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Athlete Typology and Training Strategy in the 400m Hurdles

by Janusz Iskra

ABSTRACT

Most coaches will find themselves with athletes who vary from any established ideal set of characteristics, making it necessary develop an appropriate training strategy to maximise each individual athlete's potential. For them, the most interesting analysis of training concerns groups of similar athletes - defined by body build, motor and coordinative (technical, rhythm) preparation, personality and the specifics of their sport careers - so that the relevant lessons and information can be applied in practice. In a previous study the author, who is a coach and scientist, created a typology of 400m hurdlers and found there were seven basic types of top performers in the event. The aim of this article is to systematically present the appropriate training means for the three types of 400m hurdlers seen most often in the early 21st century: "Special Endurance", "Technical" and "Rhythm" and to show how these means are incorporated into microcycles for each of the main training periods as a guide for coaches who are planning a programme. Templates of endurance, strength and rhythm training means have been prepared for each type of hurdler. In addition, sample microcycles for the "general preparation", "special preparation" and "pre-competition/competition" periods are presented.

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Introduction

Performance level in the 400m hurdles depends on the athlete's genetic and physical pre-dispositions, particularly movement awareness and coordination, and the type of long-term (6-10 years) training work that is applied. The nature and specific characteristics of this discipline make it difficult to identify "pure" talent at the first (youth) stage of training and the best we can do is look for tall individuals with running speed, endurance, strength and good co-ordination. However, in the end, coaches will find themselves with athletes who vary from any established ideal with regard to somatic build, motor preparation, level of hurdling technique, personality, etc, making it necessary to develop an appropriate training strategy to maximise each individual athlete's potential.

In training science literature we traditionally have two main approaches to the description of the preparation of athletes in any discipline.

The first presents the theory and general training aspects, including all the typical elements of a programme (training means, macrocycle planning, types of microcycles, volume and intensity of training sessions, etc.). From this approach we get a universal but perhaps over-simplified picture. In current publications about the 400m hurdles we can find a lot of very useful information written from this point of view (e.g. MCFARLANE, 1988; BOWERMAN & FREEMAN, 1991; ISKRA, 1991; BOVELL, 2004; JARVER, 2004).

The second approach is an individual analysis of the training of the best performers in a country or the world. This kind of study is very interesting but it has a basic fault: the training of a champion is reserved for unique individuals, in specific times and places, and it is very difficult to transfer the lessons, even if they are clear, to another athlete with his or her own set of characteristics and circumstances. We have many current examples of this type of analysis for the 400m hurdles (e.g. HARRISON, 1991; ALEJO, 1993; STEPANOVA, 1997; ISKRA, 1999 and 2001).

Certainly in the case of the 400m hurdles, the most interesting analysis of training, from both the theoretical and practical points of view, concerns groups of similar athletes defined by body build, motor and coordinative (technical, rhythm) preparation, personality and the specifics of their sport careers. This third variant of training literature is rare, but it can be very valuable for planning an effective programme for athletes with the characteristics of the group or groups covered (see Table 1).

In a previous study (published in Polish) I created a typology of 400m hurdlers base on the criteria shown in Table 1. I found the following seven basic types of top performers, listed here with their typical sporting background:

Table 1: Criteria of typology of 400m hurdles runners

Criteria	Characteristics
1. Somatic	• Type of body build (especially body height and length of legs) influences stride pattern. • In most of cases taller hurdlers can choose 13-stride rhythm, smaller hurdlers use a 14-15-stride rhythm • The other somatic parameters (Rohrer's indicators) divide hurdlers into thin and strong (muscular) types. • In this case we have important information to use specific training means, specially according strength and rhythm training sessions.
2. Motor	• The levels of speed, endurance, strength and flexibility are most important for choosing training means and hurdle drills. • Running **speed** is God gift for hurdlers and we must use it as a core parameter in this event. • As to a level of **endurance,** we must identify the athlete's type of this motor ability: speed-endurance or endurance-speed. • The same concerns the type of **strength**: what kind of this ability is predominant (explosive power, general strength or maybe strength-endurance abilities)? • The range of motion of joints is important to effective clearance of the hurdles. We must assess the athlete's **flexibility**, not only in absolute terms but in the proportion of the right and left leg jrange of motions.
3. Technical	• The term **technique** in 400m hurdles includes the level of clearance of hurdles (with both left and right leg) and, most important, the so called "hurdles rhythm". • Hurdle technique is a basis for runs over obstacles with increasing fatigue and necessary modification of stride rhythm. • Levels of technique and rhythm are not only expressed in running with obstacles.
4. Sport career	• This concerns previous sport experience, previous athletic event experience, and training age.
5. Psychological	• Psychological problems of 400m hurdlers are less well known. • In my 25-years of observing Polish hurdlers I find that every athlete has prefered forms of exercise.

