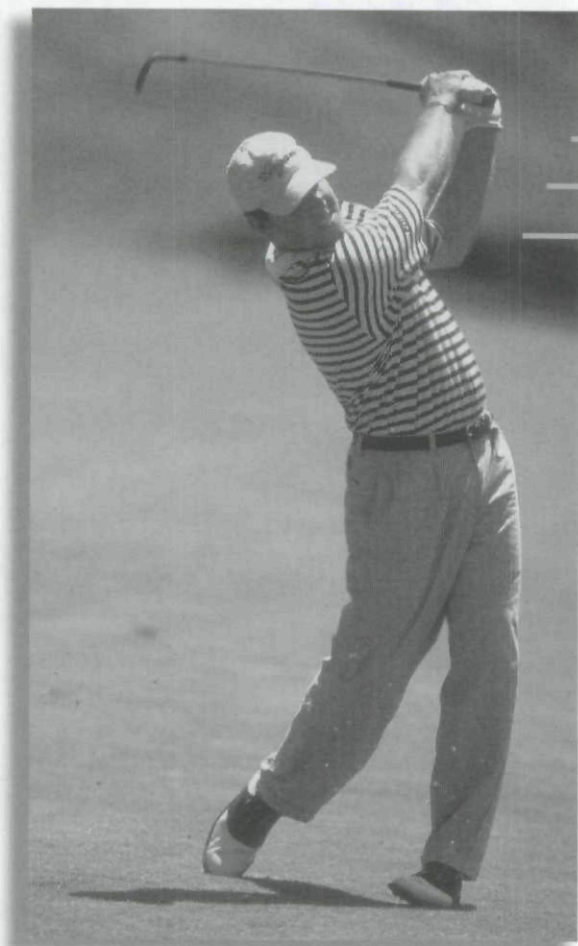




Periodizing Training for Peak Performance

Tudor O. Bompa

It is well known that organized people are more productive than others. This holds true in sports training; an athlete who plans a program well is more efficient in his or her conditioning. An effective plan, which normally translates into better performance, strongly depends on *periodization*.

The term itself is derived from *period*, which in this case refers to a particular phase of training. But the periodization concept is more than that; it includes the following two aspects of a training program:

- Periodization of the annual plan, or how to divide the annual plan into smaller phases that are easier to manage
- Periodization of the motor abilities (strength, speed, and endurance), or how to manipulate a sequence of training methods and concepts to produce a sport-specific quality such as power, power endurance, or muscular endurance

Anyone using periodization will feel its benefits. First, it provides a better, more effective way of arranging the annual plan, in which training loads and stress alter from phase to phase. Similarly, periodization builds specific emphasis on volume (quantity) and intensity (quality, speed, and power) of training into each phase (see pages 278 to 280). By varying the intensity of stress and emphasizing physical, technical, tactical, and psychological training elements during preparatory and competitive phases, the athlete facilitates better peaking and more consistent performance during the competitive phase.

Many athletes have benefited from periodization. Canadian sprinters and track cyclists, for instance, never broke a world record and were not even visible on the world sports scene before applying periodization in the 1980s and 1990s. Since their exposure to periodized training, especially the periodization of strength, they have been ranked among the best in the world, breaking world and Olympic records. Many rowers, tennis players, swimmers, and triathletes from other countries have also noticed dramatic improvements from using this method of planning. The application of periodization to team sports has also been effective. Several U.S. college football teams that used periodization have climbed from the bottom of their league standings to the top.

PERIODIZATION OF THE ANNUAL PLAN

Figure 12.1 illustrates the structure of an annual plan with only one peak, or single periodization, where peak performance is planned to be achieved at the time of the national championships (NC).

Most team sports and some seasonal individual sports such as skiing, rowing, triathlon, and cycling use the one-peak cycle, or mono-cycle. Other sports such as track and field and swimming use a two-peak annual plan, often called a bi-cycle or double periodization, which has two separate cycles, one for each peak. For track and field, the two cycles are the indoor and outdoor competitions.

