

The most effective technical training for the 110 metres hurdles

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“ Starting from the premise that success in coaching the 110 metres hurdles depends first of all on the athlete's possession of the requisite physical and motor characteristics, the author describes how experience and the adherence to basic sports principles can make it possible to construct a successful training plan for the individual athlete. He shows how an analysis of the experiences and methods of successful coaches can be used to select those training exercises which are of universal benefit and how they can best be fitted into the training plan. Ten basic elements of technique training are discussed and copious examples given of exercises and training units by means of which they can be developed. ”

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1 Introduction

The 110 metres hurdle race belongs to the group of athletic events in which a high motor potential is as important as the level of technical preparation. When skill preparation is based on the general rules of training and experiences gathered from other athletic events, especially from the sprints and jumps, the development of the technique of the 110 metres hurdle race constitutes a very specific part of the whole training process. Success in coaching the 110 metres hurdle race depends first of all on the athlete possessing the appropriate somatic characteristics (especially length of leg) and the requisite motor abilities (speed and co-ordination).

Upon this base it is possible to work out an optimal technique for every individual. If one considers the techniques and method of hurdle clearance worked out by the best Polish and foreign coaches, one may conclude that there are as many ways of achieving success as there are athletes. However it seems that the ancient saying 'All roads lead to Rome' is only partially applicable to athletics training. The constant search for a new variety of technical training seems to be a very positive phenomenon, for it is responsible for the elimination of faults in technique and it motivates the hurdler to greater efforts. However, experiments of this type should also follow another ancient aphorism 'above all - do not harm the athlete'. In spite of perfectly selected exercises and proper organisation, many new ideas may not only fail to produce the desired results but may also harm the athletes. In such cases, one should follow the principle of the individualization of technical training.

According to this, the following factors should be taken into account:

- the somatic constitution of the hurdler (height and body proportions),
- the level of motor preparation (mainly speed, power and co-ordination),

- the actual level of the technical preparation, which substitutes positive, correct forms of movement for negative faults,
- the psychological make-up,
- the actual conditions (problems, injuries, illnesses).

Taking these factors into consideration, it is possible to choose a model of technical preparation which would be optimal for the given athlete. However in order to be equal to this task, one should have a wide range of exercises at one's command, from which one can select those exercises most specifically suitable to bring about the desired results. Obviously, in spite of a thorough evaluation of the athlete, there are some other factors that influence the organisation of the training:

- the training period (phase)
- the training objectives
- the training conditions (indoor or outdoor)
- the weather conditions (wind, rain, air moisture).

The range of technical training exercises is very wide. A great many specialists in the 110 metres hurdles present ideas of perfecting technique which are based on different grounds. Many of the same exercises are included but they have different aims and order. On the other hand, all coaches have their own 'methods' which they have found to be successful. It seems that, in spite of the great variety of technical exercises, it is possible to distinguish those particular elements which have the most beneficial influence on technique training. An analysis of the publications and experiences of many coaches makes it possible to distinguish 10 elements which constitute the structure of the 110 metres hurdles technical training. Being familiar with them and employing their various possibilities may help the coach to perfect the hurdler's technique and should consequently produce better results.

The schematic presentation of the particular elements of 110 metres hurdles technical training is presented in *Table 1*.

2 Length of the race

The velocity curve of the 110 metres hurdles builds up from the start to the 2nd and 3rd hurdle and from the 3rd to the 6th hurdle, after which velocity is maintained for a while and later decreases. Accordingly, the 110 metres hurdle race can be divided into 3 phases:

- start and hurdle acceleration
- hurdle speed
- hurdle endurance.

Starting acceleration is derived from power and technique, hurdle speed depends on the level of speed and technique, while the final part of the race depends on the maintenance of technical proficiency in the face of growing muscular fatigue. There is a significant difference in the technical training in each of these phases.

Example sessions:

(h = hurdle, 107cm = height of hurdle, 9.14m = inter hurdle space)

A Hurdle acceleration:

- 2x1h + 2x2h + 2x3h (107cm, 9.14m, crouch start),
- 2x3h (100cm, 9.14m, crouch start) + 2x3h (107 cm, 9.14m crouch start),
- 1-2-3-4-3-2-1h (107cm, 9.14m, crouch start).

