IAAF @-*Letter*

for CECS Level II Coaches

December 2005 No. 3

SPECIFIC THEME: Periodized training for jumpers

GENERAL THEME: A critical view of the classical periodization concept

Specific Theme

PERIODIZED TRAINING FOR JUMPERS

1 Introduction

According to Boosey (1980, pp. 47-48), the components of jumping training and performance are as follows:

- **Endurance:** Fartlek and cross country.
- **Speed:** Intervals, starts, and specific runs to the take-off board or vault box.
- **Strength/power:** Strength training.
- **Bounding:** Multiple bounds, hopping, jumps decathlon.
- **Technique:** From major to minor skill changes.

Fig. 1 shows Boosey's periodization schedule of the changing emphases of each of the components.

As the athlete becomes more experienced and skilled over a period of years, the proportion of training will gradually shift from more general to more specific conditioning.

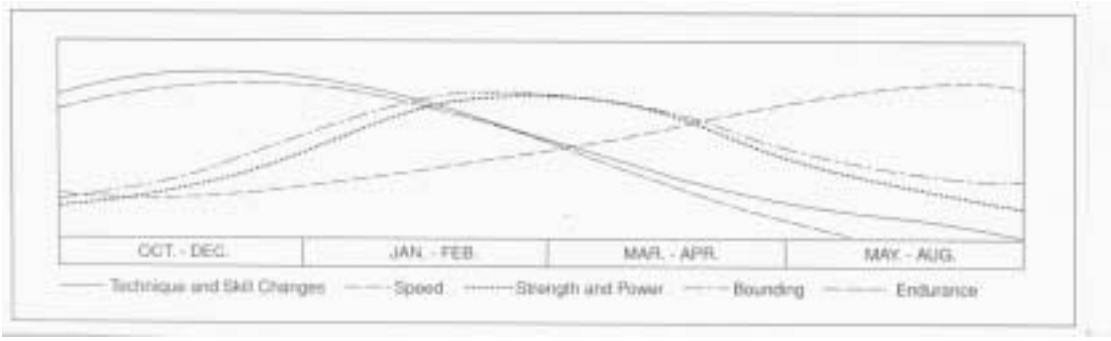

Fig. 1: Emphases of jump training (based on Boosey, 1980, p. 48)

Jumping performances depend largely on the power level of an athlete. However, the strength/power program must follow a correct approach if it is to be effective. Simply increasing the volume or load will not necessarily result in improved performances.

The most effective program uses a varying pattern of loads, intensity, and recovery, resulting in a wavy but unbroken pattern of improvement in movement speed and explosive power. The training program should not interfere with technique development. The pattern of strength and technique training should also change across the macrocycle in a wave-like pattern (see *Fig. 2*).

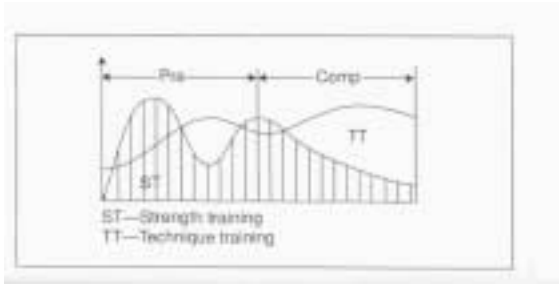

Fig. 2: Yearly strength and technique cycle (Freeman, 2001, p. 121)

2 Periodized training for the high jump

A double-periodized year for high jumping, with an indoor and an outdoor macrocycle, is perhaps the most common training year for high jumpers (see *Fig. 3*).