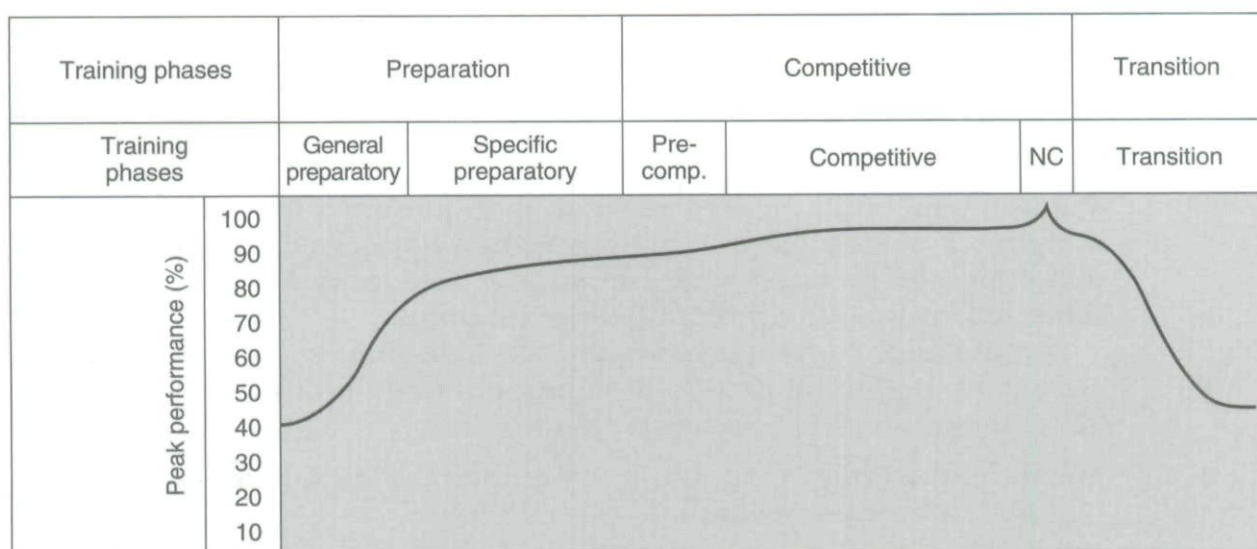


Figure 12.1 Annual plan for periodization.

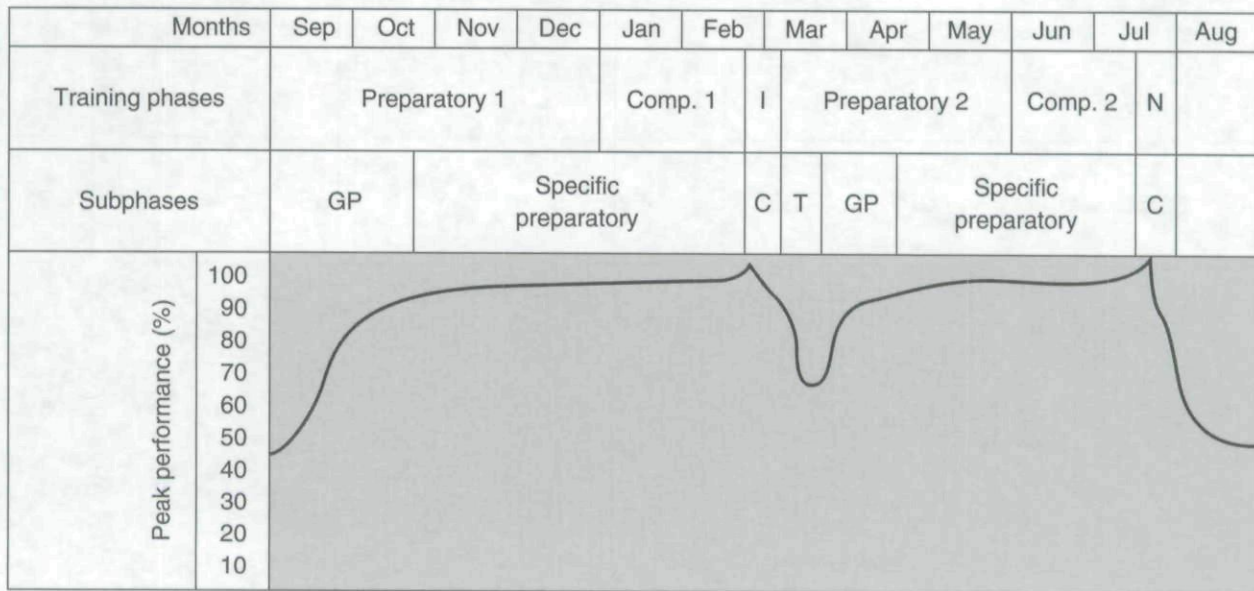


Figure 12.2 Structure of a bi-cycle applicable in track and field.

Figure 12.2 illustrates such a plan. Note the difference in the peaking curve between a mono-cycle and a bi-cycle.

As exemplified by figure 12.2, a bi-cycle annual plan has two main peaks: the first in late February or early March, the indoor championships (IC), and the second in late July, the national championships (NC). The dates of the two major competitions dictate the length of training phases and subphases. Thus, preparatory 1 is longer than preparatory 2, and the two competitive phases are of almost equal length. For the same reason, the general preparatory (GP) and the specific preparatory phases (SP) are longer for the first cycle than the second cycle. Between the first and second cycles is a two-week transition (T) phase, whereas after the national championships in July a four- or five-week transition occurs.

Other sports such as gymnastics, wrestling, and martial arts have three main competitions per year. This plan is a tri-cycle, or triple periodization. As seen in figure 12.3, the proximity of the three main competitions results in shorter training phases and subphases. Note also that the curve of peaking has more abrupt increases and decreases; the athlete must shift abruptly from GP to SP to peak at the desired times of the year.

In figure 12.3, the months of the year are numbered rather than named. This is simply because the main peaks of the sports using tri-cycles do not occur in the same months.