- "Tempo" / 400m/400m hurdles,
- "Technical" / 110m hurdles,
- "Speed" / 100-200m,
- "Endurance" / 800/400m,
- "Rhythm" / pure 400m hurdles,
- "All-round",
- "Optimal".

In most of the cases above, type-background descriptions should be obvious enough. With regard to the "All-round" (or what we now call "Versatility") group, this comprises athletes who were previously jumpers or decathletes, e.g. Dia Ba (SEN), who ran 47.23. The "Optimal" or ideal type comprises athletes who are tall and excellent in both the 400m and 110m hurdles, e.g. Edwin Moses (accordingly 45.60, 13.64 and 47.02), Kevin Young (45.11, 13.65 and 46.78) and Andre Phillips (44.71, 13.25 and 47.19). Of course, for most coaches finding such athletes are just a dream.

When we start to create a strategy and periodisation plan for 400m hurdles training we must consider the type of athlete with whom we are working. The first question might be: should we concentrate on the individual's best predispositions or should be focus on the weak points of his or her conditional and technique abilities. I believe the best and most obvious solution is to choose the types of training means as well as the volume and intensity that are most appropriate to the somatic, motor and rhythm predispositions of the athlete.

In the first decade of the 21st century we find the three most common types of 400m hurdlers on the scene are from the "Tempo" (or what we now call "Special Endurance"), "Technical" and "Rhythm" types. The characteristics of these types are presented in Table 2. The aim of this article is to provide a guide for coaches who are planning a programme by systematically presenting the appropriate training means for these three types of hurdlers and show how they are incorporated into microcycles for each of the main training periods.

Types of 400m Hurdles Training

We can start by classifying the two main areas of training appropriate for the 400m hurdles: conditioning (speed, endurance, strength) and technical (rhythm). In this section we will list the possibilities and assign the appropriate means to each of the three types of hurdler of interest here.

Table 2: Description of the three most common types of 400m hurdlers

Type	Characteristics
"Special Endurance" (400/400H)	• Excellent achievements in the 400m, in most cases the athlete continues a 400m career and is a very strong competitor in 4 x 400m relays. • In the training process we start by introducing a general "culture of hurdling" with stretching, walking and jogging over hurdles. In advances training sessions we connect flat and hurdle running. Sometimes we must choose only one leg (13 or 15 stride) rhythm.
"Technical" (110H/400H)	• Sprint hurdlers (110m hurdles) with speed-endurance abilities can be "transformed" to the longer hurdles. • The training challenge is often very good technique of one leg and very poor of the other. The challenge is greater with a right leg lead. In most of the cases we choose 13-15 stride pattern. • In training we prefer speed-endurance and various kinds of hurdle sessions (and classic intervals) with one lead leg.
"Rhythm" (pure 400m H)	• Hurdlers without motor (400m flat) or technical (110m H) preferences. They have something like "feeling of rhythm" in every part of the race. The technical level indicator is sometimes under 2 sec. "Rhythm" hurdlers have effective technique on both legs. • The coach can adapt different stride patters (13-14-15) to individual motor predispositions. • In training sessions we can use a lot of variants of rhythm runs with both left and right lead leg.

Conditioning

Speed, both maximal and technical (medium and high intensity; "elements of speed") are necessary for all the types of 400m hurdlers. The means used to develop this bio-motor ability are much the same as they are for 400m runners and other sprinters. As these are well covered elsewhere and as the differences in the volume of speed training sessions between the different types of 400m hurdlers are rather small, we will only mention them as examples when we cover microcycle planning below.

