

THE CONTEMPORARY JAVELIN TECHNIQUE

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The author discusses in detail the run-up and the delivery in the javelin throw, emphasizing the rhythm, the maintenance of the run-up velocity and the movement amplitude. It should be noted that the term "contemporary" does not apply to the new javelin. The article is a slightly condensed translation from Legkaya Atletika, Moscow, USSR, No. 6, June 1986. Re-printed with permission from Modern Athlete and Coach.

The characteristics of the contemporary javelin technique can be summed up as follows:

- The performance of all phases of the javelin throw have become faster and the movement of the legs is consequently more active.
- The movements directed to the uninterrupted forward motion of the centre of gravity of the athlete's body, that reaches its maximum at the delivery, have become more rational.
- An attempt is made to perform all movements with maximum amplitude, particularly during the final delivery.
- A firm rhythm is established to achieve an effective execution of the above mentioned characteristics.

The analyses of the javelin technique that follows is based mainly on the techniques of Felke, Hohn, Michel (GDR), Jewsjukov (USSR) and Lillak (Finland).

THE RUN-UP

Practical experience has shown that the most comfortable and effective grip is achieved by holding the javelin with the first and third, or third and second fingers, in the palm of the hand.

The length of the run-up is individual, usually 25 to 35m, and divided into two parts. The introductory part (from the first to the second check mark) is 16 to 20m long and covered in 8 to 10 running strides. The second part (from the second check mark to the throwing line) is 9 to 12m long and performed in 4 to 6 strides, known as the throwing strides.

The athlete must achieve the optimal speed (about 2/3 from the maximum) with a gradual acceleration in the introductory part of the run-up. The body is kept upright and the running action must remain normal and relaxed. The hand carrying the javelin should not deviate from the vertical (controlled by the front end of the javelin). The stride frequency is increased when the athlete approaches the second check mark. The running speed is usually 6 to 8 m/sec. at this stage and should not exceed the optimal for an individual to avoid a breakdown of the technique and the movement rhythm.

The second part of the run-up (throwing strides) starts from the second check mark. In the contemporary technique it is made up from 4 to 6 strides, each divided into three phases — approach, balance and drive.

The approach phase begins when the foot is placed on the ground. Emphasis at this stage should be on the establishment of a 25 to 30° body lean and the continuation of the forward movement by exploiting the inertia from the support leg.

The correct performance of the balance phase requires a comfortable position on the support leg that allows directing the drive in the correct direction. It looks like the athlete's body is based on a vertical that is drawn through to the support leg to the ground. The balance phase signals the start of muscular work to drive the body forward, making use of an active ankle to achieve a complete extension of the knee and hip joints.

Throwing strides

Practical experience has shown that faults occurring in the transfer from the introductory to the second part of the run-up are responsible for the shortcomings in the final stages of the throw. One of the most common faults that takes place here is the withdrawal of the javelin with the hand and the turning of the body too far to the right that upsets the forward movement.

In the correct action the first stride (in a five-stride variation) is performed with an emphasis on the right leg drive to change from a normal running action to a more active rhythm. This element is employed by many of the world's leading throwers, including Hohn, Lillak, Felke etc.

The athlete's shoulders and hips in the balancing phase of the first stride are slightly turned away from the running direction. The body moves forward in the driving phase, assisted by the forces applied from the support leg and the hand with the javelin is left standing as the arm straightens from the elbow. The javelin is not withdrawn but simply left behind, as a sudden backward move at this stage would be responsible for bad faults in the following phases of the throw.

The hips and shoulders turn completely to the right when the athlete's support leg passes the vertical in the third throwing stride. It is followed by an active drive from the right leg, directed through the hip towards the left shoulder, to accelerate the thrower's centre of gravity. It is important to execute the third stride with a full amplitude to prepare for the next stride. A vertical position is maintained and the axis of the javelin and the shoulders are kept parallel.

The next stride is often called the transition (cross) stride. It is the link between the run-up and the delivery. The left foot, that starts the transition stride, must be grounded before the athlete's body has passed the vertical to assure that the legs take over and continue with the acceleration in the delivery phase. This is the main aim of the transition stride. Looking into the transition stride reveals some controversial views among coaches. All agree that the right leg must be actively moved forward but there are disagreements on how. Some coaches believe that this must be done with the foot and lower leg, some recommend a virtually straight leg and others insist on lifting the thigh.

It is our opinion that the work of the right and left leg can't be looked at separately. The structure of the movement of both legs are similar and depend on the rhythm of the leg work. What is important is that the drive from the left leg is prolonged and corresponds with the swing of the right thigh. These movements are needed to create optimal pre-stretching for an active final delivery.

The Delivery Stride

The delivery stride begins when the right foot is placed on the ground in the fifth throwing stride. It is performed in several ways, depending on the individual needs of an athlete. Michel, Puuste and Felke, for example, place the foot with the toes pointing in the throwing direction. The amortization of the support leg follows until the right shoulder passes the support point and the ankle drive begins. The lower leg is left practically parallel to the ground and the left foot is grounded when the athlete's body is 20 to 25° short of the vertical.

The shortcoming of this variation is the opening of the hips immediately when the foot is grounded. The amplitude of the hip and thigh movements is shortened and this creates a compensation movement in the turning of the left shoulder and the left leg. In addition, it is difficult to maintain sufficient balance on the support leg for an effective forward drive of the hips in a fast run-up.