Equally visible is the shortness of training time before each peak. The longest preparatory time (P1) is in the first cycle. The other two preparatory periods are shorter, especially in the third cycle (P3). These conditions also dictate that the general preparatory (GP1, GP2, and GP3) subphases become shorter as the athlete advances through the cycles, especially in the third cycle. This brief analysis shows that a good performance in all three peaks is possible only if solid physical training is achieved through both general and specific (SP1, SP2, and SP3) physical preparation at the beginning of each cycle, especially the first.

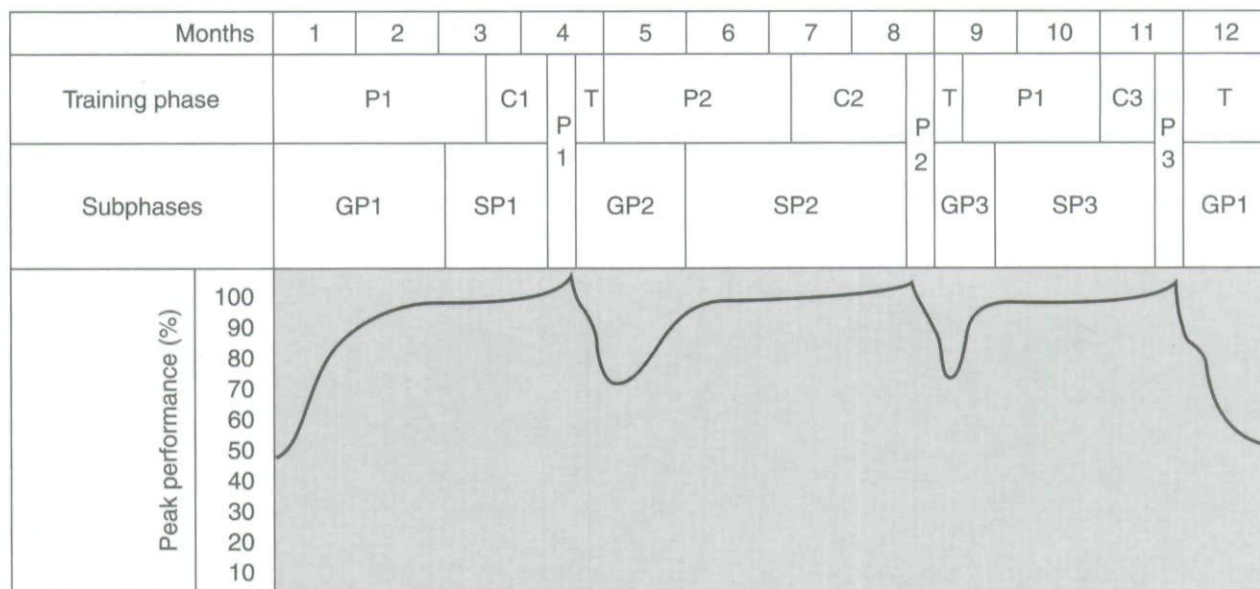


Figure 12.3 Tri-cycle with three peaks.

Selective Periodization

Training programs for junior athletes often duplicate those of elite athletes. Yet, in most cases, those using the programs of successful athletes fail to analyze whether junior athletes are ready for a multipeak plan or whether they can tolerate the high-intensity training that accompanies the training programs of elite athletes.

Irrespective of whether an athlete competes in a multipeak sport or a single-peak sport, the following types of annual plans must be considered.

- A mono-cycle is strongly advisable for junior athletes. The advantage is that it has long preparatory phases free from the stress of competition. This allows the coach to concentrate on developing skills and building a strong foundation of physical training.
- A bi-cycle is suggested for national-class athletes, individuals who can qualify for national championships. Even in this situation, the preparatory phase should be as long as possible to allow time to train the fundamentals.
- A tri-cycle and a multipeak plan are recommended only for advanced or international-class athletes. It is assumed that these athletes have a solid foundation and a background that allows them to handle with greater ease an annual plan with three or more peaks.

Although the duration of training phases depends on the schedule of competitions, table 12.1 provides a guideline for the distribution of weeks per training phase.

Characteristics of Annual Plan Training Phases

Irrespective of the number of peaks or cycles in an annual plan, all have three standard phases: preparatory, competitive, and transition.

Table 12.1 Distribution of Weeks for Various Types of Annual Plans

Annual plan (weeks)		Preparatory (weeks)	Competitive (weeks)	Transition (weeks)
Mono-cycle	52	32 or more	10–15	5
Bi-cycle	26	13 or more	5–10	3–4
Tri-cycle	17–18	8 or more	3–5	2–3

Preparatory Phase

The *preparatory phase* is of enormous importance to the entire year of training. During this period, the general framework of physical, technical, tactical, and psychological preparation is developed for the competitive phase. Inadequate training performed during this period will cause repercussions during the competitive phase, which no form of training can remedy. A significant amount of training, based especially on increased volume (quantity of work), will in the long run result in a relatively low level of fatigue after training and may enhance recovery. Therefore, throughout the preparatory phase, and especially during the initial part, a high volume of training is essential to cause adequate body adaptation to the specifics of training.