Endurance training on the other hand is specific to the type of hurdler. In Table 3 we introduce several means to develop endurance and in Table 4 we assign these training means according to the needs of each of the three types of hurdler.

Note: in the following tables "Basic" means are those that are useful for all athletes, "Helpful" are useful in individual cases, especially in the general preparation period, and "Additional" means are possibilities for creating variety in a long-term training plan.

Table 3: Endurance training means for the 400m hurdles

Type of endurance	Characteristics	Examples
1. Short alactic speed endurance	Short (30-60m) runs of interval-repetition methods with short / long intervals and sub-maximal/maximum pace	5 x 4 x 30m, V = 90%, i = 2/8 min 4 x 3 x 60m, V = 98%, i = 2/10 min
2A. Short speed endurance	Short (30-60m) runs of interval-repetition methods with short - medium intervals and sub-maximal/maximum pace	5 x 2 x 60m, V = 92%, i = 1/4 min 4 x 5 x 40m, V = 98%, i = 1/4 min
2B. Pure speed endurance	80-200m runs with medium and long intervals and sub-maximal/maximum pace	5 x 80m, V = 90%, i = 6 min 3 x 200m, V = 95%, i = 10 min
2C. Special endurance 1	200-500m runs with medium and long intervals and sub-maximal/maximum pace	2 x 300m, V = 92%, i = 20 min 1 x 500m, V = 98%
2D. Special endurance 2	500-1000m runs with medium - long intervals and sub-maximal/maximum pace	3 x 600m , V = 92%, i = 20 min 1 x 800m, V = 98%
3A. "Stress" training	200-800m runs with short (3 min) intervals and sub-maximal/maximum pace	3 x 200m, V = 92-95%, i = 3 min 2 x 400m, V = 92%, i = 3 min
3B. Intensive intervals	100-500m runs with short - medium intervals and medium - submaximal intensity	2 x 6 x 100m, V = 85%, i = 2/4 20 min 3 x 2 x 500m, V = 92%, i = 2/6 min
3C. Tempo endurance	100-500m runs of repetition method with medium interval and medium intensity	12 x 150m, V = 85%, i = 5 min 6 x 300m, V = 80%, i = 6 min 5 x 500m, V = 80%, i = 7 min
3D. Strength endurance	Uphill running and bounding at distances over 100m	5 x 200m, uphill, V = 80%, i = 6 min 10 x 100m bounding, V = 80%, i = 4 min
3E. Interval strength endurance	Bounding, skipping and acceleration at distances of 50-150m with 50m jog or walk intervals	5 x (100m bounding + 100m skip A + 100m skip B + 100m acceleration), i = 50m jog / 5 min
4A. Extensive intervals	Various distances (50-500m) running with low intensity and short intervals.	5 x 4 x 150m, V = 70%, i = 45 s / 90 s 3 x 3 x 350m, V = 75%, i = 1/2 min
4B. Continuous running and fartlek	Long (10-45 min) distances, continuous method of running or run with changing intensity (10-45 min)	3 x 12 min, i = 10-15 min other exercises, cross country 30 min

Table 4: Endurance training means appropriate for common groups of 400m hurdlers

Training Means	Type of Hurdler		
	"Special endurance"	"Technical"	"Rhythm"
Basic	• Special endurance 1 • Pure speed endurance • Intensive intervals (middle distance)	• Short speed endurance • Pure speed endurance • Intensive intervals (short distances)	• Intensive intervals • Strength endurance • Tempo endurance
Helpful	• "Stress" training" • Special endurance 2 • Tempo endurance	• Short alactic speed endurance • "Stress" training (short distances) • Continuous run • Extensive intervals • Interval strength endurance	• Interval strength • Special endurance • Pure speed endurance
Additional	• Continuous running • Strength endurance • Extensive intervals	• Strength endurance • Special endurance 1 • Tempo endurance	• Continuous running • Interval strength endurance • Special endurance • Extensive intervals

