ABOUT THE CONSTRUCTION OF TRAINING

By L.P. Matveyev

This article on the theory of training presents the views of the well-known Moscow Central Sports Institute Scientist, L.P. Matveyev, on the contemporary concepts of an efficient construction of training programs, an optimal combination of general and specific training and the problems involved in the distribution of training loads. The text is based on translated extracts from the author's lengthy article in Teoriya I Praktika Fizichesckoi Kultury, No. 12, December 1991. Re-printed with permission from Modern Athlete and Coach.

In order to solve the problems involved in the planning of training it is necessary to define what is meant under the concept of "the construction of training". It is a term that has established itself firmly in the theory and practice of sport but is unfortunately often misunderstood or wrongly interpreted.

The construction of training begins with a mental planning, prognosis and programming of training that precedes its practical application. A rational construction is also expected to make use of a cyclic control of training that is based on the work actually performed and the parameters of the training results. At the same time it is important not to overlook the two main aspects in the construction of training — the mental planning and the practical application. Deviations in the practical application are unavoidable even in the best plans. This makes the control measures important in order to make the necessary adjustments.

An evaluation of the contemporary concept of the construction of training indicates that, due to the efforts of numerous sport scientists, we have after a long development period succeeded in the establishment of the basic principles. On the other hand, there have been over the last few years attempts made to exit from the framework of these principles. While this is a normal phenomenon, care should be exercised in accepting the attempts to place the theory of training solely on the newly found principles (biology, cybernetics).

The coach and the athlete can accept in their construction of training only the most important scientific and practically proven principles that conform to and reflect the basic objective laws of the training structure. Principles that are applicable only to specific functional systems or biomechanical and bioenergetical "own" laws, as important as they are in their own domain, cannot pretend to qualify for the total specific training principles.

Of course, the contemporary theory of training does by no means pretend to have all the answers, although it can be said that it has in its present format succeeded in solving the major problems in a rational construction of training to reach high level performances, It has established certain correlations and tendencies in the training processes, such as:

- The many-sided preparation of athletes in combining different aspects of general and specific preparations with each other, based on the dynamics of training processes and their stages, phases and periods

- A succession of training processes that are adjusted according to regular training effects to create an accumulation of the effects in different stages over several years.

- The employment of training and developmental loads that correspond to the adaptation stages and help to regulate their dynamics (reflected in a wave-like and cyclic formation).

- The cyclic formation of training processes divided into micro-, meso-, and macrocycles in which the dynamics of the large cycles corresponds to the principles of form development (optimal readiness for high performances in a given macrocycle).

It is regretful that the majority of publications over the last few decades have contained very little information on the general principles of the construction of training. Nevertheless, some sports (track and field, weightlifting, swimming etc) have made progress and have produced factual information on the subject. The following text looks at some of the problems that have emerged from the vital concepts of the construction of training procedures.

GENERAL AND SPECIFIC PREPARATION

Finding an optimal combination for general and specific preparations has been a problem subject that has lately again attracted interest among sports scientists and coaches. Because of its complications it appears necessary to look first at some of the concepts used in the theory of training in order to avoid wrong interpretations:

- The terms “general” and “specific” refer above all to the fact that an efficient preparation of an athlete is not unilateral but a complex many-sided process. It is made up from a positive combination of the sport specific factors (“specific” preparation), as well as indirect factors that help to promote the progress (“general” preparation).

- The content of the general preparation is not determined by the specificity of the chosen event, but rather by the need of specialization.

- The relationship between general and specific preparations changes according to the athlete’s training level, individual characteristics, specificity of the specialization, training periods and several other minor factors. There are no set norms for the distribution of general and specific preparations in the contemporary theory of training. Large variations, based on the above mentioned factors, are common.

Today’s empirical and scientific knowledge allows us to understand the mechanism of the mutual effects of the general and specific preparations. To this belongs the data available on the “transfer” of several movement skills, that reflect the development of

individual physical capacities (strength, speed, endurance), which are acquired as a result from non-specific adaptations. All this indicates that the road to the top is not a narrow specific path but should be tied to general preparation measures that allow full exploitation of the athlete's potential capacities.