In general terms, the objectives of training in this phase are the following:

- To acquire and improve general physical training
- To improve the motor abilities required by the sport
- To develop specific psychological qualities
- To develop, improve, or perfect technique
- To familiarize athletes with the basic strategic maneuvers to be employed in subsequent phases

The preparatory phase should last between three and six months depending on the climate, the characteristics of the sport, and the type of annual plan employed. For individual sports such as track and field, rowing, and winter sports, the duration should be between one and two times as long as that of the competitive phase. For team sports it may be shorter but should not be less than two to three months.

The preparatory phase is divided into two subphases: general and specific preparation. The *general preparatory* subphase has the objectives of developing working capacity and general physical condition, improving technical elements, and teaching basic game strategy. The foremost objective, however, should be to develop a high level of physical conditioning that will facilitate future training and performance.

The *specific preparatory*, or the second part of the preparatory phase, represents a transition toward the competitive season. Though the objectives of training are similar to those of the general subphase, the character of training becomes more specific. Although the volume of training is still high, most work (70 to 80 percent) is directed toward the specific exercises related to the skills or technical patterns of the sport. Toward the end of this subphase, the volume tends to drop

progressively, allowing an increase in the intensity or quality of training. For sports in which intensity is an important attribute, such as sprinting, jumping, and team sports, the volume of training must be decreased to allow the coach to concentrate on sport-specific training.

Competitive Phase

The *competitive phase* has among its main tasks the perfecting of all training factors; this enables athletes to improve their abilities and thus compete successfully in the main competition or championship meet. Among the general objectives of the competitive phase are the following:

- To improve motor abilities and psychological qualities according to the specifics of the sport
- To perfect and consolidate technique
- To perfect tactical maneuvers and gain competitive experience

During the competitive phase, which for team sports includes precompetitive or exhibition games, the goal is to improve performance from game to game and, obviously, to qualify for the playoffs for the major competition of the year.

Before the playoffs or championship competition, a short *taper*, or *unloading phase*, occurs. The goal of the taper is to facilitate peak performance, the best performance of the year.

Let us examine the specifics of tapering for two types of sports: speed-power sports (team sports, many of the track and field events, martial arts, etc.) and endurance sports (most swimming events, triathlon, cross-country skiing, rowing, canoeing, etc.). For each of the two types of sports, we will analyze the last two weeks before the major championships of the year.

As illustrated by figure 12.4, in the first week the volume of training is reduced by approximately 50 percent of previous levels. Intensity is reduced slightly and progressively over the two-week phase. Intensity may have one peak in the first

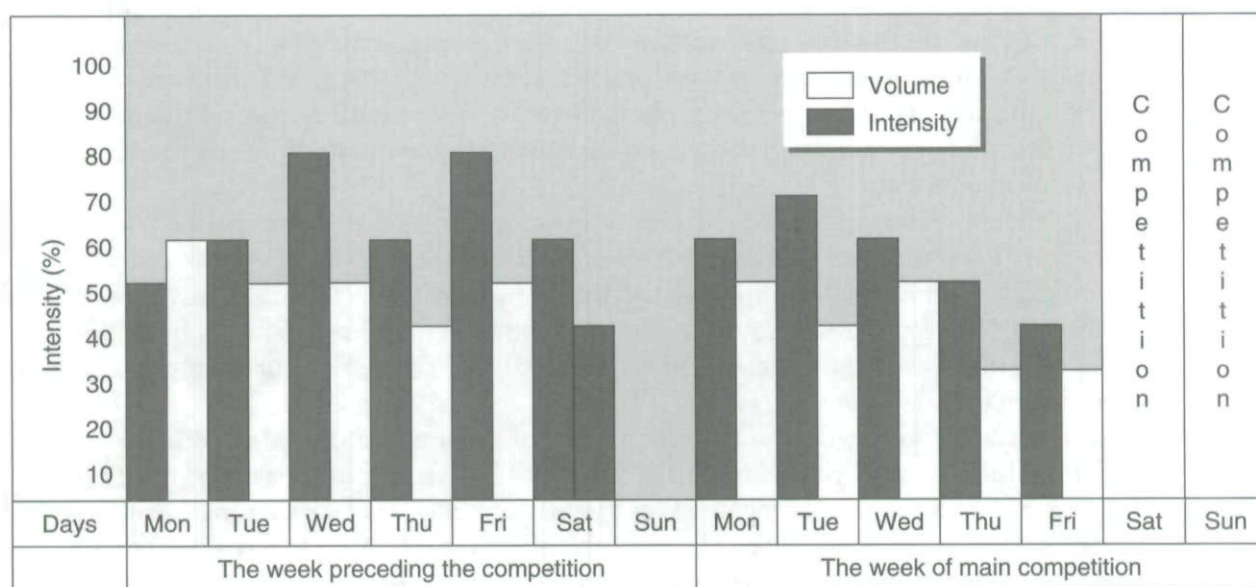


Figure 12.4 Dynamics of volume and intensity for unloading phase in speed-power sports.

part of the second week, on Tuesday, although it will not be of high intensity. Obviously, repetitions or drills of high intensity may be performed on any of the days, bearing in mind the following: The number of repetitions or drills should be much lower than during a normal week, and the rest interval should be longer than normal to eliminate the possibility of accumulating fatigue before the championships begin.