Table 5: Strength training means for the 400m hurdles

Type of strength	Type of drills	Examples
1. Basic leg strength	1A. Basic leg strength with barbell	Squats (classic, front squats). Toe raises. Step-ups (onto the box)
	1B. Basic leg strength on machines (dynamometers, specific apparatus)	Leg extension for quadriceps (leg curls) Leg flexion for hamstrings. Leg press. Feet press
	1C. Leg exercises with partner	Leg extension for quadriceps (standing and laying; concentric and eccentric contraction).Leg flexion for hamstrings (as above).
2. Supporting strength	2A. Trunk exercises	Abdomen exercise ("sit-ups", leg lifts, V ups) Back exercises ("good morning", back arches, oblique sit ups, rowing)
	2B. Arm exercises on machines	Arm curls. Triceps extension.
	2C. Classic weight lifting	Clean (clean and jerk). Bench press (incline bench press). Snatch. Dead lift.
3. Dynamic strength	3A. Directed leg strength	Half-squads
	3B. Special leg strength	Vertical jumps with barbell (half-squats jumps, jump from feet, hopping with pulling the knees towards the chest).Horizontal jumps Lunge (on the spot or horizontal) Marches (A,B drills) with barbell on the shoulders
4. Explosive strength	4A. Short jumps	Jumps to 30m or 10 repetitions – standing long jump, 3-10 alternate leg hops, bounding)
	4B. Explosive starts	Start (30m) with resistance (heavy belt, uphill, from sand or deep snow, with gum, against heavy wind)
	4C. Explosive arm strength	Medicine ball and shot throws (front, backward, overhead and others)
	4D. Typical plyometrics	Hops (double-leg jumps) over hurdle. Deep jumps
5. Running strength	5A. Multi-jumps over mid distances	All kinds of bounding from 30 - 100m (see 4A)
	5B. Sprints with resistance	Running on distance 30-100m with specific resistance (see 4B)
	5C. Running drills (skips)	Special running exercise (skip A,B,C) for 30-100m
6. Other means	6A. Isometric strength	Static exercise without movement (isometric squats, isometric strength exercise on the machines, isometric exercise with partner)

For the "Special Endurance" type of hurdler we choose of all runs with maximal (100%) or submaximal 90-95%) intensity; for "Technical" type hurdlers we choose short speed-endurance efforts; for "Rhythm" type hurdlers we prefer less flat endurance (without hurdles) with high intensity as well as running strength.

Strength is a very important part of training for the 400m hurdles. In particular, we must develop special leg strength and additional strength of trunk and upper part of body. In Table 5 we present the basic patterns of strength (or power) training.

We can see that there is a large complex of strength training sessions and a number of strength exercises. These give the coach a chance to create interesting and effective preparation programmes. The means shown comprise static, dynamic, explosive and running strength exercises. If we want to plan the best individual type of strength training for a given individual and situation, we must consider both volume (number of training sessions and number of repetitions) and intensity (loads) of the exercises. In Table 6 we assign strength training means according to the needs of each type of 400m hurdler.

For "Special Endurance" type hurdlers, the most effective strength training is based on running strength exercises (jumps, skips, uphill runs) and basic leg strength exercises with low/medium weight. The appropriate means for a "Technical" type of hurdler are: classic weight lifting, dynamic leg strength and short jumps. For the "Rhythm" type of hurdler, the training programme should emphasise leg strength training on machines and special running exercises (jumps and running drills). Sometimes in long-term periodisation we must take advantage of other exercises, like explosive starts, sprinting with resistance and isometric strength (especially after injuries).

