

Drills for Top-Level Hurdlers

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ABSTRACT

The 110m hurdler cannot run freely between the hurdles as in a sprinting race. He must correct the body posture, height of the hips above the ground and the length of each stride in accordance with the constraints on his running mechanism dictated by the effect of hurdle he has just cleared, by the proximity of next one he must clear and by fatigue in the later part of the race. This impacts running speed, particularly in the later part of the race, and the technique the athlete uses to adapt and maintain stride frequency is key to the final performance. The author, a scientist and successful coach, believes that many coaches over-emphasise the first half of the race, using workouts with only five to six hurdles, and do not prepare their athletes adequately to have the correct stride technique in the latter part of the race, where they are destined to decelerate. He suggests drills for maintaining stride frequency and improving foot push on the track without increasing stride length

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Introduction

The most important technical challenge in the 110m hurdles is to reach the highest stride frequency between the hurdles while retaining optimal stride length throughout the race'. The 110m hurdler cannot run freely, as in a flat race, but must correct his body posture and the length of each stride in accordance with the constraints placed on his running mechanism by the effect of hurdle he has just cleared, by the next one he must cross and by fatigue in the later part of the race.

Exercises or drills over sets of hurdles are an essential element of a hurdler's training. They create a mental and motor imprint of the technique so that it becomes automatic. However, these drills must be designed and executed properly. They must aim to address a specific technical issue and develop an action that will

contribute to improved results. If they do not do so correctly, bad habits may become ingrained to the point where they “feel” right to the athlete and the overall performance will suffer.

Technical Issues

Top-level 110m hurdlers are always good sprinters, able to run 10.30 sec or better in the flat 100m. For example, the best recorded 100m times of some recent Olympic champions are Roger Kingdom (USA): 10.30, Colin Jackson (GBR): 10.29 and Mark McKoy (CAN): 10.08. Other top 110m hurdlers for whom we know the 100m times include Mark Crear (USA): 10.19, Renaldo Nehemiah (USA): 10.16, and Terrance Trammell (USA): 10.04. Clearly, these athletes are able to perform when there are no constraints on their running, but we can see from race videos that champions like Kingdom, Greg Foster (USA), Lu Xiang (CHN) and Dayron Robles (CUB), - all over 1.88m tall – can have a difficult time to fit three strides in between the hurdles. The root of the problem, of course, is the distance between hurdles. Nowadays, hurdlers running on synthetic tracks get so much more energy returned from the ground on each stride and therefore move faster than their predecessors who were running on cinder tracks. This effectively shortens the space and the time available for each stride.

We know that top-level hurdlers take off 2.10 - 2.20m before each hurdle and that their touchdown is 1.30 - 1.40m after the hurdle. From this, we can understand how hard it is for them to express their speed in the space remaining between the hurdles (about 5.60m). We also know that they take three strides of different lengths between the hurdles: the shortest is the first, after the lead leg strikes the ground; the longest is the second, which is free from special constraints; and the third, before going into the hurdle, is longer than the first but shorter than the second. As a consequence, it is clearly impossible for them to run in the same way as in a flat sprint. This is the reason why the hurdlers who are fastest for the flat 60m and 100m are not necessarily the fastest in the 60m hurdles or the 100/110m hurdles

and the technique of the hurdles events is as much about running biomechanics between the hurdles as about clearing the hurdles.

The problem to be solved by 110m hurdlers, especially those who are tall, is to constraint and modify the stride lengths with maximum quickness. They manage this by using very low knee-lift and very low arm carriage compared to normal sprinting. There is a natural co-ordination between arms and legs, so that if we increase the length of the strides the length of the arm swing automatically increases. Therefore, the hurdler must restrict the knee-lift and rely on a very strong push of the feet on to the track and a high stride frequency to generate force and velocity. Drills to accomplish this (and improve stride frequency) are the key to improving performance in the 110m hurdles and the best drills are those that reduce the distance between the hurdles.

