

THE A AND Z OF SPRINTING

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The author presents guidelines for a multi-year development plan for sprinters, including a series of model test standards for different developmental stages. The plan is based on information collected on the training processes of leading athletes and sport science literature. The article is a slightly abbreviated and edited translation from Legkaya Atletika, USSR, No. 3, March 1991. Re-printed with permission from Modern Athlete and Coach.

There are certain guidelines that assist the planning of multi-year training processes. Among these guidelines are certain optimal age ranges during which developments take place. Authorities agree on three age ranges in the development of sprint performances on the higher level. The first begins at the age of 19 yrs among the male and at the age of 17 yrs among the female sprinters. The optimal development possibilities occur during 22 and 24 yrs. for men and 20 to 22 yrs. for women, while the highest level results are achieved in the 25 to 26 yrs. age range for male and 23 to 25 yrs. for women. The average age of the 100m finalists at the Moscow Games (1980) was 24.7 yrs. at the Seoul Games (1988) 25.8 yrs.

The same guidelines apply to young athletes. Based on the information collected on the training processes of the world's best sprinters and sport science literature on the subject, it appears advisable to approach the development of young sprinters in five stages as follows:

- The preliminary preparation stage (9 to 10 yrs, I),
- The first specialization stage (12 to 13 yrs, II),
- The deeper specialization stage (boys 14 to 16 yrs, girls 14 to 15 yrs, III),
- The elaboration stage (boys 17 to 20 yrs., girls 16 to 19 yrs., IV),
- The high performance stage (men 21 to 26 yrs., women 19 to 25 yrs., V).

The guidelines for practical work and physical preparations, as well as tests and norms for the different stages are presented in tables 1 and 2. It should be kept in mind that the tables represent only model characteristics for the multi-year training processes.

TESTS	MEN					WOMEN				
	I	II	III	IV	V	I	II	III	IV	V
	9-11	12-13	14-16	17-20	21-26	9-11	12-13	14-15	16-19	20-25
100m	13.5	13.0	11.8	10.5	10.2	15.2	14.5	13.4	11.9	11.2
20m (flying)	2.5	2.4	2.2	1.8	1.7	2.8	2.7	2.5	2.1	2.0
30m (standing)	4.8	4.5	4.3	3.9	3.9	5.1	4.8	4.6	4.2	4.0
60m (crouch)	8.5	8.0	7.7	6.7	6.5	9.3	8.8	8.3	7.5	7.5
150m	20.1	19.4	18.1	15.8	15.0	22.5	21.6	20.4	17.8	17.0
200m	27.4	26.4	24.2	21.4	20.4	31.0	29.7	28.2	26.4	22.9
300m	43.6	43.0	39.8	24.8	33.0	47.9	46.9	45.6	40.8	38.0
St. long jump	2.30	2.40	2.60	2.95	3.10	2.15	2.25	2.40	2.60	2.80
St. triple jump	6.90	7.30	7.60	9.00	9.70	6.05	6.30	6.70	8.00	8.40
10 steps + jump	23.00	23.80	26.00	32.80	35.50	21.60	22.50	23.00	27.00	29.50

TABLE 1: Control tests and norms for 100 and 200m sprinters from 9 to 25 yrs. of age.

TRAINING MEANS	MEN					WOMEN				
	9-11	12-13	14-16	17-20	21-26	9-11	12-13	14-15	16-19	20-25
	Total volume of sprinting (km)	25	31	78	120	125	25	29	69	110
96-100% intensity (km)	8	10	20	40	45	8	9.5	19	37	43
91-95% intensity (km)	7	9	25	35	40	7	8.5	24	32	37
Less than 91% intensity (km)	10	12	28	45	40	10	11	26	41	35
Sprint drills (km)	19	21	35	50	50	19	20	33	45	45
Starts (number)	150	200	500	900	1000	130	190	450	830	920
Jumping exercises (number of takeoffs)	2000	4000	5500	9500	10000	3000	3900	5300	9000	9300
Strength training (tonnes)	50	60	120	250	200	50	58	110	220	180
General exercises (hrs)	300	350	300	200	120	300	350	300	200	120
Competitions (number)	8	15	20	30	35	8	15	20	30	35

TABLE 2: The training loads of the basic parameters during a year's cycle (9 to 25 yrs.)

THE PRELIMINARY PREPARATION STAGE

The preliminary preparation stage takes place during the early school years (9 to 11 yrs.) at the time of an intensive development of the human organism and movement coordination. The running action of the children at this stage is natural and does not differ from the basic technique of highly qualified athletes. It is interesting to note that the highest stride frequencies are observed in the 9 to 12 yrs. age range. At the same time the children have an optimal relationship between the agonist and antagonist muscles of the lower extremities.

The main task of the preliminary preparation phase is the many-sided development of physical capacities, in particular movement speed. The all-round physical development should be well balanced, taking into consideration training means that lead to the improvement of speed and coordination capacities.

The training means vary considerably but the physical loads are restricted. The training volume is at this stage more or less equal for both sexes. Competitions include, besides a few track and field events, all types of games and relays to secure all-round physical development.