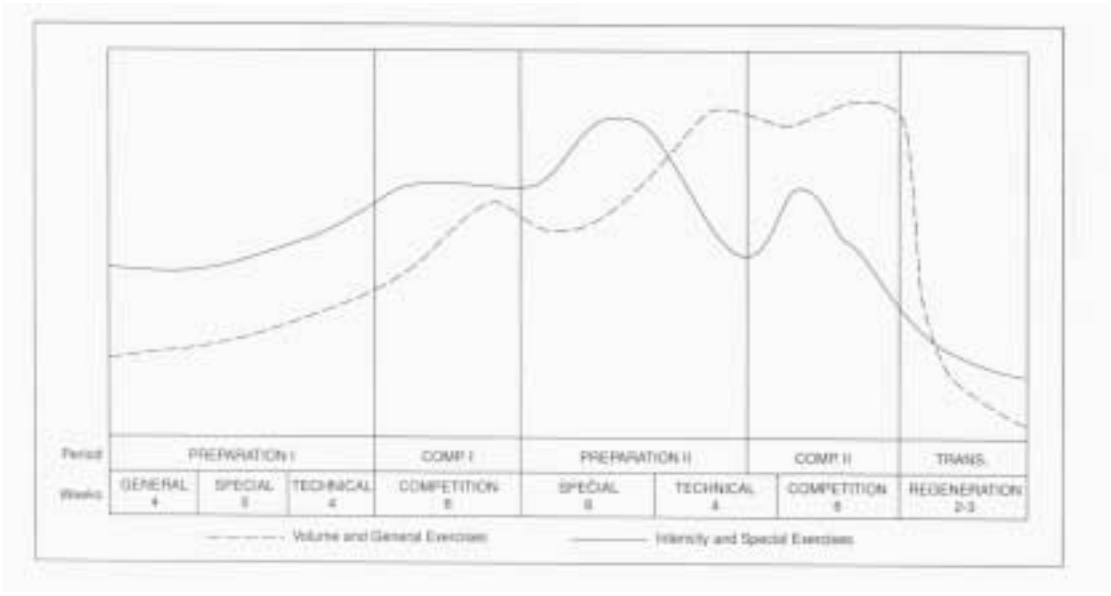

Fig. 3: Double-periodized year for high jumping (Freeman, 2001, p. 121)

Myers (1988, p. 48) suggests six phases to the training year:

- **Phase 1:** General conditioning (June/July through November).
- **Phase 2:** Specific conditioning (pre-competition I – December through January).
- **Phase 3:** Competition I (February through March).
- **Phase 4:** Specific conditioning (pre-competition II – April).
- **Phase 5:** Competition II (May through last major meet).
- **Phase 6:** Active rest (transition/regeneration).

Myers stresses that during heavy load cycles (such as during the general and specific training phases) athletes will break down if all areas of their training have high loads. He recommends alternating the peaks among the strength training, plyometrics and running (see *Fig. 4*).

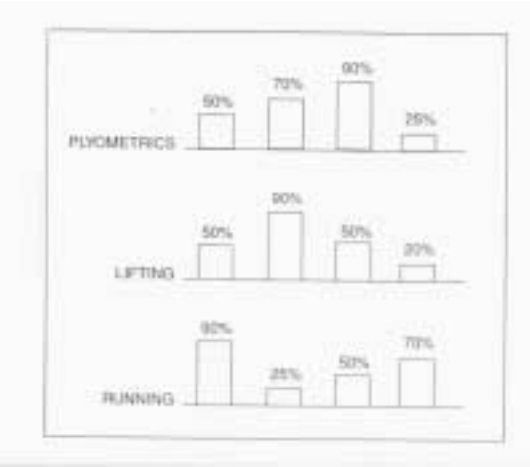

Fig. 4: Four-week mesocycle of plyometrics, lifting and running, showing microcycle loads per week (Myers, 1988, p. 47)

The microcycle (week) should also show the wave-pattern of variable loading (see *Fig. 5*).

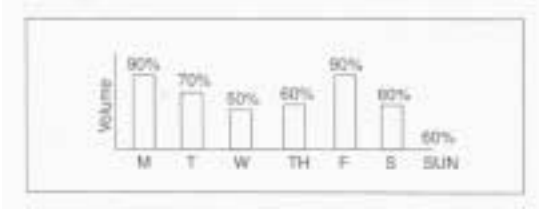

Fig. 5: Load in the high jump microcycle (Myers, 1988, p. 49)

The training year suggested by Humphrey and Nordquist (2000, pp. 191-193) can be divided into one or two peaks, depending on the training age and goals of the athlete. Each part of a training season can be divided into the general categories of preseason, early season, competitive season, and a peak:

- **Pre-season:**

  For an athlete training year round, training during the fall pre-season keys on conditioning and getting into shape. Overall, one wants more volume and lower intensity in this phase. The motto for this phase might be 'training to train.' A five-day training week could be divided into 2-3 days of conditioning runs of 2-3 miles, or longer intervals of 500-700m on grass; two days of shorter intervals of 150-300m, preferably on grass/soft surfaces; and 2-3 days of strength training. This phase would last 6-8 weeks for a year-round training plan, but only 4-5 weeks for a high-school athlete.

- **Early season:**

  As the athlete enters the early season, two days of event-specific

work should be added. Weight training is still keyed toward building strength. A philosophy during this phase would be of 'training to compete.' The intensity increases while the volume is lowered. This period also will last 4-6 weks for a year-round program and 3-4 weeks for the high school season. Since more technique work is added, this is a difficult training time and athletes will be tired.

- **Competitive season:**

  During the competitive season, athletes should do two days of event-specific work, including approach and event drills; 2-3 days of weight with more power work; 1-2 days of plyometrics; 2-3 days of speed work; and one conditioning day of 200-300m runs. This period should last 4-6 weeks in a year-round program and 3-4 weeks in a high school season.

