

Discus Fundamentals - By Denis Knowles 1

Technique is the decisive determinant of all athletic performances including those which pre-suppose great muscular strength. (Jokl).

Everything about discus technique surely has been written. Noted British coach Wilf Paish states that it is much the same now as it was in 1928.

The coach has to adhere to the biomechanical principles, and distinguish between technique and the individual athlete's style. Each coach has his own particular role model but he must decide whether a deviation from his model is an "error" or an individual adaptation (Arne Nyro).

My technical model is one of a "linear-rotary style" where leverage is maximised throughout the throw, although some coaches prefer a more linear technique, where the arms and legs are closer to the vertical axis for faster rotation and most momentum comes from the sprint across the circle.

The discus throw is usually broken down into five separate phases referred to as :

1. *Preparation.*
2. *Entry.*
3. *Non Support.*
4. *Transition.*
5. *Delivery.*

I will refer to them as :

1. *First Double Support.*
2. *First Single Support.*
3. *Flight Phase.*
4. *Second Single Support.*
5. *Second Double Support.*

Any reference to a clock will be positions around the circle, the direction of the throw passing through six o'clock

Phase One: First double support 2

In this phase ground reaction forces give the system most of the angular momentum about the vertical axis that will be transferred to the discus later in the throw.

The thrower determines the plane and the direction of the motion which is about to occur.

The Thrower Must Know To	The Coach Must Know That
1. Have his/her feet shoulder width apart.	1. A wide positioning of the feet can lead to an accentuation of the shift in body weight, giving more fluency into the turn and optimising the acceleration path.
2. Have his/her feet straddle a line that bisects the sector lines.	2. The off centre positioning of the left foot leads to a slight shortening of its path to the front of the circle allowing the thrower to take up a power position quicker.
3. Sit slightly to lower his/her centre of gravity.	3. Lowering the centre of gravity gives better balance and also stretches the muscles of the thigh, thus storing more energy resulting in greater force production.
4. Keep the right foot fixed when winding up.	4. Keeping the right foot fixed allows for a solid base and a smoother shift of bodyweight over the left foot.
5. Keep his/her body weight between his/her feet.	5. Moving too far to the right in the wind up makes it difficult to achieve balance when the right foot comes off the ground.
6. Wind up with the discus at shoulder height, the first high point.	6. The discus can be held vertically or horizontally. A vertical discus permits a slight pause at the end of the backswing.
7. Take his/her line of vision no further than 3 o'clock.	7. The position of the head would depend on the degree of torque. Some advanced throwers take their line of vision beyond 3 o'clock.

The Thrower Must Know To	The Coach Must Know That	3
<p>8. Keep the left arm high, long and relaxed.</p> <p>9. Shift his/her bodyweight onto the ball of his/her left foot.</p>	<p>8. The extended left arm has a steering function. If used as a swinging element, it would lead to a premature release of the twist of the trunk and result in the thrower "falling" to the centre of the circle.</p> <p>9. The hips and upper body shift to the left as the left foot pivots . Here the thrower aligns his/her chin/knee/toe.</p>	

Phase 2 : First single support

Forward linear momentum is generated in this phase.

The Thrower Must Know To	The Coach Must Know That
<p>1. Pivot on the left foot until it points in the direction of the throw, or down the left sector line.</p> <p>2. Sweep the right leg long and low in a dynamic fashion. leading with the inside of the leg.</p> <p>3. Line up the left armpit above the left knee and lock them together.</p> <p>4. Let the discus trail well behind the hip.</p> <p>5. Keep the left arm long and high</p>	<p>1. An early pick up of the right foot is favoured at this point since the right leg is to sweep long and wide.</p> <p>2. A wide swinging right leg moves the mass away from the rotational axis, increasing the moment of inertia which will then be decreased by moving the leg in towards the rotational axis.</p> <p>NOTE: Some throwers may favour a more linear approach and a narrow movement of a bent swinging leg.</p> <p>3. An overactive left arm will lead to an opening up of the shoulders and an unwinding of the shoulders and hips. The primary rotation of the trunk is produced not by an active left arm but from the rotary action of the right leg.</p> <p>4. The trailed discus travels through its first low point behind the thrower.(Carried just off the right hip)</p> <p>5. Dropping the left arm consequently dips the left side and leads to an unbalanced position in the centre.</p>

The Thrower Must Know To	The Coach Must Know That
6. Keep the head up and look in the direction of the throw.	6. Dropping the head will tend to make the thrower "fall" or lead across the circle with the upper body.
7. Drive off the left foot but do not fully extend the left leg.	7. Full extension of the driving left leg is not desirable. A slightly flexed leg should help take it along a shorter and quicker path to the front of the circle.