However, I completely disagree with drills that use five steps between hurdles. This is because the length of the strides is too dissimilar to the race and the transfer of learning operates best if the drill mimics what the hurdler has to do during the race.

A related issue is the difficulty in maintaining the hips at a constant height from the ground. The force applied on the ground by the leg muscles moves the hips in a certain direction at a certain time. The fastest way to run from A to B is for the hips to travel along a straight line (A-B) as shown on the left side of Figure 1. But the hip of a hurdler moves along an undulating line (A, B₁) when going over the hurdles, which means an inevitable loss in efficiency, stride frequency and running velocity. To improve performance, the hurdler, as much as possible, has to minimise the up and down movement by maintaining his hips at a constant height from the ground before, over, beyond and between the hurdles² (see Figure 2).



Figure 1

I think that the example of Kingdom is one of the best to show the quickness of the three strides between hurdles. He normally had what appeared to be a terrific acceleration after the fifth or sixth hurdle, as we can see in the final at the 1988 Olympic Games in Seoul, when he ran in 12.98 sec to win ahead of Jackson who ran 13.28. The difference of three tenths was the greatest in an Olympic final. We can see the same stride quickness and late race acceleration in Robles' 12.87 sec world record in Ostrava. When Kingdom ran indoor 60m hurdles races he could accelerate after the third hurdle because the race finished only two hurdles ahead, as can be seen in the final at the 1989 IAAF World Indoor Championship in Budapest. In both of the mentioned races, Kingdom used this acceleration to win from behind. This is one of the most important abilities reserved to champions: to be in mental control at every moment of the race, above all when hurdling from behind.

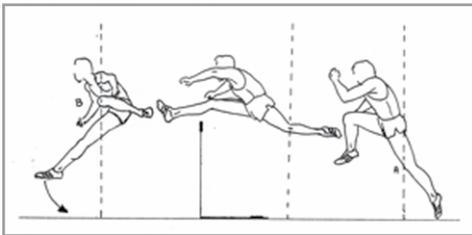


Figure 2

The key to the last part of the race is in maintaining a high stride frequency under conditions of fatigue. We know that most hurdlers lose velocity beyond the seventh or eighth hurdles and that the time spend running between the last hurdles increases³. The athlete who is closest to maintaining his velocity at the end of

the race will appear to accelerate away from his competitors. Apart from the positive effect this has on performance, it can have significantly negative psychological effect on the opposition. I believe this is an aspect of the race where focused technique training can bring improvement that translates into better results. Many coaches over-emphasise the technique of the first half of the race, using drills with only five or six hurdles and do not prepare their athletes adequately for the second half of the race.

This does not mean we should ignore the initial part of the race. It, of course, is very important because it influences the development of the whole race. I believe that the best way to go over the first hurdle is to use eight strides from the blocks. This rhythm is more similar to the three strides used between the hurdles than the seven strides approach. But the greatest difficulty with this approach is to express power while restricting the stride length. In this respect, some years ago I observed a week of workouts of the great champion Colin Jackson in Loughborough, Great Britain. It was very interesting to see how he had solved this problem. His foot touches on the ground from the blocks to the first hurdle were not on a straight line (body direction) but they went on two lines on the right and on the left of the one describing his body's running to the hurdle. In this way he expressed his speed better because the length of his strides was greater $AC > AB$ and $CD > BE$. For the same reason Nehemiah used an intentional zig-zag in the lane, very flashy, at the 1979 IAAF World Cup in Montreal.