- **Peaking phase:**

  As the athlete prepares for the year's major competition, the volume of work lessens as the intensity stays high. Workouts should be adjusted to one conditioning day of 150-200m repeats, 2-3 days of speed work, 1-2 days of weights/power, and 1-2 days of event-specific work. This is the shortest phase of the season, when the athlete is ready to perform at his or her best. For a year-round program, peaking should cover three weeks; in a high school plan, it would last two weeks.

  When an athlete has a double-peak plan, a return to a brief conditioning phase is needed after the first peak. The human body can hold a high level of training for only a short period before it needs to be recharged for the next level of training.

  During the competitive season, athletes should do two days of event-specific work, including approach and event drills; 2-3 days of weight with more power work; 1-2 days of plyometrics; 2-3 days of speed work; and one conditioning day of 200-300m runs. This period should last 4-6 weeks in a year-round program and 3-4 weeks in a high school season.

For young male high jumpers, the rapid growth of muscular strength between ages 17 and 19 can hamper proper technique development if conditioning work does not continue along with the technical training. The ages of 19-23 are the 'high performance development phase' for potential elite jumpers, so jumpers should focus on the improvement of technique and specific fitness components, while gaining competitive experience at a high level.

The fastest development occurs between ages 14 and 15 and between ages 17 and 19, with the 'real potential talent' reaching 2.15-2.23m during the latter period of improvement. However, athletes should not use maximal loads in resistance exercises before ages 18-19, as a growing athlete is more vulnerable to stress injuries (Freeman, 2001, p. 123).

3 Periodized training for the long jump

On the basis of a four-phase training year, training for the long jump could be organized as follows:

- **Phase 1: Increase of strength and spring**

  30 % Technique (learning drills with 5- to 7-step approach)

  20 % Power training, isometrics, or circuit training

  20 % Sprints and hurdles (10-12 x 30-90m or 3 hurdles)

  20 % Conditioning in gym (strengthening exercises, stretching, etc.)

  10 % General conditioning (overall training, jumps, hills, etc.)

- **Phase 2: Perfection of technique**

  20 % Varied jumps and agility exercises

  20 % Technique (10-12 jumps with full run)

  20 % Sprints and hurdles (6-8 x 60-120m or 5 hurdles, straight and turn)

  20 % Gymnasium (power/ strengthening exercises, 90 min)

  20 % Technique (10-20 jumps with short run, correcting faults)

- **Phases 3-4: Accumulation of neuromuscular potential**

  40 % Technique (10-12 jumps perfecting and synchronizing approach & jump)

  30 % Sprint starts (10-15 times, on straight and turn)

  20 % Agility (stretching and relaxation) and low hurdles (no strain)

  10 % Different jumps (varied, intensive, long recoveries)

  Also: Competition (one time per week, sometimes rest or other event)

The main training contents in long jump phases 1-2 are the following:

1. Development of power and specific strength (explosive);
2. Development of speed up to 85-90% of potential;
3. Development of explosiveness;
4. Development of long-jump technique;
5. Development of general endurance – aerobic power;
6. General and athletic fitness;
7. Development of specific endurance – anaerobic power.

A **typical weekly cycle** in phases 1-2 could be as follows:

Monday: Strength + special endurance

Tuesday: Jumping drills

Wednesday: Speed + games

Thursday: Strength + long running

Friday: Jumping drills + special endurance

Saturday: Speed + general physical conditioning

Sunday: Games

The main training contents in long jump phases 3-4 are the following:

1. Development of power and specific strength (explosive);
2. Development of speed up to 90-95% of potential;
3. Development of explosiveness;
4. Improvement of long-jump technique;
5. Maintenance of general endurance and fitness;
6. Maintenance of specific endurance.

A **typical weekly cycle** in phases 3-4 could be as follows:

Monday: Strength + special endurance

Tuesday: General physical conditioning + jumps

Wednesday: Speed

Thursday: Strength

Friday: Warmup + jumps

Saturday: Competition

Sunday: Rest

Locatelli (1993, pp. 93-94) describes six phases of speed training for the improvement of Italian long jumpers:

- **Aerobic endurance:** Circuit training, cross country, and interval training (6 weeks, Oct.-Nov.).
- **Anaerobic-alactic capacity:** Repetition runs of 60-80m at 90-93% maximum (6 weeks, Nov.-mid-Dec.).
- **Anaerobic-alactic speed strength:** Repetitions or series sprints of 30-80m at 90-97% (4 weeks, Jan.).
- **Anaerobic-lactic capacity:** Speed-endurance-oriented repetitions of 100-300m at 80-90% (6 weeks, April-May).
- **Anaerobic-lactic speed strength**.
- **Maximal speed:** Flying sprints, harness runs, approach and take-off exercises (4 weeks, July).