An optimal relationship between general and specific preparations depends largely on their mutual influences on the training effect that can be positive or negative. The last appears to occur mainly when non-adequate general preparation exercises are applied in exceptionally large training loads. The limits of the allowable variations in the different training stages require careful study and observation to find a logical system for the application of general and specific exercises. This system divided the exercises into three groups according to their influence on specialization as follows:

1. Exercises that correspond as precisely as possible to the competition exercise.

2. Exercises that are in their character close to the format and contents of the first group.

3. Exercises that differ essentially from the first group.

It is obvious that the first two groups belong to the specific and the third group to the general category. However, a closer analysis and comparison of the exercises reveals that several can't be strictly classified under the general or specific training means. This is explained in table 1.

EXERCISE GROUPS	PREDOMINANTLY SIMILAR (+) OR DIFFERENT (-)	
	FORMAT OF MOVEMENT ACTIVITY	CHARACTER OF MOVEMENT QUALITY
I	+	+
IIa	-	-
IIb	-	+
IIII	-	-

TABLE 1: Grouping of the training exercises according to their similarity or difference to the competition exercise.

As can be seen, the exercise groups can be similar to the competition exercise according to one symptom and different according to another symptom (groups IIa and IIb). For example, the so called imitation exercises, that are widely used in technique development, can be similar to the competition exercise as far as the movement activity is concerned, but differ completely in the quality of the performance intensity. In contrast, many cyclic exercises are different in their movement format (running, swimming), but similar to the competition exercise as far as the endurance quality is concerned. It appears that these exercises, combining general and specific symptoms, can be classified as a mixed group, leaving group I as the only specific exercise group.

Only an escape from the stereotype of the established competition exercise guarantees an improved performance. It allows exploitation of the different parameters of the general and specific exercises together with the planned model of the new competition

exercises. This, and not the repetition of the established competition exercise, is responsible for progressive performance improvements.

THE DYNAMICS OF TRAINING LOADS

The contemporary theory of training has no adequate means to evaluate different load parameters in training. How, for example, can we coordinate running loads with the acyclic weight training loads in order to find a common integral load indicator? There is no satisfactory answer to this question.

Another debatable question involves the order in which general and specific exercises are performed in training. Should they be employed successively or in the parallel? Some blame the contemporary theory of training for overlooking the in-parallel use of different exercises, while others are convinced about the need to use exercises in a certain succession. What is the truth? It appears that both sides have failed to pay attention to the temporal facts of the training processes.

An acceptable combination of training organization should provide within its macrocycles for combined successive loads that are adjusted in stages according to how the development of form is proceeding. It has to correspond to the need to establish form, to stabilize it, and to improve it further to be ready for the planned performance in each of the large training cycles. This becomes clearer through the understanding of the dynamics of the exercises used in a large training cycle of which a typical version is shown in Fig. 1.