In the second variation, used by Hohn, Jewsjukov etc., the foot is planted under a 35 to 45° angle to the running direction. This variation corresponds best to the model of the contemporary technique, because it allows for an optimal support phase in order to move the hips forward, while the shoulders are still kept back. It also allows to keep a "closed" position before the actual delivery.

In the third variation, used among others by Lillak, the foot is placed under a 90° angle to the running direction. The foot shifts a little forward after the placement in this variation, with the knee remaining virtually stationary. As the result, the athlete is in a position to increase the movement amplitude in the delivery phase after the left foot has been planted. It should be noted that this is a very individual variation.



CONTEMPORARY JAVELIN TECHNIQUE — THE DELIVERY
The main aspects of the delivery apply to all technique variations.

THE DELIVERY

The main aspects of the delivery, applicable to all three variations of the delivery stride, can be summed up as follows:

- There should be an optimal bend of the knee joint of the right leg that remains practically unchanged until the left foot has been grounded. This means that the support leg can exploit the horizontal velocity of the thrower's centre of gravity in order to transfer it first to the large muscles (thigh, hip, trunk) and then to the smaller muscles (shoulder, arm), while the left leg remains firmly planted.
- An early upward extension of the right leg must be avoided because it would immediately transfer the run-up velocity to the shoulders, bypassing the hip and the trunk. The velocity should be transferred first to the thigh and the hip to achieve a rational throwing position.
- It is not important how far the elbow is from the axis of the thrower's body during the delivery action in the double support phase. This depends on the shoulder flexibility. Important is that the delivery begins the maximum distance back from the vertical line that intercepts the left foot, that the shoulder movement doesn't precede the hip movement and that a "closed" position of the left shoulder is maintained as long as possible.

- As already mentioned, the athlete has to land on the right leg after the transfer stride without a breaking action. Consequently, it is an advantage to place the right leg close to the vertical. The thrower must attempt to move the hips forward at the moment the centre of gravity passes the support plane, followed by a fast grounding of the left leg. The pressure of the right leg to the ground is at this stage equal to the athlete's body weight.
- The breaking force that occurs when the left leg is planted assists the pre-stretching of the trunk and shoulder muscles. This is followed by a sudden acceleration of the javelin by the shoulder and arm. The force applied along the long axis of the javelin receives at this moment its initial flight velocity, over 30m/sec. for qualified athletes

THE RHYTHM

The foundation of all movements in the javelin throw, from the beginning of the run-up until the release, is the movement rhythm, responsible for a smooth technique. The movement rhythm is a term that covers the space and time relationship of the leg action in the run-up, as well as the performance of technique elements.

The rhythm of the throwing strides is usually evaluated according to the duration, the frequency and the length of the strides. An example of these rhythm indicators is shown in a five-stride variation of a 94.44m throw by Hohn in table 1. The space characteristics of the same throw are presented in Fig 1.

Table 1: Rhythm indicators of U. Hohn in a 94.44m throw.

Indicator	Throwing Strides				
	1.	2.	3.	4.	5
Stride length(m)	2.07	1.81	2.13	2.07	1.44 (1.84)
Stride duration (sec.)	0.36	0.30	0.28	0.34	0.24
Stride frequency (stride/sec.)	2.77	3.33	3.57	2.94	4.17

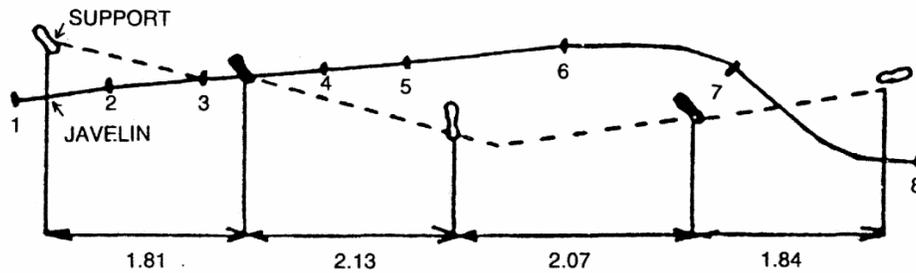


FIG. 1. THE THROWING STRIDES OF HOHN (94.44m)

It can be seen from the table, that there are only insignificant variations in the stride length and stride frequency in Hohn's throwing strides. It should be noted that his last stride is actually 1.84m long after a 40cm slide of the support leg until the left leg has been planted.

The stabilized parameters shown in the table indicate that the throwing strides are performed in a good running rhythm that will allow the athlete to concentrate better for the delivery action. The relatively long fourth stride (transition stride) assists in the maintenance of the run-up speed and allows improving the acceleration of the javelin. The shortening and speeding up of the rhythm is characteristic for the last stride and indicates a fast placement of the left leg.

The throwing strides of Hohn show a peculiarity. He moves slightly to the right in the first and second strides and to the left in the fourth and fifth stride. However, the placement of the left leg in the final stride still coincides with the direction of the run-up.

To achieve movement in a straight line, the feet should be placed straight, without getting close, or even crossing, the centre line of the run-up. The distance between the feet should remain the same as in the transfer to the throwing strides. This is important because it provides favorable conditions for a straight action in the final phase of the throw.