B Hurdle speed

- 3-4-5-6-3h (100cm, 9.00m, standing start),
- 2x5h (107cm, 9.14m, standing start) + 2x5h (107cm, 9.14m, crouch start) + 2x5h (100cm, 9.14m, crouch start) - 2x4h + 2x5h + 2x6h (107cm, 9.14m, crouch start).

Table 1: Model of technical training for the 110m hurdles

Element of rhythm training	Characteristics
1. Length of the race	<ul style="list-style-type: none"> • hurdle acceleration • hurdle speed • hurdle endurance
2. Rhythm	<ul style="list-style-type: none"> • technical rhythm (1-2 strides) • classical rhythm (3 strides) • lengthened-rhythm (5,7 strides) • varied rhythm (4,6 strides)
3. Inter-hurdle spaces	<ul style="list-style-type: none"> • 3 stride rhythm - 8.5-9.14m • 5 stride rhythm - 12.8-13.40m • 7 stride rhythm - 17.3-18.20m
4. Height of the hurdles	<ul style="list-style-type: none"> • low hurdles - 76-84cm • medium hurdles - 91cm • one metre hurdles - 100cm • high hurdles - 106.7cm
5. Rest intervals	<ul style="list-style-type: none"> • maximal - 5-90min • optimal - 3-15min • shortened - 15sec-3min
6. Training intensity	<ul style="list-style-type: none"> • maximal & sub-maximal/90-100% • high/80-90% • medium & low/80% and less
7. Length of the approach	<ul style="list-style-type: none"> • shortened approach/5-6 strides • standard approach/7-8 strides • lengthened approach/8-12 strides
8. Length of the finish	<ul style="list-style-type: none"> • shortened finish/2-3 strides • standard finish/14.02m • lengthened finish/14.02m and more
9. Type of start	<ul style="list-style-type: none"> • crouch start • standing start
10. Technical exercises	<ul style="list-style-type: none"> • trail leg • lead leg

C Hurdle endurance

- 2x12h (84cm, 8.80m) + 2x12H (91cm, 9m) + 2x12h (100cm, 9.14m),
- 4x11h (103cm, 9.05m, standing start),
- 2x6h (100cm, 13.10m, 5 stride rhythm) + 2x12h (100cm, 9.14m, 3 stride rhythm) + 2x10h (107cm, 9m, 3 stride rhythm).

3 Rhythm (the number of inter-hurdle strides)

The 1-7-stride rhythms are used according to the requirements of the training period, the 3 stride (standard) rhythm being the most important. In the general preparation period hurdlers may take off from alternate legs (2, 3 and 6 stride rhythm), in order to improve co-ordination in the preliminary technical exercises. In the special preparation period, when the hurdler is working on rhythm endurance, the 5 and 7 stride rhythms are used. The lengthening of the inter-hurdle intervals facilitates the development of speed, which will later be transferred to the 3 stride rhythm technique. Various types of runs may be constructed by combining 3, 5 and 7 stride rhythms.

Example sessions:

A Technical rhythms:

- 8x10h (84cm, 4.50m, 1 stride rhythm with trail leg),
- 5x10h (84cm, 4m, 1 stride rhythm with trail leg) + 5x10h (84cm, 4.20m, 1 stride rhythm with lead leg).

B Classical rhythms:

- 6-8-10-12-6h (107cm, 9m, standing start),
- 2x5h (107cm, 9.14m, crouch start) + 2x5h (107cm, 9.14m, standing start).

C Lengthened rhythms:

- 4x10h (3-3-5-5-5-5-3-3-stride rhythm, 100cm, 8.90/13m),
- 3x8h (3-3-3-5-5-7-7-stride rhythm, 91cm, 9m/13.10/17.50m),
- 4x8h (3-5-3-5-3-5-3-stride rhythm, 100cm, 9.14/13.20m),
- 5x8h (3-3-5-7-5-3-3-stride rhythm, 91cm, 8.90/13.00/17.80m).

