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Lecture Title

Hurdle Races I

Hurdling is the act of running and jumping over an obstacle at speed. In the sport of athletics, hurdling forms the basis of a number track and field events which are a highly specialized form of obstacle racing. In these events, a series of barriers known as hurdles are set at precisely measured heights and distances which each athlete must pass by running over. Failure to pass over, by passing under, or intentionally knocking over hurdles will result in disqualification. Accidental knocking over of hurdles is not cause for disqualification, but the hurdles are weighted to make doing so disadvantageous

History

Track and field hurdle events have a long history. The two major hurdle races for men appeared in the mid-19th century in England. Around 1830, hurdle races of 100 yards were run over heavy wooden barriers. The distance was extended to 110 meters in 1888. The elongated hurdle race at 400 meters was introduced around 1860 in Oxford. Runners jumped over 12 heavy wooden barriers that were spaced equal **distance** apart. The 110-meter hurdles were introduced as an Olympic Games race in 1896, just after the heavy, solid hurdles were replaced with lighter-weight hurdles that could be knocked over forwards. The 400-meter hurdles became an Olympic sport for men in 1900.

First Time Participation of Women

The first women's hurdle races were run in 1926 over a distance of 80 meters. The event attained Olympic status in 1932. In 1969, the distance was extended to 100 meters, which became the standard at the Olympics beginning in 1972. Women didn't run the 400 meter hurdles at the Olympics until 1984.

2. Evolution

In the early days of the sport, hurdles were much more of a barrier than in the 21st century. Because you couldn't "run through" the hurdles and knock them over**;** the stationary, heavy hurdle was more likely to knock over the runner **. Early** technique was primitive. Competitors executed "bundled" jumps by tucking their legs under their bodies. Even when lighter hurdles were introduced, you were disqualified if you knocked over more than three hurdles, a rule that prevailed until the L-shaped hurdle was introduced in 1935. Gliding over hurdles then became

the modern hurdling technique, and when synthetic running tracks became standard in the 1960s, records were regularly shattered.

General Information

The standard outdoor hurdling distances **for** men are 110m (120yds)**,** 400m (440yds) and 100 m (110yds) and 400 m (440yds) for women **;** 50 m 55yds and (60yds) indoors. All hurdle races are run in lanes, the hurdles in each lane being set out in accordance with the specification in the chart opposite.

A hurdle is made of metal and wood, and consists of two bases and two uprights supporting a rectangular frame reinforced by one or more crossbars. The uprights are fixed at the extreme end of each base, and the hurdle should be so placed on the upright **that they** are on the side of the competitor's approach. The hurdle should be so designed that a force, at least equal to the weight of 3.6 kg (7lb) applied to the centre of the top of the crossbar is needed to overturn it. It may be adjustable in height for each event. The counter weight should be adjustable so that at each height**,** a force at least equal to the weight of 3.6 kg (7lb) and not more than 4 kg (approx 9 lb) is required to overturn the hurdle. Where hurdles comply with these specifications, knocking down any number in a race will not warrant a competitor's disqualification, orany entitlement to claim a record. A competitor should be disqualified if he or she:

- Trails a foot or leg below the horizontal plane of the top of any hurdle at the instant of clearance;
- Jump any hurdle not is his or her own lane; or
- Deliberately (in the referee's opinion) knocks down any hurdle by hand or foot.

3. Hurdle Dimensions

The maximum width of an approved hurdle should be 1.2 m (4ft) and the maximum length of the base should be 70 cm ($27^{1/2}$ inch). The top bar should be 70 cm ($2^{3/4}$ in) in width and between 1 cm ($^{1/2}$ in) and 2.5 cm (1 in) thick, and should be striped in distinctive contrasting colors. The lighter stripes should appear at the end of the hurdle and should be at least 22.5 cm (9in) wide.

Hurdles Race Specifications

Men

Distance of race	Height of hurdle	Distance from start line to hurdle	Distance between hurdles	Distance from last hurdle to finish line
110 m	**1.067**	**13.72**	**9.14m**	**14.02m**
400 m	**0.914 m**	**45 m**	**35 m**	**40 m**

Indoor Men Hurdle Event

Distance of race	Height of hurdle	Distance from start line to hurdle	Distance between hurdles	Distance from last hurdle to finish line
50 m	**1.067 m**	**13.72 m**	**9.14 m**	**8.86 m**
60 m	**1.067 m**	**13.72 m**	**9.14 m**	**9.72 m**