Technical

The real heart of the 400m hurdles coach's job is to choose the appropriate forms of technical (rhythm) training. We can design appropriate activities using the following modification options:

- whole distance of the race,

Table 6: Strength training means appropriate for common groups of 400m hurdlers

Training Means	Type of Hurdler		
	"Special endurance"	"Technical"	"Rhythm"
Basic	• Basic leg strength with barbell (low weights) • Directed leg strength (medium weights) • Multi – jumps (middle distances)	• Basic leg strength with barbell (high weights) • Classic weight lifting • Directed leg strength (high weights) • Special leg strength • Short jumps	• Basic leg strength on machines • Multi jumps (middle distances) • Running drills (middle distances)
Helpful	• Trunk exercises • Explosive strength • Running drills (middle distance)	• Trunk exercise • Explosive starts • Typical plyometrics	• Trunk exercise • Arm exercises on machines • Sprints with resistance
Additional	• Short jumps • Explosive starts	• Sprints with resistance • Isometric strength	• Explosive starts • Leg exercises with partner

- part of the distance,
- type of rhythm (number or strides),
- length of inter-hurdle spacing,
- height of the hurdles,
- times of rest intervals,
- intensity of runs,
- length of the approach,
- length of the finish (40m),
- type of start,
- technical emphasis (trail or lead leg drills).

Table 7: Technical (rhythm) training means for the 400m hurdles

Form of Training	**Type of Rhythm (Technical) Training**	Examples
1. Classic forms of 400m hurdles (runs with maximum and submaximal intensity)		
1.1. Short rhythm (= hurdle acceleration, distance to 150m)		3 x 1H (2 x 3H (crouch start), 1-2-3-2-1H (standing start)
1.2. Medium rhythm (= hurdle speed, distance to 300m)		2 x 4H / 2 x 7H, 5-6-7-8-5H, 1 x (3-10h) / (3-6h) / 1 x 8H 250mH / 300mH / 200mH
1.3. Long rhythm (= hurdle endurance, distance up 300m		2 x 10H (i = 30 min), 9-10-11H, 12H (430m) / 11H (395-m) / 10H (360m)
2. Training forms of 400m hurdle run (runs with high and moderate intensity)		
2A. Rhythm tempo (repetition period)		
2.1. Classic hurdles		5 x 5H, 4-6-8-10-8H, 4 x 6H (5-10 h), 3 x 8H (s = 3)
2. 2. Modified hurdles ("rhythm drills" 1)		- even rhythm 4 x 8H / 8 strides, s = 20m, 6 x 6H / 8-6-4-6-8 strides, s = 20 / 15.50 / 11 8 x 6H (on the curve, 4 stride, s = 10.50m odd rhythm 5 x 6H (11 strides, s = 26.50m, 1L + 4 R), straight + curve, 3L + 2R 6 x 10H (5 strides, s = 13.80m, 4L + 2R)
2B. Rhythm intervals (interval method)		
2.3. Classic interval hurdles		4 x 2 x 5H (i = 2 min) 5 x (1-6h + 7-10h), i = 1 min, a = 35m 4 x 3 x 3H, I = 2 min, a = 45/44/43
2.4. Modified interval hurdles ("rhythm drills 2")		- even rhythm 5 x 4 x 5H (4 strides, s = 10.50m, i = 1/6 min) 4 x (4-5-6-4H) (6 strides, s = 15.20m, i = 1.5/8 min) - odd rhythm 5 x 3 x 5H (7 strides, s = 18-m, i = back trott / 8 min, 3L + 2R) 4 x 2 x 6H (3-5-7-5-3 strides, s = 8.80/13.20/17.00m, i = walk back / 6 min 1L + 3R
2.5. "Turnaround" ("shuttle") runs		5 x 2 x [5H (one side – 6 strides, s = 15m) + 2H (back - 35m)] 5 x 3 x [2H (one side – 7 strides, s = 17.70m) + 1H (back, hurdle in the middle, indoor)] 4 x 2 x [5H (one side - 8 strides, s = 20.20m) + (back, 80m, sprint run)
2.6. "Stress" rhythm		3 x 5H, 100% intensity, a = 45/44.5/44, I = 3/4 min 3H + 6H, 100% intensity, i = 3 min, 8H + 2H (9 - 10h), 100% intensity, a = 45/35m, i = 4 min