I also observed Jackson do drills starting from the blocks and running first over one hurdle and then over three or four hurdles. When running over one hurdle, his take-off before the

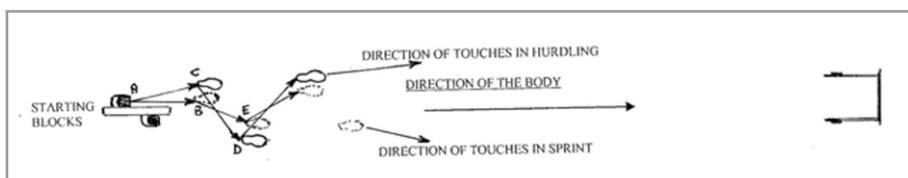


Figure 3

hurdle was at about 2m and his landing was at about 1.50m. But when he was running over four hurdles, his take-off at the first hurdle was 2.20m and the landing was at 1.40m, and the distances before and after the other hurdles were the same. In the first drill, Jackson knew that the take-off and touchdown distances were not important because he had no more hurdles to clear, but when he had to run over several hurdles his well-trained mind ordered him to go into the first hurdle shortening his strides.

This reminded me of a drill used by some hurdlers from the former GDR, which I had seen earlier during an international course at the National School of Athletics in Formia, Italy. They started (men and women) about 20-25cm beyond the starting-line, thereby shortening the distance to the first hurdle. In this drill, like drills where the hurdles are placed closer than normal, the athlete KNOWS that the hurdle is nearer, so his mind forces him to restrict the length of his strides. For this reason I believe that when we train to improve the technique to attack the first hurdle we must make the athlete clear the second hurdle as well.

Drills

Training for rhythm

To address the issue of rhythm, I think the best drills are those where we reduce the distance between the hurdles. For instance, the athlete should run from the blocks 3 or 4 x 8-10 hurdles set at 8.80m. If we want to emphasise acceleration from the first hurdle onwards we can gradually increase the distance between the hurdles:

- 1 to 2 - 8.70m
- 2 to 3 - 8.80m
- 3 to 4 - 8.90m
- 4 to 5 - 8.90m
- 5 to 6 - 9.00m

After the 6th hurdle we maintain a spacing of 9.00m because at this point the hurdler has reached maximum velocity.

Training to shorten the stride length

I like very much a drill that I use to limit the stride length and to create quickness in the legs shown in the accompanying figures. From the start, the hurdler must focus his attention on a powerful push off the track in order to run faster (Figure 4). In Figure 5 the hurdler is focusing on a very powerful push of his right leg on the ground together with controlled and associated arm movements. In Figure 6, at the touchdown, the hurdler must repeat with his left leg what he has done with the right one, moving his arms in the same way. Figure 7 shows that it is very important to shorten stride length controlling that the knee doesn't rise too much. Remember that this is a quickness drill NOT a speed drill. The athlete's hip position runs quickly from X to Y (Figure 8). The small swing of the arms and the tighter fold of the legs (C) reduce the stride length but not the stride frequency, which, above all, is what the hurdler must do in a race.



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8

Training for the second half of the race

For this drill the hurdler runs from the blocks over 10 hurdles with the first six spaced normally and the last four spaced at 8.80m. I believe that this is a good drill to maintain the right rhythm at the end of the race since the hurdler is psychologically influenced by the fact that the hurdles are closer. In contrast to the first drill, maintaining the stride frequency between the hurdles is more difficult but, by the transfer of learning, both drills will lead the same effect: to make a more difficult or easier condition than the competition and thereby improve the final result.

Conclusion

The fastest hurdler is the one that runs very quickly between hurdles all the way until the finish of the race. He must be able to use power pushing on the track, but it is not necessary to be overtly powerful. He also must have very low knee-lift between hurdles and very low arm carriage to contain stride-length.

I think that many coaches over-emphasise the first half of the race using workouts with only 5-6 hurdles so the latter part of the race, where the athletes are destined to decelerate, is de-emphasised. The coach must emphasise the need to express acceleration from the starting blocks to the finish line of the race to his hurdlers.

Drills are a key element of the 110m hurdler's training but it is important that they are designed and executed properly. They must aim to address a specific technical issue and develop a specific action that will contribute to improved results.

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