Women

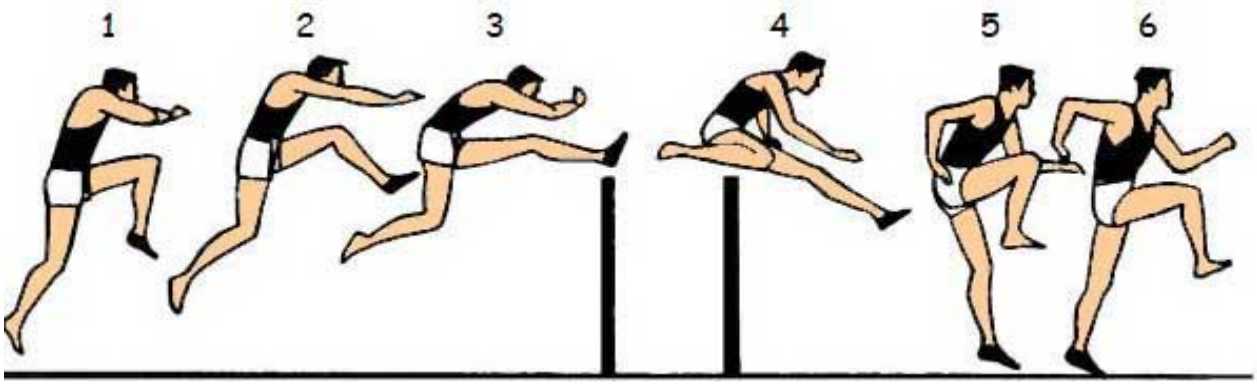
Distance of race	Height of hurdle	Distance from start line to hurdle	Distance between hurdles	Distance from last hurdle to finish line
100 m	**0.840m**	**13 m**	**8.5 m**	**10.5 m**
400 m	**0.762 m**	**45 m**	**35 m**	**40 m**

Indoor Men Hurdle Event

Distance of race	Height of hurdle	Distance from start line to hurdle	Distance between hurdles	Distance from last hurdle to finish line
50 m	**0.840 m**	**13 m**	**8.5 m**	**11.5 m**
60 m	**0.840 m**	**13 m**	**8.5 m**	**13 m**

Technique

Every hurdle race is based on certain conditions laid down in the rules of the various track and field associations and to which a hurdler must adhere. The 100~~m~~meters hurdles for women, the 110 meters and the 400 meters hurdles for men and women are Olympic events. Their rules are fixed by the **International Amateur Athletics Federation** (IAAF), whereas the conditions for children and juniors depend on the individual countries.



Take-off **Hurdle Clearance** **Landing**

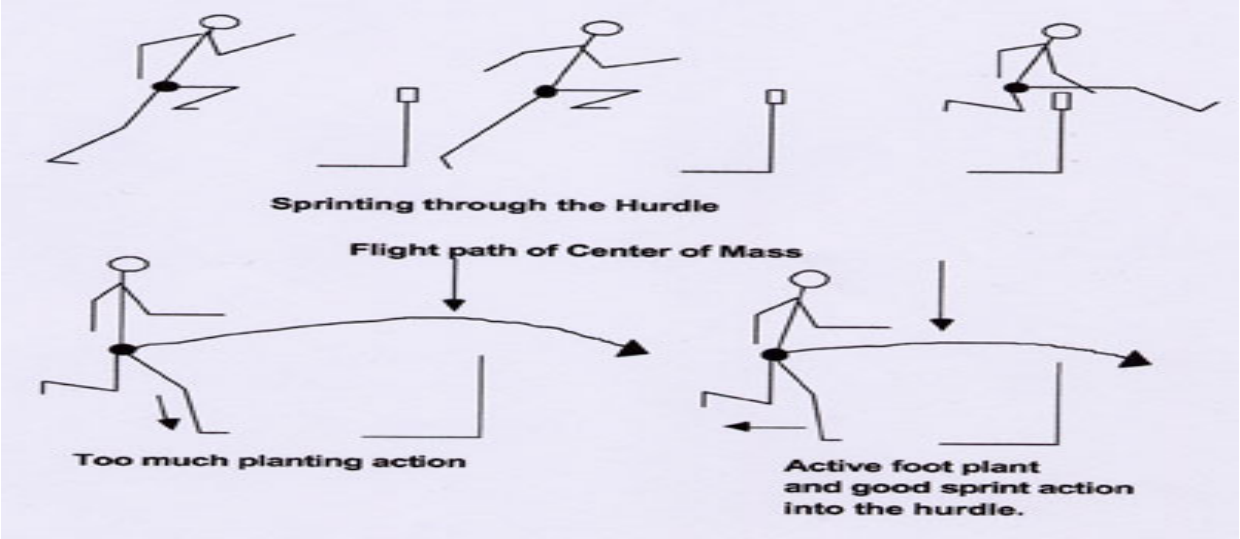
110 m hurdles

The 110 meters hurdle race for men is technically the most difficult. Technique will therefore be treated in the first place in full details, while particulars of the 100 meters and 400 meters hurdles will be dealt with later. The track sections into which the race may be conveniently divided are: the start, the approach to the first hurdle clearance, running sprint to the tape. These sections must be technically mastered, if the sprinting abilities of a hurdler are to become fully realized.