4 Periodized training for the triple jump

Fig. 6 gives a classic view of periodized training in the triple jump.

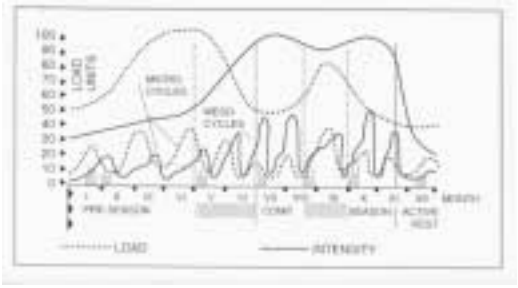

Fig. 6: Periods of the triple jump year (Freeman, 2001, p. 125)

The basic structure is a classic Matveyevan repetitive pattern of microcycles forming mesocycles forming macrocycles. The example shown is a double-periodized year, allowing a short indoor season and a long outdoor season.

In a four-phase training year, training for the triple jump could be organized as follows:

- **Phase 1: Increase of strength and spring**

  30 % Technique (5-7 repetitions of learning drills)

  20 % Power training, isometrics, or circuit training

20 % Sprints and hurdles (10-12 x 30-90m or 3 hurdles)

20 % Conditioning in the gym (strengthening exercises, mobility, etc.)

10 % General conditioning (overall training, jumps, hills, etc.)

- **Phase 2: Perfection of technique**

  20 % Technique (10-15 jumps with short approach)

  20 % Sprints and hurdles (8-10 x 60-120m on turn or 5 hurdles on straight)

  20 % Gymnasium (power exercises)

  20 % Technique (8-10 jumps with full approach, no strain)

  20 % Varied jumps)

- **Phases 3-4: Accumulation of neuromuscular potential**

  40 % Technique (8-10 jumps perfecting technique and rhythm)

  30 % Sprint starts (10-15 times, on straight and turn)

  20 % Agility (stretching and relaxation) and low hurdles (no strain)

  10 % Different jumps (varied, intensive, long recoveries)

  Also: Competition (one time per week, sometimes rest or other event)

5 Periodized training for the pole vault

In a four-phase training year, training for the pole vault could be organized as follows:

- **Phase 1: Increase of strength and spring**

  30 % Technique (learning drills)

  20 % Power training, isometrics, or circuit training

  20 % Sprints and hurdles (10-12 x 30-60m or 3 hurdles)

  20 % Conditioning in the gym (specific exercises, trampoline, etc.)

  10 % General conditioning (overall training, jumps, hills, etc.)

- **Phase 2: Perfection of technique**

  20 % Varied jumps and agility exercises

  20 % Technique (10-15 jumps with full run, increasing heights)

  20% Technique (15-20 jumps with short run, medium heights, correction of faults)

  20 % Gymnasium (power/ strengthening exercises, 90 min)

  20 % Speed work (10-12 x 60-80m carrying pole)

- **Phases 3-4: Accumulation of neuromuscular potential**

  40 % Technique (perfecting basic technique)

  30 % Sprint starts (10-15 times)

  20 % Agility (stretching and relaxation) and low hurdles (no strain)

10 % Varied jumps and gymnastic ability

Also: Competition (one time per week, sometimes rest or other activity)

A double-periodized training year for the pole vault could include the following tasks:

Preparation I (2 months): 1. Development of general conditioning, 2. development of specific conditioning, 3. development of technique.

Preparation II (1 month): 1. Development of specific conditioning, 2. development of technique.

Competition I (6 weeks): 1. Development and stabilization of technique.

Preparation I (4 weeks): 1. Development of specific conditioning, 2. development of general conditioning.

Preparation II (4 weeks): 1. Development and stabilization of technique, 2. reaching of competitive form.

Competition II (5 months): Training must be planned to meet individual needs.

Transition (4 weeks): 1. Reduction of training volume, 2. enjoyable active rest.

The preparation phase in the vault (until the first meet) should last at least three months, including a least 120 training sessions, over 200 vaults on a softer pole from short approaches and over 100 full approach vaults with the regular pole. The length of a successful competitive season depends largely on the length of the preparation phase and the volume of work that is included. During the specific preparation phase, the specific conditioning rises to 60-70% of the total training load.