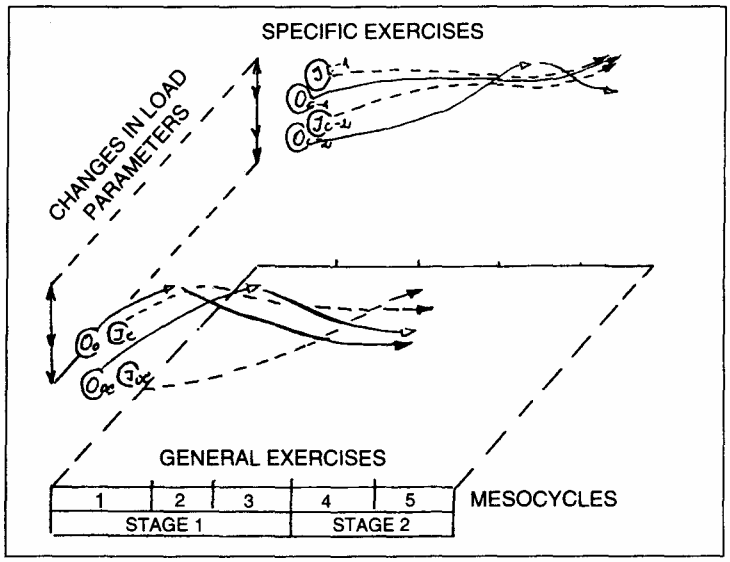

FIG. 1. Tendencies in the load dynamics of the different exercise groups during the macrocycle in the preparation period. ø = load volume; J = load intensity; Oc-1 and Jc-1 = close to competition exercises; Oc-2 and Jc-2 = other specific exercises; Ooc and Joc = combined general and specific exercises; Oo and Jo = general preparation exercises.

As can be seen the graphs represent the dynamics of the load volumes and intensities in the described four exercise groups employed during the whole preparation period.

Unlike what was practiced in the past, the system also includes exercises that resemble closely the demands of the forthcoming competitions. However, the use of these exercises is limited, in particular during the first preparation phase where the prerequisites for a new performance level are developed. Of course, the use of these exercises is adjusted and adapted to individual needs.

Constantly increased training loads in today's high performance sport require a well designed and rational planning to balance the increased loads with the realization of the adaptation principles. The last assumes that the total load is adjusted to the adaptation principles in which the load is essentially increased at the time when the initial adaptation changes to the "durable" adaptation.

This, in turn, means that the load dynamics in a large training cycle takes a wave-like format (see Fig. 2).

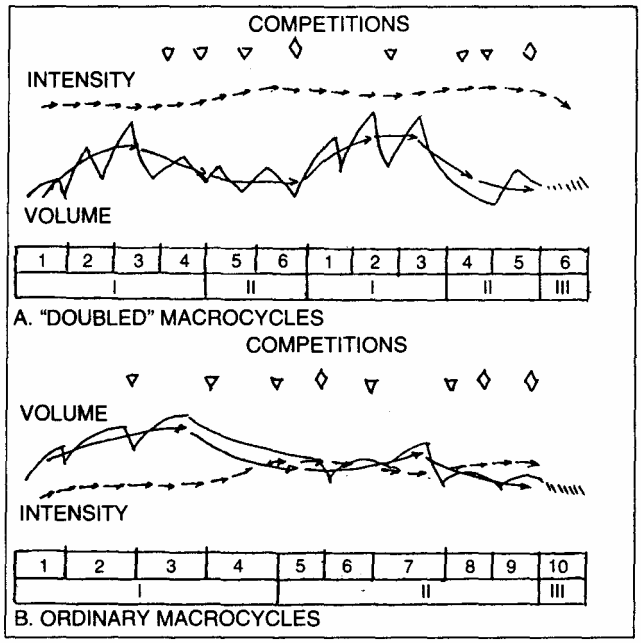

FIG. 2. Typical variations in the dynamics of training loads in a macrocycle. Variation A – typical for speed strength events; B – typical for endurance events. Short arrows = intensity; long = microcycle loads; unbroken line = mesocycle loads.

It can't be denied that the load dynamics have a wave-like format, although some authors claim it to be different in cyclic events where the summary indicators of physical work are supposed to be stable. Admittedly, some parameters, such as the total training time, remain relatively stable, but this does not mean that the same is applicable to the parameters of single exercises. After all, an athlete can only expect to repeat the already achieved performances when the major parameters remain unchanged.

Another factor to be taken into consideration is the event specific wave-like dynamics of the training loads. For example, the wavy pattern in the graph of the basic specialized loads in the speed-strength events (Fig. 2, A) are far more prominent than in the endurance events. The waves of the basic loads in aerobic and mixed aerobic-

anaerobic work are flatter because of the relatively restricted power output of these basic exercises.

Under certain circumstances, dependent on the duration of the training cycle, the load dynamics can take a non-wavy format. A graduated step by step, or some other format, can therefore be justified in the framework of small and medium length training cycles. This indicates that it is necessary to widen the factual analysis in order to find the most appropriate variations for the application of training loads.