D Alternating rhythms (both legs):

- 6x6h (84cm, 10.50m, 4 stride rhythm with right and left leg).

4 Inter-hurdle spaces

This is one of the crucial elements in the organisation of rhythm training. Usually the

inter-hurdle spaces expand in line with the competition period. The following spaces are used according to the level of preparation, the training period, the height of the hurdles and the weather conditions:

- 3 stride rhythm: 8.50m, 8.70m, 8.90m, 9m, 9.14m,
- 5 stride rhythm: 12.90m, 13m, 13.10m, 13.20m, 13.30m,
- 7 stride rhythm: 17.30m, 17.80m, 18m, 18.20m, 18.40m.

Examples of sessions:

A Shortened spaces:

- 3x10h (100cm, 8.80m) + 2x10h (107cm, 8.90m),
- 4x11h (100cm, 9m, 1-4h + 8.90m, 4-9h + 8.80m, 9-11h),
(1-4h = from 1st to 4th hurdle),
- 5x10h (100cm, inter-hurdle spaces are lengthened in each run – 8.70m / 8.80m / 8.90m / 9m / 9.14m),
- 2x8h (91cm, 8.70m) + 2x8h (100cm, 8.90m) + 2x8h (107cm, 9.14m).

B Standard spaces (9.14m).

5 Height of the hurdles

This, together with the inter-hurdle spaces, provides a basic modification of the technical training. Heights of 91, 100 and 106.70cm are used most often. Sometimes lower hurdles are used (76-84cm) or artificially heightened (110-112cm). In some cases intermediate (eg. 103cm) heights are used, which, according to many coaches does not cause any changes of speed or technique. Low hurdles (76-84cm) are used in the general preparation period, in order to perfect technical elements. Medium hurdles (91, 100cm) form the basis of rhythm endurance training in the special preparation period. High hurdles are used for the development of starting ability and as the basic hurdle height during the competition period. The height of the hurdles can remain unchanged throughout the training or can be changed in the case of certain training runs or even in the course of one run.

Examples of the hurdle height stipulations:

A Low hurdles (76-84cm)

- 6x5h (84cm, 6m, with trail and lead leg)
- 5x10H (84cm, 10m, 4 stride rhythm).

B Medium hurdles and 1 metre hurdles (91-100cm)

- 6x8h (91cm, 13m, 5 stride rhythm)
- 5x10h (100cm, 8.80m, standing start)
- 3x10h (91cm, 8.80m) + 2x10h (100cm, 9m).

C High hurdles (107cm)

- 3x2h + 3x4h (107cm, 9.14m, crouch start)
- 3x10h (107cm 1-5h + 100cm 6-10h, 9m, standing start).

6 Rest intervals

Modelling of the technical training by means of the durations of rest intervals refers to both repetitions and the series of exercises. The length and the character of these intervals depend on the training method and the intensity of effort. If the duration of the intervals is insufficient, we may use so called 'hurdler's intervals'. The rest intervals may be:

A Maximum – 5min-1.5 hours – used for races of maximum intensity:

- 2x110m hurdles, $i = 60\text{min}$ ($i = \text{time of interval}$),
- 110m hurdles (100cm, 9.14m, crouch start) + 60m hurdles (107cm, 9.14m, crouch start), $i = 20\text{min}$,
- 4x2h (107cm, 9.14m, group starts), $i = 6\text{min}$.

B Optimal – 3-15min – used for most of the technical training:

- 5x11h (103cm, 9m, standing start), $i = 8\text{min}$.
- 2x8h + 2x6h + 2x4h (100cm, 8.9m, standing start), $i = 6, 5, 4\text{min}$ (repetitions) / 10min. (sets).

C Shortened 15sec-3min

This constitutes the basis for interval training. The intervals are designed to intensify work on the hurdler's endurance and they may take various forms:

- 3x2x5h (91cm, 8.80m), $i=1/6\text{min}$ (intervals passive, shortened),
- 4x2x8h (100cm, 8.90m), $i = \text{walk}/6\text{min}$ (walk back intervals),
- 3x3x3h (107cm, 9m), $i = \text{jog}/6\text{min}$ (jog back intervals),
- 4x4x5h (100cm, 8.80m), back to back with a pause for the change of direction).