Phase 3: The flight phase

The function of the flight phase is to establish stretch of the rotators of the trunk & horizontal flexors of the humerus by increasing the lead of the hip axis over the shoulder axis and of the shoulder axis over the discus.

The Thrower Must Know To	The Coach Must Know That
1. Pick up the left foot late. (Stay on the left foot for as long as possible)	1. A late pick up of the left foot reduces the time of the flight phase and stops the thrower jumping to the centre.
2. Lead to the centre with the lower right leg.	2. There is a linear shift of the body weight to the middle of the circle.
3. "Cut" inward with the right foot, Rotating the hips abruptly from right to left.	3. The abrupt rotation of the hips from right to left produces a resultant rotation of the torso to the right. This will give the discus a loss of speed during this phase but will give the thrower a longer pull on the discus in subsequent phases. At this point there is a significant development of torque.
4. Carry the discus out and up towards its high point.	4. Keeping the discus away from the axis of rotation increases the moment of inertia of the upper body and lengthens the final acceleration path.

Phase 4: Second single support

The Thrower Must Know To	The Coach Must Know That 5
1. Land on the ball of the right foot with the right leg flexed	1. Landing on the ball of the foot minimises the reduction of angular velocity due to friction.
2. Plant the right foot somewhere between 12 and 2 o'clock	2. This position will vary according to the thrower's ability.
3. Keep the bodyweight over the right foot.	3. At this point the thrower is momentarily off balance but he must avoid a premature shift of bodyweight on to the front leg.
4. Pivot the right foot as it lands, accelerating the right hip to the front.	4. The right foot must turn to maintain torque between upper and lower body.
5. Take the left leg along a short path to the front of the circle.	5. The fast and active positioning of the left leg in the turning direction further increases the rotation of the lower extremities thus maintaining torque.
6. Take the discus up to shoulder height, the second high point.	6. The discus climbs to a high point in order to keep the orbit in the same plane. The thrower maximises the final acceleration path by maintaining a right angle between the throwing arm and the torso.
7. Keep the left shoulder closed and the left arm across the body. (wrap the left arm across the body)	7. Because of its brief diagonal position in front of the body, the left arm can be swung diagonally upward through the line of the throw i.e. in the plane of the shoulder axis, adding stimulus to the delivery.

Phase 5: Second double support.

Release of the discus occurs usually in double support but some throwers release in single or non-support due to loss of ground contact. In this phase vertical linear momentum is generated.

The Thrower Must Know To	The Coach Must Know That 6
<ol style="list-style-type: none"> 1. Pivot the left foot towards the direction of the throw, fix it in a position between 6 and 7 o'clock, brace the left leg and block the left side. 2. Complete the right foot pivot, propelling the right hip to the front, simultaneously transferring body weight from the right to the left leg. 3. Rotate the shoulder axis into a position above and parallel to the hip axis. 4. Drive the legs upward to lift the upper body. 5. Release the discus at shoulder height. 6. Watch the discus flight. 	<ol style="list-style-type: none"> 1. A blocked left side helps transfer all kinetic energy to the discus. There should be little or no rotational movement after release. 2. The throwing base is unique to the individual but it must allow for extension of the legs whilst remaining in contact with the circle. 3. The centre of the shoulder axis must be above the centre of the hip axis. Any displacement to the left or right must be avoided. 4. The thrower must maximise vertical velocity. 5. A shoulder height release maintains the long radius and a long acceleration path. 6. Some throwers spin after the throw but the ideal throw should be finished in perfect balance. Watching the flight helps to avoid after throw spinning. Spinning after the release suggests that there has not been sufficient transfer of kinetic energy from the thrower/discus system to the discus.