Figure 12.5 illustrates the tapering strategy of a sport where endurance is the most important physical ability. Unlike speed-power sports, in which intensity of training must be maintained, endurance sports require the participant to guard against doing too much training at high intensity, which is the most fatiguing element. Throughout the two weeks of tapering, therefore, intensity must be progressively reduced. The volume of training, though decreased as well, remains slightly higher. In this way, the athlete preserves his or her fitness level while removing the fatigue of high-intensity training because intensity drops below 40 percent.

Transition Phase

After months of stressful training and many competitions or games, the *transition phase* is a welcome change for athletes and coaches alike. The objective of transition is to remove fatigue from both the body and mind, to relax psychologically, and to regenerate biologically before a new annual plan starts. During transition, however, the athlete must maintain an acceptable level of physical training, about 40 or 50 percent of the level of the competition phase. If this amount of training is not performed, detraining of most of the qualities developed during the year occurs, in the form of protein degradation and an inability to recruit the same number of muscle fibers. Consequently, the rate of strength loss may be as much as 3 or 4 percent in the first week, with even greater losses in the following weeks.

When strength decreases, so does speed because speed and quickness rely heavily on the force of muscle contraction. Inactivity also affects endurance ca-

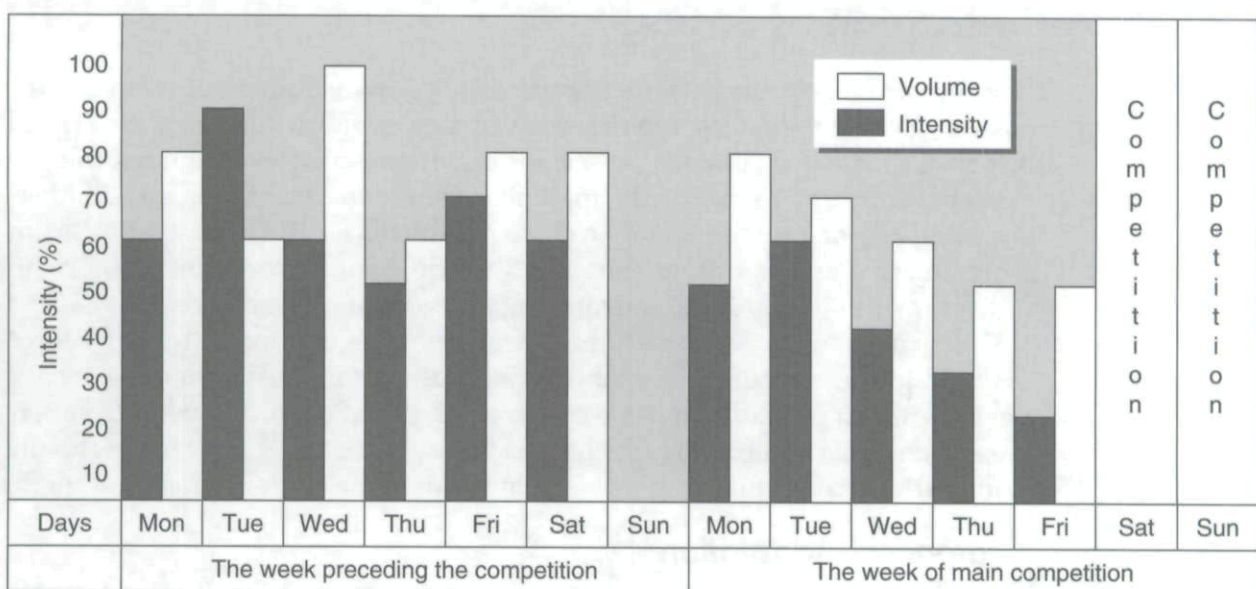


Figure 12.5 Dynamics of volume and intensity for unloading phase in endurance sports.

capacity. A loss of some 7 percent occurs in the first two weeks (a 30 percent decrease in the level of hemoglobin and a loss of up to 50 percent of mitochondria volume).

To avoid excessive biological degeneration, the athlete must maintain two to four workouts per week. Informal and relaxed training can be the norm.

PERIODIZATION OF MOTOR ABILITIES

One of the key elements in the success of periodization is how the main motor abilities such as strength, speed, and endurance are trained during the annual plan.

