finishing the throw
After the right leg makes contact near the middle of the circle it must continue to turn, the left leg snaps down to the front of the circle, the discus should be 270 degrees from the
throw. After the left leg has contacted the ground the throwing action can begin, this position is called the power position and is same positioning used in the standing throw.

The right leg turns with most of the body weight over it, the thrower works to stay over a turning right foot as long as possible.

The shoulders are back and over the right leg as it turns. Since the hips lead the throw, the upper body is waiting to strike. As the legs turn the left arm opens up and stretches high across the chest.

When the thrower is ready to finish the throw, the chest and head drive upward with the legs. The legs will lock out and drive upward just prior to the release of the discus. The chest is driven up to meet the left arm, which is now pulling in.

The right side of the body rotates to complete the throw as the left side of the body braces and acts like the hinge on a door. The bracing action, called the block, is critical to accelerate the final phase of the throw.

The discus thrower feels a long and powerful pull on the discus as the legs turn and lift during the execution of the throw. The two keys to a great finish in the discus throw are a strong block from the left side and a right side the never stops turning until the discus is released. The discus is released just below shoulder height.

There are two types of releases in the discus throw, the non-reverse and the reverse at
release. In the non-reverse, the thrower’s feet stay fixed on the ground during the release of the throw. With a reverse, the thrower lifts off the ground during the release of the throw and right foot is brought forward to the front of the ring after the discus is released. The reverse of the feet is also called the recovery since the discus thrower recovers their balance after the release of the discus.

There is disagreement if throwing with fixed feet is better than throwing with a reverse. The longer path of acceleration with fixed feet versus increase in the height of release with the reverse is the biomechanical debate. The coach must find the technique that has consistent high-level results for the discus thrower.

**Influences on Discus Distance**

1. Velocity of the discus at release
2. Angle of release
3. Attitude angle or angle of tilt at the release
4. Wind direction and velocity

**Throwing angles, wind and discus types**

The discus is an aerodynamic event; wind conditions can affect the flight of the throw. The vertical lift and horizontal drag as well as the type discus thrown are factors in the distance thrown in the discus. To maximize aerodynamic forces, the discus should be released with some upward tilt to the front of the implement. The ideal angle of release for the discus throw is between 32-37 degrees. Facing the throwing sector, a head wind is ideal, also some cross wind form right to left is helpful for quality discus throwers. Although wind conditions and discus throwing is an interesting topic, most throwers should be more concerned with the execution of the technique.

Ideally, beginners should throw a discus with lower rim weight (70%) like the OTE Low Moment discus because the thrower has a less clockwise spin on the implement. And more advance throwers use a discus with high rim weight, such as a Pacer Gold (90%) because of the higher rim weight, the discus turns faster and goes further if the thrower can apply the initial spin on the implement.

**Teaching progression for the discus**

**Bowling**

The discus is released with a clockwise rotation off the index finger. The thrower rolls the discus off the hand near the ground and focuses on the clockwise release of the implement.

**Tosses**

The thrower tosses the discus in the air, then adds some arm swing and the discus is released from the side of the body like an actual discus throw.

The drills are designed to teach proper release technique and develop confidence that the discus will not fall off the hand if the implement is in motion.
Standing throw
The thrower gets in the power position with the feet wider than shoulder width, the discus starts on the left side, then the discus thrower winds the discus back to 270 degrees and turns the right leg into the left side.

Standing are often completes without a reverse to emphasize the right side turning and a strong block with the left side.

½ turn throws
The thrower sets up in the middle of the circle, the right foot is placed at 9 o’clock and the upper body is facing the center of the sector, the discus is at the side of the body. The focus of the throw is an active turning the right foot, as the upper body stays back as long as possible.

Multiple ½ turn throws
The thrower completes a series of 1/2 turns then on the final ½ turn, the discus is thrown. The discus thrower can also lean back and lift the right foot up and place it down in the middle of the ring, this adds some rhythm to the half turn throw and closely simulates the timing of the full throw.

As with the standing throws, the throw is often completed without a reverse.

Slow full throws, no reverse
The athlete executes the full technique but at a slower pace focusing on body positions. During the release phase, the discus thrower’s feet remain on the ground.

Full throws, no reverse
The throw is performed without the reverse, concentrating on turning the right side in the middle and the blocking action of the left side.

As with the slow full throws, other objects can be thrown to learn the technique without focusing on distance.

Non-throwing drills for the discus

Winding
The thrower practices the winding motion. The athlete needs to learn how to properly set up the start of the throw. This drill is works on the whole winding motion, not just winding again and again; it prepares the athlete for the next phase of the throw.

Wind and step-out
The athlete completes a wind and steps out with the right leg, tapping it on the ground at the 3 o’clock position. The left side should point at 3 o’clock with the shoulders level, the left leg will support most of the body weight (90%+).

Wind, step-out, step to the middle
The thrower completes the previous drill, then step with the right foot to the middle of the circle.

Wind, step-out, step to the middle, turn to the power position
The discus thrower adds to the previous drill by turning the right foot is in the center of the circle and the athlete will complete the drill by finishing in the power position.

Wind, step out and turn to the power position
The thrower performs a step out, and then works on sprinting from the 3 o’clock position, landing in the power position. The drill should simulate the actual body position in the full throw, keeping very little weight on the right leg on the step out.

Turn to the power position
The athlete executes the initial throwing motion, landing in the power position. The emphasis is on balance and landing in a good throwing position with most of the body weight over the right leg.

**Drills with a throw**
During each phase of the drill there is a long pause, the coach checks the positioning of the thrower, then the next phase of the drill/throw is completed.

Wind, step-out, step to the middle, turn to the power position, standing throw

Wind, step out and turn to the power position, standing throw

Turn to the power position, standing throw

Wind, step-out, step to the middle, ½ turn throw

Wind and step to the middle, ½ turn throw
Throwing Variable Weight Implements

Throwing heavy and light implements can help throwers develop particular needs such as speed and specific strength. Using lighter implements develops speed and specific strength is developed with heavier implements. The three methods below account for the percentage each implement is thrown during the practice session.

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<tr>
<th>Speed</th>
<th>Specific Strength</th>
<th>Balanced</th>
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<tr>
<td>30% Standard weight</td>
<td>20% Standard weight</td>
<td>34% Standard weight</td>
</tr>
<tr>
<td>60% Light weight</td>
<td>20% Light weight</td>
<td>33% Light weight</td>
</tr>
<tr>
<td>10% Heavy weight</td>
<td>60% Heavy weight</td>
<td>33% Heavy weight</td>
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Throwing for specific strength early in the week and speed later in the week is a common approach. During the early season, the specific strength and balanced approach are used more often. As the peak of the season approaches, speed training is more dominant. The coach should find what method works best for each athlete and develop a program that best fits each thrower.

Shot Put
Generally, there is a 10% difference in performance between the standard and light/heavy implements listed. For example, a 50’ high school boy’s shot-putter should be able to throw 45’ with the 14 pound shot put and 55’ with the 10-pound shot put. It is not recommend going beyond or below the implement weight listed for most throwers.

The difference in distance thrown is approximately: 50 centimeters per kilogram, or about two feet per pound in the shot put. In the shot put, a 1-kilogram or 2 pound difference is optimal.

Discus
In the discus, 5 meters per .25 kilograms or 15 feet per ¼ pound and in the discus up to a .25-kilogram differential is best for full throws. Heavier implements and balls can be used for stand throws and half turns.