The training load during competition should be controlled carefully, allowing adequate recovery for good performances. The training volume should drop by about 20-25% per week at this time. However, the training load should not be dropped dramatically, as form may disappear after the next meet is over. A phase of 6-8 weeks is used to prepare for a major meet, with the training volume at about 90% of maximum for the first one or two weeks. The emphasis is on quality vaulting, with good rests between vaulting sessions (two days of rest after a session of 15 quality vaults, or three days of rest after a session of 25 quality vaults).

Annual Training Plan for Age 16-17 Pole Vaulters		
(Freeman, 2001, p. 127)		
Tasks:	Development of speed	
	Development of strength	
	Development of technique	
Training:	Total training sessions:	250-260
	Vaults with 20m runs:	650-700
	Vaults with longer runs:	380-400
	Transfers, run to hang:	650-700
	Specific drills on pole:	700-750
	Sprints (20-60m):	22-23 km
	Sprints (70-100m):	55-60 km
	Sprints (over 100m):	55-60 km
	Gymnastics and tumbling:	135-140 hours
	Weight training:	80-85 tons
Competitions:	Pole vault meets:	13-14
	Meets in other events:	8-10
Tests:	20m from flying start:	2.0-2.1 sec
	40m from standing start:	4.8-4.9 sec
	20m flying (with pole):	2.2-2.3 sec
	60m from crouch start:	7.1-7.2 sec
	Standing triple jump:	28’11”- 29’3”
	Parallel bars uprise:	30 reps in 1:45.0
	Press behind neck:	40-45% of body weight
Performances:	100m:	11.2-11.4 sec
	Long jump:	20’8”-21’4”
	High jump:	5’9”-5’11”
	Pole vault:	16’1”-16’9”
	Grip height on pole:	14’9”-15’1”

Annual Training Plan for Age 18-19 Pole Vaulters		
	(Freeman, 2001, p. 127)	
Tasks:	Development of power and strength	
	Development of speed	
	Development of technique	
Training:	Total training sessions:	270-280
	Vaults with 20m runs:	600-650
	Vaults with longer runs:	500-550
	Transfers, run to hang:	750-800
	Specific drills on pole:	600-650
	Sprints (20-60m):	23-24 km
	Sprints (70-100m):	60-65 km
	Sprints (over 100m):	60-65 km
	Gymnastics and tumbling:	130-135 hours
	Weight training:	100-110 tons
Competitions:	Pole vault meets:	18-20
	Meets in other events:	4-6
Tests:	20m from flying start:	1.9-2.0 sec
	40m from standing start:	4.7-4.8 sec
	40m from stand (pole):	5.0-5.1 sec
	80m from crouch start:	9.0-9.1 sec
	5 hops on takeoff leg:	62’4”- 65’0”
	(6-stride approach)	
	Parallel bars uprise:	30 reps in 1:30.0
	Upstart on rings	
	Press behind neck:	50-55% of body weight
Performances:	100m:	11.0-11.1 sec
	Long jump:	22’4”-22’8”
	High jump:	6’1”-6’3”
	Pole vault:	17’1”-17’5”
	Grip height on pole:	15’3”-15’7”

Annual Training Plan for Age 20-23 Pole Vaulters (Freeman, 2001, p. 128)		
Tasks:	Development of power and strength	
	Development of speed	
	Development of technique	
Training:	Total training sessions:	310-320
	Vaults with 20m runs:	500-550
	Vaults with longer runs:	650-700
	Transfers, run to hang:	650-700
	Specific drills on pole:	750-800
	Sprints (20-60m):	20-21 km
	Sprints (70-100m):	55-60 km
	Sprints (over 100m):	50-55 km
	Gymnastics and tumbling:	100-110 hours
	Weight training:	50-100 tons
Competitions:	Pole vault meets:	25-30
	Meets in other events:	2-3
Tests:	20m from flying start:	1.85-1.9 sec
	40m from standing start:	4.6-4.7 sec
	40m from stand (pole):	4.9-4.95 sec
	80m from crouch start:	8.8-8.9 sec
	5 hops on takeoff leg:	65’7”- 68’11”
	(6-stride approach)	
	Gymnastic tests	
	Press behind neck:	55-60% of body weight
Performances:	100m:	10.8-10.9 sec
	Long jump:	23’0”-23’8”
	High jump:	6’5”-6’7”
	Pole vault:	17’8”-18’1”
	Grip height on pole:	15’7”-15’9”

General Theme

A CRITICAL VIEW OF THE CLASSICAL PERIODIZATION CONCEPT

1 Introduction

The methodical principles of contemporary training systems are largely based on the work of Russian coaches of the early 1950s, when the former Soviet Union prepared for its first participation in the Olympic Games in Helsinki in 1952. The preparation was based on the information collected by L. P. Maveyev at the Moscow Institute of Physical Culture. This information was published as a theoretical concept known as “periodization” in 1965. Matveyev’s concept attracted attention outside the Soviet Union because training theories had at this point not yet involved scientists, and the success of Soviet coaches and athletes on the world stage were exceptional (Verhoshansky, 2002, p. 43).