In several sports, the benefits of periodization of motor abilities are not yet recognized and therefore not applied. For instance, I have seen football players working on maximum speed from February on without building any base, without doing any tempo running to develop an anaerobic-aerobic foundation. Without a proper base, the athlete will reach a plateau in maximum speed training. In addition, maximum nervous system stimulation, which occurs in maximum speed training, cannot be maintained for long without fatiguing the central nervous system (CNS). A well-developed periodization of speed, as shown in figure 12.6, will eliminate such problems.

Figure 12.6 illustrates the periodization of main motor abilities. A brief explanation of the periodization of strength, endurance, and speed will define the sequence and training methods employed in each phase. Adherence to the periodization sequence of specific phases develops the necessary combination of abilities for each sport. All but a few sports require a certain combination of motor abilities. Developing the correct mixture, through periodizing motor abilities, is the secret to achieving the best specific conditioning for each sport.

Figure 12.6 refers to a mono-cycle annual plan. It is easy to apply the same concept to a bi- or tri-cycle. The same sequence, with more condensed phases, is repeated as many times as the number of competitive phases in a plan.

Periodization of Strength

During the training phases of the annual plan, strength-training plans and methods vary depending on the requirements of a given sport. Although the critical ingredient for many sports is power, for others muscular endurance is the key element. Power, or the ability to apply force in the shortest time, is a combination of speed or quickness and strength. Football, baseball, most other team sports, martial arts, sprinting, jumping, throwing, and so forth are all sports in which the level of power has a strong impact on final performance.

Muscular endurance, on the other hand, refers to the ability to apply force against a lower resistance for a long period. Athletes in most swimming events, rowing, canoeing, triathlon, cross-country skiing, and so forth benefit from improving muscular endurance to the highest level realistically possible. Let us briefly examine the specific training phases and methods of the periodization of strength.

Anatomical Adaptation

Following a transition phase, when athletes usually do little strength training, it is scientifically and methodologically sound to begin a strength program aimed

Phases	Preparatory		Competitive			Transition
Subphases	General preparatory	Specific preparatory	Precompetitive	Main competitions		Transition
Strength	Anatomical adaptation	Maximum strength	Conversion: • Power • Muscular endurance • or both	Maintenance	C	Compensation
Endurance	Aerobic endurance		• Aerobic endurance • Specific endurance	Specific endurance		Aerobic endurance
Speed	Aerobic and anaerobic endurance	• Specific speed • Alactic • Lactic • Speed endurance		• Specific speed • Agility • Reaction time • Speed endurance		Play and games

Figure 12.6 Periodization of motor abilities.

at adapting the anatomy to a new strength program. The main objective of the anatomical adaptation phase is to involve most muscle groups, thus preparing the muscles, ligaments, tendons, and joints to endure the subsequent long, strenuous phases of training. A general strength program, using many exercises (9 to 12) performed comfortably without pushing too hard, is desirable. Apply the following to help achieve the objectives of this first phase: a load of 40 to 60 percent of the athlete's maximum, 8 to 12 repetitions in two or three sets, performed at a low to medium rate, with a rest interval of one to one-and-a-half minutes between exercises, over 4 to 6 weeks. Longer periods of anatomical adaptation (8 to 12 weeks) should certainly be considered for junior athletes and those without a strong background in strength training.

Maximum Strength Phase

The level of maximum strength affects both types of strength—power and muscular endurance. The athlete cannot reach a high standard of power without achieving a high level of maximum strength. Because power is the product of speed and maximum strength, it is logical to develop maximum strength first and then convert it into power. During the maximum strength phase, then, the goal is to develop maximum strength to the highest level the athlete is capable of reaching. The duration of this phase (one to three months) is a function of the sport's events and the athlete's needs. This phase may be quite long, perhaps

three months, for a shot-putter or football player, whereas an ice hockey player may allocate only one month for the development of this type of strength.

Conversion Phase

To meet the needs and characteristics of the sport or event, maximum strength must be converted into sport-specific qualities such as power, muscular endurance, or both. Through the application of the appropriate training method for the type of strength sought and the use of training methods specific to the selected sport, maximum strength is gradually transformed into power or muscular endurance. Throughout the conversion phase (one to two months), the athlete must maintain a certain level of maximum strength. Otherwise, power may decline slightly toward the end of the competitive phase.

Although the maximum strength phase is specific to the preparatory phase, the duration of the conversion period begins toward the end of the preparatory phase and continues into the beginning of the competitive phase (precompetitive phase).

Maintenance Phase

As the term suggests, the main objective of strength training for this phase is to maintain the standards achieved in the previous phases. Again, the program followed during this phase is a function of the specific requirements of the sport. The ratio between maximum strength, power, and muscular endurance must reflect such requirements. For instance, a shot-putter and a lineman in football may plan two sessions for maximum strength and two for power, whereas a jumper may consider one for maximum strength and three for power. A baseball player, a wide receiver in football, or a 100-meter swimmer may plan one session for maximum strength, two for power, and one for muscular endurance. A 1,500-meter swimmer may dedicate the entire strength program to building muscular endurance.