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3. Technical form of 400m hurdle rhythm (elementary hurdle drills without specific 400m hurdle rhythm)	
3.1. Walking over hurdle (= special hurdle drills in walk)	10 x 10H walking over hurdles (5LL + 5TL; 4 = 100m, s = 1.5m) 10 x 10H (to 5 in two lines) – walking over hurdles, 5ll (L + R) + 5 rl (L + R)
3.2. Jogging over hurdles (= special hurdle drills in jogging)	4 x 8H (trail leg with jog, three strides, s = 7-m, 2L + 2R) 5 x 6H (lead leg with jog, five strides, s = 11-m, 3L + 2R, on the curve) 6 x 2 x 10H (one side – lead leg, back – trail leg, s = 11.50m, 3L + 3R)
3.3. Sprint (110m H) hurdle rhythm (= typical 110m H training runs)	5 x 6H (L) + 5 x 6H (R) – 3 strides, 100m, s = 8,50m 2 x 110H (L) + 2 x 110H (R) – strides, 91 cm, s = 9.14m 6 x 3H (L) + 2 x 3H (R) - 3 strides, 107cm, s = 9.00m
4. Mixed form of 400m hurdle training	
4.1. Rhythm-tempo training	(1-3h) + 100m flat + (7 – 10h) 200m H + 150m flat + 300m H (1-3h) + 70m flat + (6 – 8h) + 50m flat
4.2. Tempo-rhythm training	200m run + (6 – 10h) 150m run + (4 - 8h) + 50m run 200m + 200m-H + 200m

Abbreviations:
H – hurdle distance or number of hurdles,
h – chosen hurdles,
L – left leg,
R – right leg,
LL – lead leg,
TL – trail leg,
i = time intervals,
s = spacing between hurdles,
l = high of hurdles,
a = approach

In Table 7 we present several types of specific (with hurdles) work. In fact, these are only part of what is possible in this interesting and complicated area, but we can at least start from this basic information.

Characteristic of training for "Special Endurance" type hurdlers are runs connected with flat and hurdles distances ("tempo-rhythm" and ""rhythm-tempo"). Additionally we use intervals and classic hurdle runs in the odd number of strides pattern (take-off on the one leg). Work with the "Technical" type of hurdler also focuses on the same odd number stride rhythm. In this case the running distances are short and medium and intensity is very high. When teaching the above types of hurdlers effective rhythm, we emphasis the best leg. For the third type of hurdler covered here ("Rhythm") the core of technical training consists of all kinds of rhythm runs (classic, modify, interval) in changing stride patterns. The examples are presented in Table 8.

Microcycle Planning

The final stage of creating a periodised training programme for any event is writing the microcycles with detailed exercise information. Here we can give sample programmes specific to the types of 400m hurdlers on which we have been focusing in order to illustrate the principles and provide a draft for coaches to begin their own elaboration.

When we elaborate a 400m hurdles microcycle programme we must take into consideration information about the individual athlete and environmental conditions. The most important individual indicators are:

- Performance level;
- Age (also training age);
- Somatic parameters (especially body height and leg length);
- Level of motor abilities (speed, endurance, strength and flexibility);

Table 8: Technical and rhythm training means appropriate for common groups of 400m hurdlers

Training Means	Type of Hurdler		
	"Special endurance"	"Technical"	"Rhythm"
Basic	• Tempo-rhythm • Rhythm-tempo • Modified interval hurdles (with flat runs or 9-15 strides rhythm) • Jogging over hurdles (long spacing, both legs) • Walking over hurdles	• Short and medium rhythm (only best leg) • Sprint hurdles • (long distance, both L/R legs) • Classic hurdles (odd rhythm) • "Stress" rhythm (5-7 strides rhythm, short distances) • Jogging over hurdles (both legs)	• Medium and long rhythm • Classic hurdles (odd and even pattern) • Modified hurdles (odd and even pattern) • Modified interval hurdles • Classic interval hurdles
Helpful	• Classic hurdles (medium and long distances) • "Turnaround" runs (flat + hurdles) • Medium and long rhythm • Modified hurdles (19-15 strides)	• Rhythm-tempo (short flat distances) • "Turnaround" runs (one straight – one leg) • Classic interval hurdles (odd rhythm) • Modified hurdles (5-7 strides) • Modified interval hurdles (5-9 strides)	• "Stress" training (only hurdles) • Rhythm–tempo • "Turnaround" runs (various kinds of rhythm)
Additional	• "Stress" rhythm • Short rhythm • Sprint hurdle (both legs)	• Long rhythm • Walking and jogging over hurdles (both legs)	• Tempo-rhythm • Short rhythm • Sprint hurdle rhythm • Walking and jogging over hurdles

- Level of hurdle technique (hurdle rhythm, hurdles clearance on both legs, ability to hurdle on the curve);
- Aim of each season (to reach top of the form (World Championships or Olympic Games), to prepare for a prolonged period of the high-quality performances (cycle of "Diamond League") or competitions in indoor season.