2 The conflict between the classical periodization concept and the requirements of modern high-performance sport

Many specialists even today use Matveyev’s concept in progressive presentations of the organization of training. However, according to Verhoshansky (2002, p. 43), the majority have found in practice that the theory of periodization does not present a model training system for elite athletes within the demands of modern competition calendars and other international development tendencies.

A formal, mechanical division of a training year into periods and mesocycles does no longer seem practical. Further, it has turned out that the principles of periodization are not really reliable because they are based on relatively thin research and on experiences assembled in the early days of the Soviet training system in the 1950s.

Also, Verhoshansky (2002, p. 43) continues, the methodical recommendations of periodization theory are not sufficiently concrete and fail to meet the demands of contemporary high-performance sports. This applies in particular to endurance sports and speed events in athletics. Periodization also fails to provide acceptable methodical recommendations for the improvement of specific conditioning and final competition preparation.

Particularly endurance sports experts are most critical about Matveyev’s periodization theory, because a very dynamic organization of training loads has been gradually eliminated in these sports. Coaches still following the outdated elements of periodization find it extremely difficult to keep their athetes in top form throughout the competitive season.

Especially the success of African athletes can be explained at least to some extent because they have rejected the theory of periodization in the planning of training.

Horwill (1992) claims that the theory of periodization is unsuitable for modern running training and that the original plan was mainly conceived for field-event athletes (p. 13). He also states that neither the former

Soviet union nor the West European (male) runners have broken world records in middle distance running or won Olympic gold medals over the last 30 years. At the same time, British athletes, who have not followed the Russian concept of periodization, have achieved such performances. Nevertheless, British athletes began to follow Matveyev's theory since the 1980s and their performances have since shown a backward trend (Horwill, 1992, p. 13).

Peter Tschiene of Germany, in an analysis of several training concepts (1985), comes to the conclusion that Matveyev's periodization theory has remained unchanged since its publication in 1965, although enormous changes have meanwhile taken place in sport. Tschiene (1990, 1991) recommends that the periodization theory of a yearly training cycle must be reformed and changed to a modern concept based on substantial principles that take into condsideration the role of competition and individualization.

In an article by Bellotti et al. (1978), particular attention was drawn to the lack of reliability and effectiveness of Matveyev's theory in the training of, among others, runners. The authors stressed that Matveyev's findings dated back to the time between 1950 and 1960. Obviously training methods have enormously changed since then, reflected in numerous new records. Several new dominating training concepts, based on sports-science studies have emerged and modified old approaches to high-performance training.

Verhoshansky points out that the rejection of the periodization concept was even more categorical in Russia, where the former Vice President of the State Committee of Sport, Kolessov, declared that participants in high-performance sports "should not continue to follow the outdated system of Prof. Matveyev" (Verhoshansky, 2002, p. 44).

3 Verhoshansky's criticism of Matveyev's periodization concept

Verhoshansky (2002, pp. 44-47), expresses his criticism of Matveyev's periodization concept under seven headlines.

3.1 Disregardment of new biological understandings

Matveyev maintains that the biological laws do not determine the macrostructure of training and the development of form is rather guided by other laws. He overlooks the process of performance development from the position of adaptation and refuses to acknowledge the priority of 'biological components' in the theory of training.

Matveyev agrees in reference to the theory of adaptation that "adaptive processes play a certain role in the reconstruction of the organism through sporting activities" (Matveyev, 1991, as quoted by Verhoshansky, 2002, p. 44), but claims that adaptation is only one aspect in the improvement of performance: "The priority in the interpretation of the processes involved in the perfection of sporting performances and related

phenomena should not be regarded as the theory of adaptation but the theory of development" (Matveyev, 1991, as quoted by Verhoshansky, 2002, p. 45). Verhoshansky (2002, p. 45) holds that "this picture shows a lack of scientific seriousness and the impossibility of developing periodization further on scientific principles."

3.2 Missing 'legalities' in training concepts

Matveyev claims that periodization principles "express the biological 'legalities' of adaptation in training" (Matveyev & Meerson, 1984, as quoted by Verhoshansky, 2002, p. 44). According to Verhoshansky, this was a strange declaration "because it is known that training processes are based on subjective concepts of their contents, structure and temporal sequence. There are no 'legalities.' At best we can only talk about methodical rules in training, which are formulated according to empirical data" (2002, p. 45).