The athlete should dedicate two to four sessions each week to maintaining the required strength, depending on his or her level of performance and the role that strength plays in the skills and performance of the particular sport. Considering the objectives of the competitive phase, the time allocated to the maintenance of strength is secondary. The coach, therefore, must develop an efficient and specific maintenance program. Two to a maximum of four exercises involving the prime movers (the muscles performing the technical skills) should maintain strength levels.

Cessation (C) Phase

The strength-training program ends five to seven days before the main competition so that all energy is available to achieve a good performance.

Compensation Phase

This phase completes the annual plan and coincides with the transition phase from the present to the next annual plan. The objectives of the transition phase are to remove fatigue and replenish exhausted energies. An informal strength-training program, therefore, should have the goal of involving muscle groups other than the prime movers in order to build the weaker muscles that are not often trained.

Periodization of Endurance

During an annual training plan, endurance is developed in several phases. For an annual plan with one peak, endurance training is accomplished in three main phases: (1) aerobic endurance, (2) aerobic and specific endurance, and (3) specific endurance.

Each of the suggested phases has specific training objectives. *Aerobic endurance* is developed throughout the transition phase and early preparation phase (one to three months). Although each sport may require a slight alteration, the athlete could achieve the goals of aerobic endurance through the uniform and steady-state method, with moderate to medium intensity. As a general consequence of such a program, the athlete's working capacity and cardiorespiratory system progressively improve. As the athlete adjusts to training, he or she must elevate the workload, especially the volume (quantity) of training.

Aerobic endurance and specific endurance play an extremely important role in achieving the objectives set for endurance training. Throughout this phase, which represents a transition from aerobic endurance to a type of endurance specific to each sport, aerobic endurance is still emphasized. Elements of anaerobic activity specific to the sport are introduced. Particularly in team sports, the rhythm of activity and the pace of specific drills become progressively sport specific. Intensive training specific to the competitive phase may fail unless the foundations of endurance are solidly developed during the second phase. The prevailing methods are uniform, alternating, and long and medium interval training (toward the end of this phase). The volume of training reaches the highest levels during the aerobic phase and the aerobic and specific endurance phases of the annual plan.

Specific endurance coincides with the competitive phase. The selection of the appropriate methods depends strictly on the demands of the sport and the needs of the athlete. For many sports, however, the intensity of training must be emphasized so strongly that it often exceeds racing intensity. The alternation of various types of intensities should facilitate a good recovery between training sessions, leading to a good peak for the final competition.

Periodization of Speed

Training for periodization of speed depends on the characteristics of the sport, the athlete's level of performance, and the competition schedule. Training for team-sport athletes will therefore be different from that for sprinters. The first group of athletes usually follows a mono-cycle annual plan, whereas sprinters, who in most cases participate in both indoor and outdoor seasons, follow a bi-cycle plan.

Whether for individual or team sports, the periodization of speed may follow several training subphases. *Aerobic and anaerobic endurance* should be considered the training base for the phases that follow it. Whether through tempo running for sprinters, football players, baseball players, and basketball players or through steady-state training for athletes in other sports, this first phase is necessary for building a solid aerobic foundation for speed training. Training progressively incorporates activities that are more specific to the particular sport. At the beginning of the phase, fartlek (speed play) is used to build a strong aerobic base. Later, various types of interval training and repetition training, which are one step closer to specific speed, are added.

Alactic speed and anaerobic endurance training become more intensive, event specific, refined, and specialized as the competition phase approaches. Specificity of training prevails in methods and specific exercises. Maximum velocity for sprinters, wide receivers, basketball players, and similar athletes is emphasized, progressing from 10 to 15 meters to 30 to 60 meters.

Specific speed could incorporate some or all of the speed components (alactic, lactic, and speed endurance), depending on the specifics of the sport. Drills for the development of agility and reaction time are also introduced.

Specific speed, agility, and reaction time require specific methods and drills that are designed to work toward the goal of developing specific speed and refining related abilities such as agility and reaction time.

During the competitive phase, the intensity of training is elevated through specific training methods and participation in competitions. Although exercises specific to the chosen sport prevail, general ways of training, including games and play for fun, relaxation, and active rest, should also be incorporated. A correct ratio between these two groups of exercises will lower stress and strain in training. Many sprinters and team-sport athletes are prone to injuries because of high-intensity training; alternation between various means and intensities is an important training element.

DYNAMICS OF THE VOLUME AND INTENSITY OF TRAINING

The volume and intensity of training play an important role in the loading strategy of training during the annual plan, as well as being crucial elements to consider for peaking purposes.

The *volume* of training is the quantitative element of training, which includes the duration of activity; the distance covered or weight lifted in a training session; and the number of repetitions of an exercise, skill, or drill. The volume also refers to the sum of work performed in a given training phase. Thus, an athlete may perform 24 training sessions in August and 21 in October. The same athlete may run 80 kilometers per week in April and only 72 kilometers per week in July. In both examples, the volume of training is higher in the first month.

