

THE MAIN TECHNICAL ASPECTS FOR A LONG DISCUS THROW

By Dennis Knowles

Australian National Junior Throws Coach, Dennis Knowles, presents a short summary of the main technical aspects of the discus throw, suggesting that, if technique is based on sound biomechanical principles, there are no significant differences between male and female athletes. The article, compiled by Natasha Shankelton, is based on the author's address to the High Performance Throws Workshop, held last year by the Throwers Club of New South Wales.

INTRODUCTION

"I am always quite fascinated by the phenomenon whereby 14 to 15-year-old boys, with only natural levels of strength, are able to develop an excellent technique and throw distances in excess of 60 metres with the 1 kg discus" (Peter Taylor – Australian National Shot Put Coach)

The author has always wondered why young males can throw in excess of 60 metres, and many with poor techniques can throw over 55 metres, with the 1 kg discus, but are unable to obtain these distances with the 2 kg, due to lack of physical attributes, such as height, size and arm span. The question is how do they do it?

The simple answer is speed.

Much work has been done on the temporal analysis of the senior elite males and females, but little or no studies have been conducted on young males, who are throwing in excess of 60 metres. These boys are usually full of uncontrolled aggression, but the major determining factor is that they are fast.

It has been considered that because of ratio of athletes mass to the discus is different in men and women, there are two different techniques. I feel that this is not the case. If the throwers technique is based on sound biomechanical principles, then there is one technique for both men and women. It must also be taken into account that variation in style will occur between individuals to accommodate their immediate physical resources.



BASIC DISCUS TECHNIQUE

"There is one technique for men and women"

What are the main technical aspects for a long throw?

A GOOD ORBIT

The thrower must establish a good orbit for the discus but more importantly the plane

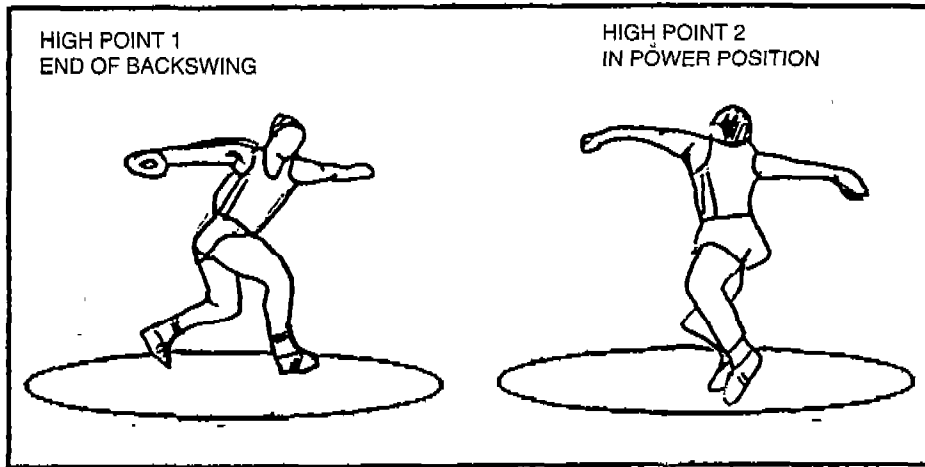


FIG. 1: Optimal high points of the discus throw.

of the orbit must be at an angle as close to the optimal angle of release as possible.

Emphasis here must be placed on the carry of the discus and the positioning of the two high points, these being firstly at shoulder height at the end of the back swing, and secondly at the front of the circle in the power position, both of these points are in double support. (Figure 1)

Many believe that the second high point should be in alignment with the right hand sector line, and others say that the alignment should be at a point that bisects the two sectors. Assuming that the thrower straddles a line that bisects the two sectors at the beginning of the throw, alignment of the second high point with the left sector line is a better option, as this positioning allows the optimal

orbital plane to be achieved. I believe that aligning the high point with the right hand sector line leads to the orbital plane being tilted, resulting in the thrower "skying" the discus. (see Figure 2)

ACCELERATION PATH

The thrower must create a long acceleration path, over which to apply the force generated – (Basic Mechanics)

There is an established view that the entry of the throw (first single support phase), should be used to establish and maintain the lead of the hip axis over the shoulder axis, and of the shoulder axis of the discus. Another view is that this leading of the hip axis can be obtained during the flight phase through good foot work and body positioning.

