

110m Hurdle Theory and Technique

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WANTED:

Highly motivated sprinters to attempt one of track & field's most dynamic events. Must be extremely rhythmic and highly coordinated to hurdle 10 barriers in a 110m sprint race. Competitive sprinting speed is a prerequisite. Explosive strength and dynamic flexibility required to sprint over 39-42 inch high hurdles. Tall stature can be an advantage during the developing years (but may cause problems at elite levels). Determination, mental toughness, and ability to concentrate necessary to learn the techniques and develop speed endurance. Terrific opportunities for success.

The coach who actively recruits athletes with these characteristics for the 110-meter hurdle event has a base of athletic individuals around which to develop his team. By these very qualifications hurdlers have the versatility to complete in other explosive speed events (sprints, vertical and horizontal jumps, relays) to enhance the team.

I. THEORY

Many coaches teach the high hurdles as a highly technical event, spending much of their time (and the athlete's energy) measuring and analyzing aspects of hurdling such as number of strides to the first hurdle, take-off distance, landing distance, hurdle clearance techniques and touch-down times, while neglecting the basic premise of the event -- the 110-meter high hurdle event is a sprint event. The majority of the coach's (and athlete's) energy should be spent on teaching the concept of sprinting over hurdles.

The athlete's speed is a function of his stride length and stride frequency. The hurdler's stride length is for the most part predetermined (by the set distance from the starting line to the first hurdle and in between each of the 10 hurdles, and then to the finish) -- ideally 8 strides to the first hurdle and 3 strides in between. This means that the young high school hurdler takes the same amount of strides as the elite international-caliber hurdler. The variable between their ability levels then is the hurdler's stride frequency. The coach, then, needs to develop the athlete's stride frequency by training him with fast rhythmic repetitions over the hurdles to adapt the athlete's speed to hurdling.

II. TECHNIQUE

Sprint Start and approach to 1st Hurdle

The starting position and block clearance are the same for the hurdler as the 100m sprinter. The hurdler makes a transition to erect sprinting posture "running tall" quicker

than the sprinter to prepare for takeoff over the 1st hurdle.

The high hurdler should strive for 8 strides to the 1st hurdle. Eight strides will give the hurdler a stride length during the last 3 strides prior to the hurdle that will be similar to the stride length required on the 3 strides between each of the subsequent hurdles.

[NOTE: to affect 8 strides to the hurdle, the hurdler must have his lead leg in the back block at the starting line.]

Take-off

As the hurdler plants on his 8th step from the blocks, he must drive the lead knee of the free leg linearly towards the hash mark on the lead leg side of the hurdle. A fast lead knee is critical to hurdling efficiency.

The take-off distance from the hurdle depends on the hurdler's velocity at take-off. If the hurdler takes off too close to the hurdle, the result will usually be excessive clearance height over the hurdle. The center of mass (COM) should be raised only as high as needed for the athlete to clear the hurdle efficiently.

The head leads the body over the hurdle. This results in the lean of the upper body into the hurdle. The trunk lean makes it possible to minimally raise the COM for effective hurdle clearance.

The take-off leg, which will serve as the "trail leg", must fully extend at take-off. This is sometimes referred to as a "delayed trail leg", although it happens naturally if the drive of the lead knee is sufficient.

The hips and shoulders must stay "square" to the hurdle. The hurdler should coordinate lifting the elbow of the lead arm with driving the lead knee. The lead arm comes up to a position where the hand is in front of the sternum. The hurdler should never "reach" the lead arm too far in front of the body or across the midline of the body -- this results in excessive rotation as the hurdler clears the barrier.

Lead Leg

When the thigh of the lead leg drives up to a position parallel to the track, momentum is transferred to the lower leg, which extends naturally. The foot of the lead reaches its apex of the flight curve prior to clearing the hurdle. The foot is always dorsiflexed with the toe up. The hurdler should never "swing" the lead foot up and towards the hurdles.

The hurdler "paws" the lead foot down to the track as he clears the hurdle, with the foot still dorsiflexed. Never "snap" the lead leg down -- this jerks the trunk back (action-reaction) and out of good sprint position.

Trail Leg

Immediately after take-off, the foot should "tuck in" or "fold up" behind the hip and follows the knee over the hurdle. The hips precede the knee over the hurdle, and the hurdler should "pull" the trail through and over the hurdle the hurdle in a continuously accelerating movement (with no "posed" position).

Arm Action

The lead arm should "sweep" back in a wide arc. This is necessary to increase the moment of inertia of the arm to balance the greater mass of the trail leg moving in the opposite direction. As soon as the lead arm passes the trail leg, the radius shortens to resume sprinting action. The trail arm stays relaxed with the hand near the hip (on the lead leg side). It should deviate as little as possible from normal sprinting action.

Landing

The hurdler should strive for an "active" landing, with the lead leg pawing at the back of the ground with the foot still dorsiflexed. The foot of the lead leg should land directly beneath the hurdler's COM. A fast getaway stride is the result of high and effective trail leg technique.

III. TEACHING

Sequences of progressive drills can be used both to teach hurdle technique in introductory sessions as well as to prepare the hurdler for training or competition as part of a warm-up. Drills may be done at lower than standard height to increase efficiency. For example, high school boys may do the drills over 33-36" hurdles and advanced hurdlers at 36-39".