Beyond of these we must analyse the following environment conditions:

- Training conditions (tracks, indoor, halls, equipment, climatic (attitude), camps,
- Weather (temperature, wind),
- Medical conditions (nutrition, supplementations).

These groups of training means are a basis for the "puzzle game" of planning: two groups of speed drills, 12 endurance training means, 16 strength groups of exercises and (most important) 14 types of rhythm training form a "pack" of playing-cards for coaches to arrange. Their utility value depends on the knowledge and experience of the coach as well as the level and type of hurdler.

In Tables 9 to 11 we give examples of microcycles and training sessions in the three stages of a one-year preparation.

Table 9: Examples of typical microcycles for common groups of 400m hurdle runners in the "General Preparation Period"

Day	Type of Hurdler		
	"Special endurance"	"Technical"	"Rhythm"
Mon	1. Speed + Basic strength with barbell (light weights)	1. Speed + Basic leg strength with barbell (heavy weights)	1. Speed + basic leg strength on machines
	2. Walking and jogging over hurdles	2. Jogging over hurdles (1 and 3 steps between – both legs)	2. Trunk exercises arm exercises on machines
Tue	Tempo endurance (8 x 600m, i = 6 min, V = 80%)	Sprint hurdles (5-7 steps between, 8-10 x, both legs)	Modified interval hurdles 6 x (100-m run + 3 hurdles + 100m skip B + 2 hurdles)
Wed	1. Directed leg strength + explosive arm strength	1. Classic weight lifting + directed leg strength	1. Tempo endurance: 8 x 500m, i = 6-8 min, V = 80-85%
	2. Multi jumps + extensive intervals	2. Extensive intervals	2. Multi jumps + extensive intervals
Thu	Intensive intervals: 5 x 2 x 300-m, i = 2/8 min, V = 85/90%	Intensive intervals (short distances): 5 x 3 x 120-m, i = 1/8, V = 85/90/95%	"Turnaround" hurdle (1): 5 x 3 x (first side – 5 hurdles, 6 stride second side – 2 hurdles, 10-12 strides).
Fri	running drills trunk exercise: (5 x 2 x (one side flat distance + second side 3-4 hurdles in back side) "Turnaround" hurdle	short speed endurance: 4 x 3 x 5H in 3 stride rhythm, i = back jog + 4 x 3 x 30m high speed (i = 30 s/6 min) Turnaround" hurdle	Interval strength endurance: 6 x 100 skip A + 100 bounding + 100 skip B + 100m run
Sat	Special endurance 2: 4 x 500-m, i – 10 min, V = 90%	Trunk exercise + explosive starts + plyometrics	"Turnaround" hurdle (2): one side – 10 hurdles / 4 stride second side 80m run, i = 6-8 min
Sun	Continuous run: 3 x 15 min	Fartlek: 2 x 20 min with 50-100m build-ups)	Continuous run + Strength endurance (5 x 200m uphill + 5 x 100m bounding uphill)

Table 10: Examples of typical microcycles for common groups of 400m hurdle runners in the "Special Preparation Period"