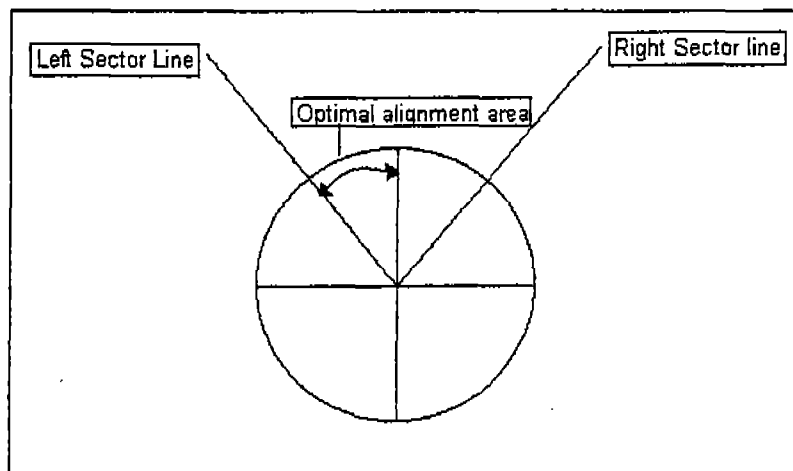


FIG. 2: Optimal alignment area.

Studies have shown that females lose anywhere from 21 to 86 degrees more than males of the hip axis lead over the shoulder axis during this phase. I believe that effort in the flight phase is important, but if the discus trails at the back of the circle in the first single support phase, then there is an even better chance that it will trail at the point prior to delivery. The emphasis should be on the control of the free arm and flexibility in the shoulder region, rather than the hips.

DYNAMICS

The thrower must be more dynamic at the back of the circle.

Recently there has been great debate on this issue between biomechanist, Jesus Dapena and Czech coach Jan Vrable. Dapena claims that there is more to be gained from being dynamic at the back of the circle, as long as the rest of the throw is executed with precision. In the opinion of Vrable, the work must be done using ground reaction forces at the front of the circle, whilst in double support.

So who is right? Both are correct, but I believe that Dapena is "more correct" than Vrable in terms of the 1 kg implement. Recent studies by Hay indicate that for females the greater width of the leg swing at the rear of the circle leads to greater rotary momentum at takeoff, thus resulting in a greater distance being thrown.

The question now arises, how do we become more dynamic at the back of the circle?

By pre-tensioning the hip area from a wide base and an early pick up of the sweeping right leg. When coaching this, it is not wise to just ask for an early pick up of the right leg. It must be understood that it is a consequence of having a good base, effective wind-up and smooth loading of the left leg. This is shown in information from biomechanical analysis, which is often misinterpreted. If a thrower has a wide sweeping right leg, they then therefore have a greater distance to travel with the right foot, which leads to the indication that they have a long flight phase. If they are "tight" at the back, their flight phase would appear as shorter and thus more desirable, when in fact this is not the case.

EFFECTIVE BLOCK

The thrower must block effectively.

For this to happen the thrower must firmly plant and straighten the left leg, the free arm

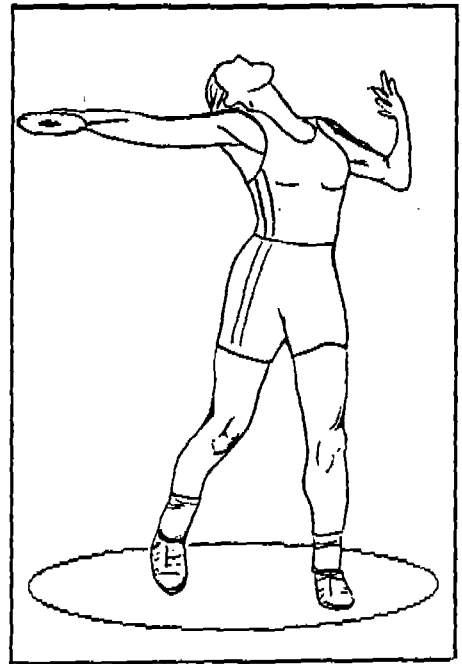


FIG. 3: An effective block.

must travel in a long, wide path through the line of the throw, and not shorten too early. (see Figure 3)

There is an established difference between males and females in blocking styles, with many males and very few females actually leaving the ground prior to the release of the discus. On the other hand, studies by Bartlett and Hoffman found no such consistent differences between male and female throwers. Hoffman's study, using force plate data, devises the conclusion that during a model performance the right foot leaves the ground at approximately 80ms prior to release of the implement, with the left foot breaking contact at release.

Here the question arises, do we coach an active reverse, or insist on a fixed feet delivery? I believe that until the thrower displays an immense degree of leg power, the latter is preferable. Often a jump delivery will occur in more powerful athletes as a result of increased vertical thrust during the delivery phase, but again we must take into account individual style and physical resources.

IN CONCLUSION

In conclusion, it can be seen that there is a lot more to throwing the discus than just these four points, but emphasis on these points will eventually lead to an overall improvement in technique and performance of the athlete.