THE FIRST SPECIALISATION STAGE

The first specialization stage takes place usually during the first two years at a sport school (12 to 13 yrs.). It is the time of a rapid development of the neuro-muscular system and therefore well suited for an effective improvement of explosive muscular power.

The main tasks at this stage are the development of all-round physical capacities, preparations in a variety of track and field events and a gradual shift towards specialization in sprints. These tasks are based on the understanding that the 12 to 13 yrs. age range is a favorable time for the development of speed and explosive power.

Running speed at this age improves mainly through an increased stride length with a slight reduction of stride frequency. The balance between leg extensors and flexors begins to deteriorate in favor of the extensors. To avoid an asymmetric development and to improve muscular coordination requires to emphasize the strengthening of leg flexors at this stage.

In order to secure many-sided physical development it is necessary for the young athletes to employ a wide variety of physical conditioning exercises and learn the techniques of different track and field events. This is assisted by all types of games, relays and complex jumping and bounding exercises. The general physical preparations take 70 to 80% of the total training time, specific drills and exercises 20 to 30%.

The volume of the training load is gradually increased without forcing the intensity. While the number of competitions also is increased, the competitions serve mainly as additional training sessions. It is interesting to note that the training volume at this stage increases up to 50% (table 2), but the basic sprinting performances improve only by 4 to 6% (table 1). Further, the strength indicators of the various muscle groups improve by 20 to 55%, but the explosive power indicators by only 5 to 7%.

THE DEEPER SPECIALISATION STAGE

The second specialization stage takes place between 14 and 16 yrs. of age at the time when the development of functional capacities has reached a high level. The main tasks at this stage include the further development of many-sided physical performance capabilities and the improvement of the explosive power level.

Running speed at this age continues to improve mainly through an increased stride length, while the balance between the hip and leg extensors and flexors deteriorates further, unless steps are taken to avoid the development of

asymmetry. The improvement of explosive power and absolute strength of the lower extremities must therefore emphasize weaker muscle groups.

A wide range of exercises and drills is essential to avoid the development of the so called "speed barrier". The training volume is increased, while the intensity increases take place mainly in the development of specific capacities for sprinters. The number of competitions also increases, adjusted to individual capacities and technical levels.

Compared with the previous stage, the volume of the training load increases by 100 to 150% (table 2), performances improve by 5 to 9% (table 1), the strength level of the different muscle groups improves by 40 to 80% and explosive power by 20 to 50%. Although all-round physical development makes up to 30 to 40% of the total training volume, there is a trend towards gradual specialization and the employment of more sprint specific work.

THE ELABORATION STAGE

The performance elaboration stage occurs between 17 to 20 yrs. for boys and 16 to 19 yrs. for girls at the time when the functional capacities of the organism are already equal to those of adult athletes. The main task of this stage is to exploit the physical and technical capacities of an athlete and to convert them into high level sprint performances.

The physical performance capacities are at this stage close to the maximal. The asymmetry of the strength level between the hip, leg and ankle extensors and flexors show a better balance, reflected in an increased running speed through an increased stride length, as well as stride frequency. The trend in training processes is towards a narrow specialization that is adjusted to individual demands.

The training volumes and intensities continue to increase and reach levels close to the career maximals. Training loads are adjusted to the means and methods that lead to the planned results in the control tests (see table 1). A large number of specific exercises are employed. These exercises and drills should correspond as closely as possible to the dynamic and kinematic characteristics of the competitive sprinting movements in order to combine the development of physical performance capacities with the improvement of the sprinting technique.

The volume of training loads, in comparison to the deeper specialization stage, is increased by 40 to 110% (table 2). The performances over the basic sprint distances improve by 11 to 13% (table 1), the strength indicators of the different muscle groups by 20 to 80% and the explosive power indicators by 50 to 100%.

THE HIGH PERFORMANCE STAGE

The high performance stage (usually 21 to 26 yrs. for men and 20 to 25 yrs. for women) takes place at the time when the development of the morphological and functional components begins to slow down. While this is the most active stage in the career of the sprinter, it also is a stage where performances can stagnate and the rate of improvement is temporarily interrupted.

The main task of this stage is to reach the high performance level and to maintain it as long as possible. The problems of asymmetry in the lower extremities are now further reduced, reaching an optimal level that corresponds closely to those of 9 to 11 year olds. Consequently most improvements take place through a higher stride frequency.

Compared to the previous stage, there are no significant increases in the training volume but the intensity reaches its maximum. This is achieved by further increases of specific exercises and drills and a reduction of low intensity general exercises. Particular emphasis is now placed on the preparation for competitions, including psychological and tactical preparations and a complex control over the training procedures.

The training volume of the high performance stage increases by only 4 to 12%, while the volume of the general physical preparation activities decreases slightly (table 2). The performances over basic sprint distances improve by 3 to 7% (table 1), strength indicators of the different muscle groups by 6 to 11%, the explosive power indicators by 30 to 40%.