Day	Type of Hurdler		
	"Special endurance"	"Technical"	"Rhythm"
Mon	Speed + Interval hurdles: 4 x 6H (7 strides) + 4 x 6h (11 strides) back	Speed + Sprint hurdles (e.g. 4 x 8 h, 7 strides, both left (91cm) and right (84cm) leg	Speed + Explosive starts + Extensive intervals (e.g. 5 x 200, i = 1-2 min, V = 40%)
Tue	Intensive intervals (short and middle distances): 5 x (200-m + 150-m), i= 1,5/8 min, V = 90/98%	Directed leg strength + Special leg strength + Extensive intervals	Modified hurdles: (4 x 15 hurdles / 6 strides + 4 x 10 hurdles / 10 stride
Wed	1. Directed leg strength + Trunk exercise + Explosive arm strength	1. Intensive intervals: 3 x (60 + 100 + 150m), i = 1/10, V = 85/90/95%)	1. Running drills + Trunk and arm exercises
	2. Rhythm-tempo: (200-m + VI-XI) + (I-Vh) + 200-m) + (100 + III-VIIIh + 100m)	2. Jogging over hurdles (high hurdles)	2. Walking over hurdles + sprint exercises
Thu	Tempo endurance + Special endurance 1 (3 x 2 x 450-m, i = 8 min, V = 85/95%)	Short and medium rhythm (1-2-3-4-5-6h interhurdle spacing – 50-80cm)	Modified interval hurdles [6 x (6 hurdles 8 strides + 100m + 5 hurdles 7 strides) i = 1/10]
Fri	Running drills + sprint with resistance + short jumps	Technical speed + Classic weight lifting + Short jumps	Technical speed + Sprint with resistance + Extensive intervals
Sat	"Stress" training (3 x 300m, p = 3 min, V = 90/95/98%)	Pure speed endurance + "Stress" rhythm (3 x 150m, i = 12, V = 95% + 2 x 2 x 4h, i = 1/10	Medium and long rhythm (6-8-10-12-6 hurdles)
Sun	Extensive intervals + jogging over hurdles: (5 x II + rI + R + L) – together 20 x 8 hurdles, 5 strides, 11m)	Strength endurance [e.g. 6 x (100 bounding + 100m run (90%) + 100 skip B]	Tempo endurance (600-500-400-300-600m, i = 6, V = 80%)

Table 11: Examples of typical microcycles for common groups of 400m hurdle runners in the "Pre-Competition and Competition Period"

Day	Type of Hurdler		
	"Special endurance"	"Technical"	"Rhythm"
Mon	Speed + endurance 1 + Tempo-rhythm (300m, v = 95% + 3 x 150m + IV-VIIh, i = 10)	Speed + Short speed endurance (4 x 4 x 30m, V = 95/98/95/98%, i = 30 sec/10min	Speed + Short and medium rhythm (3-4-5h)
Tue	Elements of speed + Sprint with resistance + Stretching (static)	Classis hurdles (I-IVH + V-XH + I-VIIIH)	Technical speed + Jogging over hurdles + trunk exercises
Wed	Pure speed endurance (150-200-250-200-150m, i = 8-10, V = 95%)	Directed leg strength + Short jumps + Sprint resistance + technical speed	Rhythm-tempo [2 x (300m-H + 150m), i = 4/15
Thu	Rhythm-tempo [2 x (I-Vh) + 100m + 2 x (III-VIIh) + 50m]	Sprint hurdle 5 x 200m-H (7 strides, 20 hurdles)	Intensive intervals multi jumps (e.g. 3 x 3 x 150m, i = 80/90/95%) and 6 x 100m jumping
Fri	Running drills + Short jumps Extensive intervals + stretching (dynamic)	Hurdle drills + explosive starts (or free day)	Walking over hurdles + Extensive intervals (short distances)
Sat	Competition or test (400m-H, 400m or 8 hurdles or 500m)	Competition or test (400m-H or 11 H run)	Competition or test (400m-H or 300m-H with 15 hurdles, 18.50m)
Sun	Strength + Extensive + Intervals (short distances) (Trunk and arm exercises)	Extensive interval (long distances)	Continuous run + Stretching

Conclusion

The practical study of 400m hurdles training shows that it is necessary to choose various types of training session according to the specific abilities of the individual hurdler. This is more preferable than copying the training of the biggest (sometimes genetic) talents. The possibility of planning individual-specific preparation programmes creates a chance to maximise all the given athlete's capabilities. The presentation here of training principles based on the classification of the main groups of hurdlers is an important step towards understanding the individual (professional) preparation required to do this.

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