Drills

A-march (over hurdles)

With the hurdles set 4-6 feet apart, the athlete steps in a marching rhythm over the tops of the hurdles, exaggerating knee up/toe up/heel up/ action and erect posture.

A-skips (over hurdles)

With the hurdles set 6-8 feet apart the athlete skips over the top of the hurdles, again emphasizing knee up/toe up/heel up/ action in the skipping rhythm.

B-skips (over lead leg side)

With the same set and same skipping rhythm, the athlete casts his lead leg out and over the hurdle on every other skip, pawing the lead leg back to the ground after clearing the

hurdle.

C-skips (over the trail leg side)

With the same set-up and same skipping rhythm, the athlete raises his trail leg laterally on every other skip, clearing the side of the hurdle.

Fast Leg Drill (over Hurdles)

With several hurdles set 8.5-8.8 meters apart, athlete performs fast leg drill over lead leg side of hurdle, that is, pulling the heel tightly to the butt in an accelerating motion simulating a sprint stride at maximum velocity on every 4th stride.

Half Hurdling / Lead Leg

With the same setup, athlete sprints over the lead leg side of the hurdle executing the lead leg action. May require hurdles set as much as 9" below the standard hurdle height to execute efficiently.

Half-Hurdling / Trail Leg

With the same set-up, athlete sprints over the trail leg side of the hurdle executing the trail leg action. Requires "air-step" with lead leg coordinated with trail leg action. To avoid over-rotation around vertical axis, lead leg should land 6-12" beyond hurdle.

Although this sequence of drills is not an inclusive list of drills, performing these drills in sequence prepares the athlete for hurdling at faster velocities. Additional drills which produce strength and dynamic flexibility in the range of motion used in hurdling include:

Ground Hurdling

Seated on the ground, the athlete imitates the arm action, leaning his trunk forward on every 4th arm pump and lifting the elbow of the lead arm, the sweeping it back while keeping the shoulders square.

Wall Hurdling

Leading with the knee while lifting elbow of the lead arm and "landing" the dorsiflexed foot of the lead knee against the wall.

Trail Leg Circling

Whole balancing by bracing with the arms against a fence or another hurdle to support his leaning trunk, the athlete repetitiously circles his trail leg continuously over the

hurdle.

Resisted Trail Leg

In the same position as the previous drill, the athlete circles his trail leg against the resistance of a partner holding the foot of his trail leg.

In teaching the beginning hurdler, don't hesitate to lower the hurdles or move them closer. The objectives should be teaching efficient hurdle clearance technique at a fast rhythm, and not necessarily to negotiate the hurdles at their standard height and distance.

It can also be advantageous to teach the beginning hurdler to take 4 steps between hurdles. This will accomplish allowing the hurdler to maintain efficient sprint technique without "reaching" for the hurdles, and will force him to develop ambidextrous hurdling ability, an advantage if the athlete will also compete in the 300m/400m race.

IV. TRAINING

Drills can be of value for (1) teaching hurdling technique, and (2) as a warm-up method, but the majority of practice time should be spent on fast hurdling. Repetitions over hurdles can be done using several different methods to accomplish varied training objectives, sometimes within the workout:

Method	Objectives
Start over 2-3 hurdles	Starting mechanics; acceleration pattern
Repetitions over 4-6 hurdles	Transition from acceleration phase to maintenance
Repetitions over 8-12 hurdles	Speed endurance
Repetitions over 6-10 hurdles, 8.5-8.8 meters apart	3 strides in reduced distances forces faster stride frequency; quick rhythm between hurdles
Repetitions over 4-6 hurdles, 12.5 - 13.0 meters apart	5 strides over increased distance allows athletes to sprint over hurdles at a faster velocity

Sample Training Program

Although very simplistic, the following table separates the hurdler's training year into 5 phases, and suggests objectives and methods for each phase:

Phase	Primary Objective	Methods
Off-season	Develop explosive strength	Hill running, bounding plyometrics
Pre-season	Learn hurdle technique	Drill progressions, video analysis
Early season	Speed endurance	High volume of repetitions, distances
Mid-season	Racing experience	High volume of races
Peak season	Refine speed	High intensity repetitions, quality races

V. TROUBLESHOOTING

In analyzing hurdlers' technique, it is often advantageous to view the hurdler, either actively or via videotape, from a head-on position. Most of the faults listed in the table below can be spotted from such a viewing position:

Correcting Common Faults		
Fault	Cause	Correction
Taking off too far from the 1st hurdle	a) blocks too bunched; or b) initial strides too short.	a) space blocks farther; or b) accelerate explosively
Excessive height over hurdle	taking off too close or jumping over hurdle	use lower hurdle heights to practice
Locking the lead knee	swinging the foot up instead of driving the knee	skipping drills on sides and over hurdles
Off-balance landing	excessive rotation around vertical axis	avoid reaching -- lift elbow of the lead arm
Landing on heel	snapping lead leg down; straightening trunk	hold lean throughout hurdle clearance
Serpentine stride pattern between hurdles	excessive rotation around vertical axis	drive knee at take-off ; keep hips and shoulder square

In addition to trouble shooting technique from a visual standpoint, the coach can also analyze "touchdown" times to evaluate performance in both training and competition.

The coach can manually (or by viewing videotape played at actual speed) time the touchdown of the lead foot over each hurdle, and by plotting the data, have an effective model of each repetition and race.