The Start and the Approach to the First Hurdle

The hurdler has to cover a distance of 13.72 meters (= 15 yards) for the first hurdle. In this rather short distance **,** he must develop a fairly high speed. The initial speed at the first hurdle is of great importance for the final performance, since no essential speed is achieved between the hurdles.

The starting position and the take-off are not very different from that of the sprinter. The hurdler should, however, make it a principle to place his trailing, make it a principal to place his trailing foot on the front block, so that having performed 8 strides, he can clear the hurdles. In order to develop high speed in the approach to the first hurdle, he must not only be an excellent sprinter. Most hurdlers take 8 strides to arrive 2 meters short of the first hurdle. The strides length is progressively increased up to the last stride before clearance, which will be shorter than the previous one.



- **Extend lower part of lead leg actively forward**
- **Bend trunk well for high hurdles, with bending less exaggerated for lower hurdles**

The Action of the Leading Leg

The complete action consists of a quick forward and upward thrust of leading leg in the direction of the hurdle edge and the active downward pressing of the thigh immediately after clearance for the landing. The action of the leading leg introduces the sequence of movements much as in the ordinary running stride. In order to get over the hurdle, however, a more vigorous upward drive of the thigh and the lower leg are necessary. Therefore the thigh goes up beyond the horizontal. In this phase the lower leg points downward almost vertically and completes its drive by being projected vigorously towards the edge of the hurdle. This driving force results in a complete but brief stretching at the knee joint before the foot crosses the hurdle. The downward movement of the leg sets in immediately **afterwards**. For this action**,** the lead leg is slightly flexed at the knee joint, thus ensuring a resilient impact of the leading foot to the track beyond the hurdle. By pressing the thigh down and backward, the downward movement san be quickened. An active landing ensures the best get-away stride.

4. Variant of The Leading Leg Action.

With many hurdlers**,** the leading leg is not fully stretched after the initial swing, but bent at knee joint. If this flexion is only slight, no technical disadvantage will ensure. A strong flexion, however, impedes a low forward lean, so that the trajectory of the centre of gravity cannot take the most economic path over the hurdle. **The** excessive flexion is often caused by a too slow forward swing of the shank or by an insufficient flexibility at the hip joints.

The Action of the Trailing Leg

For a rational clearance of the hurdle, the trailing leg must be stretched away from the body when clearing the hurdle. This movement, if correctly performed, requires good mobility of the hip. The main function of the trailing leg consists in performing the get-away stride without unnecessary delay after clearance. The sequence of the athlete's movements should be as follows: after a vigorous push-off from the ground follows a phase of relaxation for the take-off leg i.e. the lower leg swings slightly upward in a relaxed manner. An active forward movement of the thigh should begin only when the foot of the leading leg has reached the edge of the hurdle. The proper timing of the relaxation phase is decisive for the good coordination of the leg movement. The vigorous thrust of the leading leg forward and upward and the initial lagging behind of the trailing leg in the relaxation phase ensures the accomplishment of a full extension of both legs. This phase brings about an expansion, mainly of the pelvic muscles, and a rapid pull through of the trailing leg. The lateral bending of the thigh and the foot begins during the relaxation phase and ends just in front of the edge of the hurdle. The thigh is then bent away from the pelvic to almost a right angle and the lower leg points horizontally backwards. The next movement leads forward over the hurdle with a flat, slightly upward turned thigh.

At the moment of landing of the leading leg, the trailing movement is not yet fully completed, since the thigh and the lower trailing leg are still laterally bent away from the body, viz. not yet in the running direction. In this phase the position of the thighs is approximately horizontal. The lower leg will go forward for the first stride after the hurdle, when the knee points in the running direction.

As already mentioned, the relaxation phase is extremely important for a good coordination of the leg movements. This phase is part and parcel of every running stride, only that it is somewhat longer in the hurdle stride. Therefore**(,)** hurdles with an inadequately developed feel for the proper movement cannot always seize the right movement for the pull-through of the leg. If this movement is started too early, the trailing leg comes forward too quickly into the running direction, causing a "dead phase", meaning that the trailing leg must break or interrupt the

forward drive, because the leading foot has not yet touched the ground. A delayed pull through of the leg often leads to the striking or knocking down of the hurdle with the knee or the ankle.

The Action of the Arms

The usual movements during running are also executed during hurdle clearance, with the sole difference that in the hurdle stride the arms perform additional functions. They must, for instance, contribute **to** a greater degree **in** maintaining body balance. The arm on the opposite side of the leading leg must, additionally, aid the realization of a proper forward lean of the trunk.