7 Training intensity

This depends mainly on the training period, the training objective, the state of the athlete and the training conditions (temperature, wind, rain). Usually, the following rule is observed: the higher the intensity, the smaller the number of units covered. The same rule applies to the rest intervals: the higher the intensity – the longer the rest intervals. Some-

times, in a single training session, the same hurdle runs may be used but at different intensities. As the competition period approaches the intensity of the runs increases.

Examples of the technical training:

A Maximal and sub-maximal intensity

- Competitions or tests.

B High intensity – hurdle accelerations, variations of hurdle speed and hurdle endurance:

- 3x14h (100cm, 9.14m, standing start), $i = 12\text{min}$, I (intensity) = 90%,
- 1-2-3-2-1h (107cm, 9.14m, crouch start, group races), $i = 5-10\text{min}$, $I = 90\%$,
- 1x10h ($I=90\%$) + 1x10h ($I=80\%$) + 1x10h ($I=95\%$).

C Medium and low intensity – technical exercises, walking and jogging:

- 5x8h (100cm, 7m, with trail and lead leg).

8 Length of approach

This may be standard (13.72m), shortened (5-6 strides) or lengthened (9-12 strides).

Examples:

A Shortened approach:

- 3x2h (107cm, 9.14m, crouch start, approach with 5 strides = approx. 10m).

B Lengthened approach:

- 4x4h (100cm, 9m, crouch start, approach with 9 strides = approx. 18m).

C Standard approach:

- 2x2h + 2x4h (107cm, 9.14m, approach standard minus 50cm).

9 Length of the finish

This element of rhythm training, designed to perfect finishing ability, is often neglected. Most often no attention is paid to continuing to run on after crossing the last hurdle, which encourages a faulty sequence of movement. Generally it is sufficient to take 2 or 3 quick strides after crossing the last hurdle but it is sometimes useful to lengthen the finish to 14.02m or even beyond (approx. 20m) the normal distance.

Examples:

A Shortened finish:

- 6x6h (100cm, 9.14m, crouch start),
- fast 2-3 strides after last hurdle clearance.

B Standard finish (14.02m)

C Lengthened finish

- 5x4h (107cm, 9.14m, crouch start),
- fast finish to 60 metres.

10 Type of start

The use of the crouch or standing start depends on the period of preparation and the type of the rhythm training. In the case of rhythm endurance training (more than 7 hurdles) the crouch start is used very rarely. In the pre-competition period, on the other hand, in exercises dealing with the unit from the 3rd to 5th hurdle, the crouch start is necessary. In order to get the utmost benefit from technical training, it should be remembered that too many block starts may be stressful and have a negative training effect. Standing starts are usually carried out without a signal, whereas crouch starts require the starting command.

Example session:

A Crouch start:

- 2x1h + 2x2h + 2x3h (107cm, 9.14m, crouch start, group races).

B Standing start:

- 4x13h (100cm, 9m, high start, individual races).

11 Use of the basic technical exercises

This refers to the use of various hurdle exercises performed by the trail leg and lead

leg. These exercises form the basis for technical training in the general preparation period and are used as the introductory part of all rhythm training units. Technical training exercises are useful at all levels of proficiency for the whole training period.

Example sessions:

A Trail leg:

- 4x8h (100cm, 7.5m, 3 stride rhythm),
- exercises for the trail leg at a jog.

B Lead leg:

- 5x8h (91cm, 1m, 1 stride rhythm),
- exercises for the lead leg at a walk.

On reviewing some of the basic elements that influence the structure of technical training for the 110m hurdles, it can be seen that a great number of variations and combinations can be used. Their value can be verified if they are based on practice with an individual athlete. However it should also be remembered that success cannot serve as the decisive criterion for the use of any one group of exercises. According to the classical principle of sport training theory, every year 20% of the exercises should be changed. In order to do this, it is necessary to be well acquainted with the variety of exercises available and the ways in which they can be usefully adapted.