The logically speculative presentation of training and competition without objective evaluation led the concept of periodization to an "unseparable correlation between the general and specific preparation of an athlete" (Matveyev, 1991, as quoted by Verhoshansky, 2002, p. 45). To this were added other similar 'legalities,' such as the 'cyclic character of training, a wave-like formation of training,' etc. At this time, however, it was already known that progress in international high-performance sport was tied to more far-reaching and complex factors than periodization theory allowed (Verhoshansky, 2002, p. 45).

The confusion of 'legalities' also was responsible for producing confusing 'principles.' An analysis of 17 textbooks conducted by the Institute of Physical Culture in the former Soviet Union showed that the authors failed in most cases to see differences between the principles of training systems, general pedagogical aspects and specific principles in training (Galkin, 1988, as referred to by Verhoshansky, 2002, p. 45).

To sum it up then, there a lot of contradictions in the theory of periodization, that make it unusable as an instrument for the organization of training and actually prevent further developments (Belotti et al., 1978, Horwill, 1992, Zanon, 1997, as referred to by Verhoshansky, 2002, p. 45).

3.3 Disregardment of the biological adaptation processes

Matveyev's speculative concept was based on a phasic development of top form. A dynamic development of sporting form was introduced by Letunov (1950) and Prokop (1959). They were the first sports-medicine specialists who formulated ideas that the improvement of an athlete's training state is based on the biological laws responsible for the development of adaptation processes in training.

However, according to Verhoshansky (2002, p. 45), it appears that Matveyev failed to understand the biological ideas of Letunov and Prokop. "This appears to be the reason for his primitive 'pedagogical' interpretation of the nature of training. Matveyev merely changed the nature of training phases and maintained that

his phasic development of form is the natural assumption for the periodization of training. It is easy to recognize that this concept of training, from the viewpoint of the 'dynamics of the sporting form,' gives only a superficial picture and is today regarded as naive" (Verhoshansky, 2002, p. 45).

3.4 Lack of scientific method

Verhoshansky (2002, p. 45) regards Matveyev's methods as rather primitive. "They cover the so-called pedagogical observations and antiquated analytical-synthetical principles" (Verhoshansky, 2002, p. 45). However, in an attempt to counteract the lack of scientific principles in these methods, Matveyev presented in 1991 a careful analysis to support his concepts. The analysis showed a lower limit of 1.5-2% in the range of top performances. Deviations from personal best performances were calculated to be 3-5% in cyclic speed-strength events. Athletes were regarded to be out of form under these limits. The calculations followed a simple graph of performances (fixed by points) which was based on a percent-time system. The absolute personal best performances were set as 100%. From this, Matveyev developed his concept of a 'wave-like format' of sporting form. However, somehow he failed to notice that a large part of top-form performances were below this critical range (Verhoshansky, 2002, p. 46).

3.5 The principle of periodization does not correspond to the reality of training and competition

According to Matveyev, the essence of periodization is the formal and mechanical formation of training processes into subjectively formed parts (cycles, phases, periods, etc.).

Verhoshansky's (2002, p. 46) criticism of this is that, first of all, the mechanical formation of training processes and their later reunification to some adaptive entirety has nothing in common with a realistic organization of training in most sports. Secondly, this formation neglects objective adaptation processes. "It simply does not even replace training control through different trial and error methods because periodization offers no objective confirmation for the choice of an optimal variation" (Verhoshansky, 2002, p. 46).

According to Verhoshansky (2002, p. 46), the linear logic of first training and then competition simply fails to relate to objective realities. In contemporary sport, the competition period, with an increased number of important (international) competitions, has been considerably extended. In cycling, for example, the competition period has been extended almost to nine months. This means that the preparation period is not sufficiently long for a 'fundamental preparation' and the development of sporting form must take place mainly within the long competition period. "A formal demarcation of preparation and competition periods is therefore unacceptable" (Verhoshansky, 2002, p. 46).

3.6 Arbitrary division of training processes

Verhoshansky (2002, p. 46) identifies the construction of training as the poorest part in the concept of periodization. Matveyev holds that periodization is based on a simple sequence of single training sessions in the training process. The basic structural unit is the 'microcycle'. Different microcycles in turn make up a larger unit called 'mesocycle', and finally the mesocycles are combined to a 'macrocycle'. As far as the realization of such a linear principle is concerned, Matveyev recommends the use of mesocycles of different directions, such as familiarization, basic, preparation, control, competition, maintenance, restoration, etc. Each mesocycle is made up of 3-6 microcycles. Verhoshansky (2002, p. 47) expresses his doubts on how this is substantiated and how the speculative recommendations in periodization can be applied to practical training.