If during the approach to the hurdlethe shank of the leading leg is thrust forward, the opposite arm comes forward simultaneously. It is suggested that the hand be bought into the proximity of the foot, thus assisting the forward lean of the trunk. When the trailing leg comes forward, the trailing arm swings backward to counter-balance this movement. It is either almost stretched (as in the backward arm movement of a **breast**-stroke swimmer) or flexed at the elbow, similar to the crawling motion in the water. It does not matter in which way the backward movement is performed, as long as the shoulder axis remains frontal and the arm is not swept backward too strongly. After landing, the arms give an immediate effective support to the get-away stride. During the hurdle stride**,** the leading arm is almost passive. It remains strongly flexed alongside or slightly ahead of the body and support the forward movement only after the landing.

5. Variant of The Action

One familiar variant of the arm action is the double arm action. During the last stride before clearance, at the latest, the hurdler brings both arms forward ahead of the body, in order to thrust them forward towards the hurdle together with the leading leg. This wide forward movement of the arms brings the centre of gravity into a favorable position above the hurdle. Nevertheless this variant of the arm is hardly seen in top performers, because a certain lapse of time the “amble” position is necessary, which is not conducive to a smooth running rhythm.

Position of the Upper Body

A hurdler with a good technique keeps a low trajectory of the body’s CG over the hurdle. This is achieved by a proper changing of position of the limbs in relation to the body’s centre of gravity. Since the flight after the take-off action, all movements during the support less phase create **counter-movements** for maintaining the body balance. A downward lean of the trunk (upper accompanying chart) automatically cause a lifting of the pelvic and of the trailing leg (lower accompanying chart). A pronounced forward lean of the body is therefore a preliminary condition for a flat trajectory of the body CG over the hurdle.

The forward lean of the trunk already begins during the approach to the hurdle, in order to achieve a flat take-off angle. After the take-off best hurdlers accentuate the forward lean by further lowering the upper part of the body forward and downward in order to achieve a marked lean before the body’s centre of gravity passes the hurdle. A favorable forward lean implies that the hand of the leading arm reaches-or could reach-the foot of the leading leg. With most hurdlers the eyes are facing ahead during the hurdle stride.

The forward sweep **of** the trailing leg is **counter-balanced** by an uplift of the trunk, a certain forward lean should, however, be maintained to make sure that on landing the body’s centre of gravity lies above the leading leg or slightly ahead of it. Thus is the only way to continue without delay.

Length of the Hurdle Stride

Athletes with good running qualities and physical condition will attempt to shorten the flight time over the hurdle. Since, for technical reasons, it is impossible to shorten the approach distance to the hurdle, time can **be** gained only by an active landing of the leading leg. Such a saving of time is equivalent to the shortening of the distance of landing behind the hurdle and a relative increase of the distance between the hurdlers, thus reducing the velocity of strides. A high stride frequency between the hurdles is, however, the basis for a good performance. In general the hurdle stride is of about 3.50 meters length, of which 2.10 meters (=60 percent) apply to the track distance before and 1.40 meters (=40 percent) to the distance behind the hurdle.

Judging of the Hurdle Stride

When observing a hurdle stride or appreciating its technical quality, the landing phase is most revealing, especially if the following points are taken into consideration:

1. Position of the centre of gravity of the body. The most suitable running position has been adopted if, after the landing, the centre of gravity lies over the lead leg or slightly ahead of it.
2. Position of the hip and shoulder axis. Both axes must possible remain constantly square to the running direction, as a body twist in most cases leads to a deviation from the straight line.
3. Length of the hurdle stride. With due consideration of individual difference, the length of the hurdle stride and of the getaway stride should be in good proportion.

The Three-Step Rhythm between the Hurdles

In the 110 meters hurdle race**,** the distance between hurdle is 9.14 meters (=10 yards). If we deduce from this the length of the three strides between the hurdles sometimes called three-step rhythm-a distance of about 5.65 meters, i.e. 1.88 meters for each step. But practice shows clearly, that the three steps are not of equal length. Thus the first stride after the landing, which is of about 1.55 to 1.60 meters, will always be the shortest, because the push-off force is reduced by the preceding hurdle stride. There follows a wide second stride measurement 2.00 to 2.20 meters and this is the longest between the hurdle the hurdles. The last stride before the hurdle is always slightly shorter than the previous one.

The Finishing Sprint to the Tape

The 110 meters hurdle race will always end a finishing sprint covering 14.02 meters. On this section of the distance, the hurdler increases his speed by sprinting towards the tape with vigorous strides, increasing the stride length in line with speed. Measurement of stride has shown that not all hurdlers succeed in doing this. At first they use strides of similar length as between the hurdles. This means that with this pattern of striding they could clear eleven hurdles.

Conclusion- Under easier condition hurdling can be learnt comparatively quickly by children**,** adolescents and adults. The conditions should be related to the age and the efficiency level of the learners. The object of the technical training should be to achieve harmony between the sprinting and the hurdling stride and to lead the learner step by step to competition level