3.7 Adaptation principles are ignored

The most important peculiarity of adaptation, the conversion of qualitative characteristics from external developments into internal characteristics of the organism, was not taken into consideration in the theory of periodization. The ignorance, or misunderstanding, of the specific character of adaptive changes in the organism was responsible for Matveyev's explanation in claiming the so-called 'transfer' of performance capacities. Although this phenomenon exists, it does not apply to high-performance sport.

For example, it is today not acceptable to state that "there are several cyclic locomotor exercises that clearly differ in their form (running, swimming, cross country skiing, cycling, etc.), but are still close as far as their endurance and other physical qualities are concerned" (Matveyev, 1991, as quoted by Verhoshansky, 2002, p. 47).

According to Verhoshansky (2002, p. 47), this concept is unacceptable because the specific nature of adaptational reactions of the organism depends on the type of training involved. This fact has been known for some time and is accepted as a very important criterion in the choice and organization of training loads. Load volumes have presently reached reasonable limits and the possibilities of developing new specific conditioning exercises has diminished. The so-called 'transfers' and the importance of large and ineffective volumes of conditioning exercises in the preparation period belong to the 1950s.

3.8 Three primary criticisms

In summary, Verhoshansky's attack on Matveyev's periodization theory appears to have three primary criticisms:

(1) Periodization theory disregards biological adaptation principles.

(2) It is mechanical.

(3) It provides no research proving that its principles work.

4 Is periodization still a valid approach to training?

In dealing with Verhoshansky's criticism of Matveyev's concept of periodization, Freeman (2002), first of all, simply states that "if Verhoshansky's criticisms were true, periodization would never have worked at any level. That is demonstrably false" (p. 48).

Freeman points out that Verhoshansky's arguments assume that only the pure, fairly rigid system that Matveyev described 40 years ago defines how periodized training is used today.

At the time Matveyev first wrote of periodization, track and field competition for most of the world was a relatively simple system with only a small number of truly significant competitions. In most countries, an athlete's goal was to perform well at the national championships. Before 1983 there were no athletics world championships. The Olympic Games every four years were designated as the only world championships. Dual meets between two nations were major events. During the 1980s elite track and field became professional, and during the same period the IAAF greatly expanded their series of high-level championships. Most years now feature a world or continental championship of some sort, usually following an extensive number of elite competitions. The demands of those meets are not for a peak, but for a sustained elite performance over a series of 20-30 competitions.

4.1 Does the periodization concept disregard biological adaptation?

According to Freeman (2002, p. 49), the pattern of stimulus and response, with an eye toward compensation and supercompensation, lies at the core of the training process. That biological principle existed before periodization and it is the core concept of training at every level and of course also of periodized training.

4.2 Is the periodization concept mechanical?

The charge that periodization is mechanical or even robotic is the true source of most attacks on this concept of training. But even 30 years ago, Russian scientists warned coaches not to be too rigid in their approach to the training process. One of the strengths of periodization is that the training process is adapted to any changes in the athlete's fitness. "Periodization is a living system, not an iron robot or a computer running on data from the 1960s" (Freeman, 2002, p. 49).

4.3 Does the periodization concept provide no research proving that its principles work?

Regarding the charge of a lack of research proving that periodization works, Freeman points out that few training systems are thoroughly researched. In his opinion, there are three causes of this: (1) In most countries sport research is not considered prestigious enough for scientists to spend much time or money on it. (2) Elite athletes are notably

unwilling to risk sacrificing their training time for such experiments. (3) The unwillingness to participate in such research is the result of the extended competitive seasons that we see today.

Freeman holds that Verhoshansky's argument that one can no longer separate the training and competition phases does not invalidate periodization. "Training has rarely been completely distinct from competition – certainly athletes still train during their competition season" (Freeman, 2002, p. 49).

Freeman also points out that Verhoshansky's argument that Matveyev used little research to develop his system was refuted by Platonov (1999). "In fact, the original theory was based on hundreds of unpublished Soviet research studies, which at that time were treated as state secrets and not available outside a central group of Soviet scientists and coaches" (Freeman, 2002, p. 49).

In summary, Freeman in dealing with Verhoshansky's criticism arrives at the following conclusion: "Every training system uses aspects of periodization. Every system has a preparation phase – no training system has meaningful competitions from the first day of the new training year. And if they are not meaningful, then they serve primarily a training function – back to preparation. […] The basis of periodization is valid and extremely valuable for all sports, today and in the future. Practically every athlete attempting to win a world or Olympic championship uses a training plan based on the principles of periodization. That is in part because it *is* a flexible, changing system, adapted to the growing complexities of sport, not the rigid, creaking, authoritarian system described by Verhoshansky" (Freeman, 2002, p. 50).

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