The quantity of work, or the volume of training, is an important element to train in all sports, especially in sports in which endurance is the key physical quality. High volume is an important training ingredient, especially during the preparatory phase when the foundation of strong conditioning is built. As the competitive phase approaches, the volume of training decreases more visibly for speed-power sports such as sprinting, jumping, throwing, martial arts, football, and baseball. For endurance sports such as distance events in track, swimming, cross country, rowing, road racing in cycling, and triathlon the volume of training is still high during the competitive phase because aerobic endurance must be constantly emphasized to maintain good performance.

The *intensity* of training, on the other hand, represents the qualitative component of the work performed in a given period. It usually refers to how fast an action is performed (speed), the power or strength displayed in training or competition, and the psychological stress experienced by the athlete while competing or performing a difficult skill or routine.

Both the volume and intensity of training have specific dynamics during the main phases of the annual plan. The following two examples illustrate the dynamics of volume and intensity in endurance and speed-power sports.

Figure 12.7 illustrates the dynamics of volume (aerobic endurance) and intensity (lactic-acid training) used in training for a 400- or 800-meter swimming event. Peak performance is scheduled for the winter and summer nationals. On the left of figure 12.7 is the kilometrage per week. The dynamics of the aerobic endurance (volume) and lactic-acid (intensity) training change according to the phase. In the early preparatory phases (P1 and P2), the volume of training increases in steps every three to four weeks, alternating with a lower volume, with the goal of removing fatigue, regenerating the body, and relaxing the mind. Toward the end of the preparatory and early part of the competitive phases (C1 and C2), the volume stabilizes around 100 to 105 kilometers per week. As the main competitions approach and the taper for the nationals begins, the volume of training decreases progressively to 50 kilometers per week. These less fatiguing conditions promote removal of fatigue, regeneration of the body, and relaxation of the mind so the athlete can achieve peak performance.

Since the 400-meter or 800-meter event is one in which the proportions of aerobic and anaerobic lactic acid are about 85 percent and 15 percent, the kilometrage of lactic-acid training is quite low. Even in the hardest months, December, January, May, and June, the height of lactic-acid training is not above 20 kilometers per week. Training designed to tolerate lactic-acid buildup is not to be neglected, however, in most months of the year.

Figure 12.8 illustrates the dynamics of volume and intensity for a speed-power sport such as football. The same approach is possible for any other speed-power sport, but the dates of competitions might change. The dynamics of volume and intensity for a football team are far different from those for the swimmer in the previous example. In football, both volume and intensity are measured by hours per week. The types of training done for volume are tempo running (200 to 600

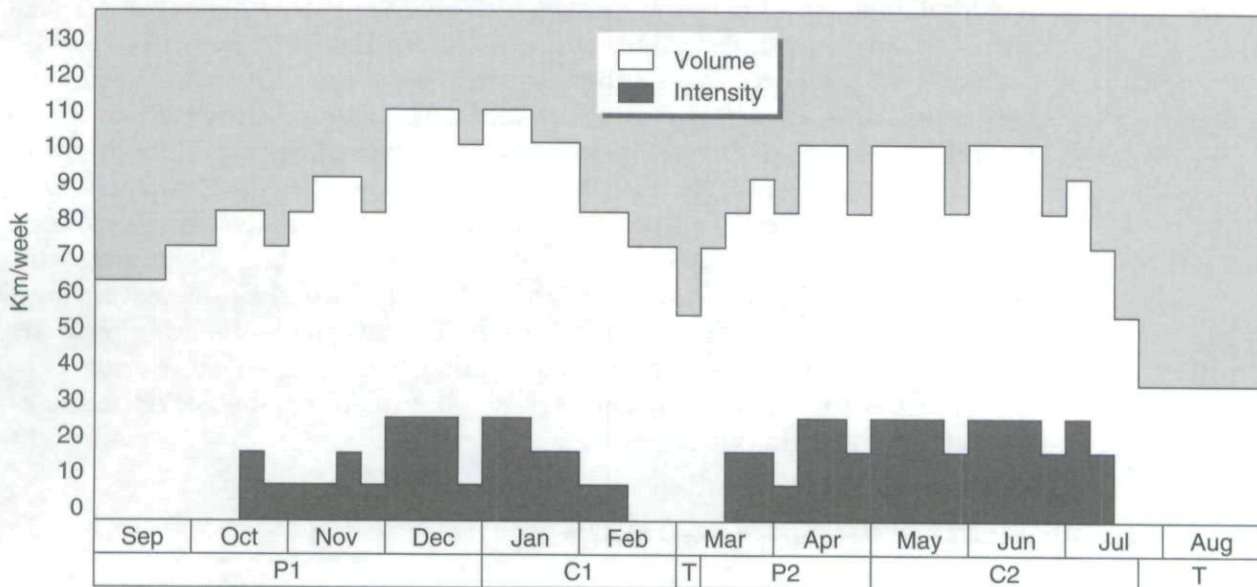


Figure 12.7 Dynamics of volume and intensity for training for a 400- or 800-meter swimming event.

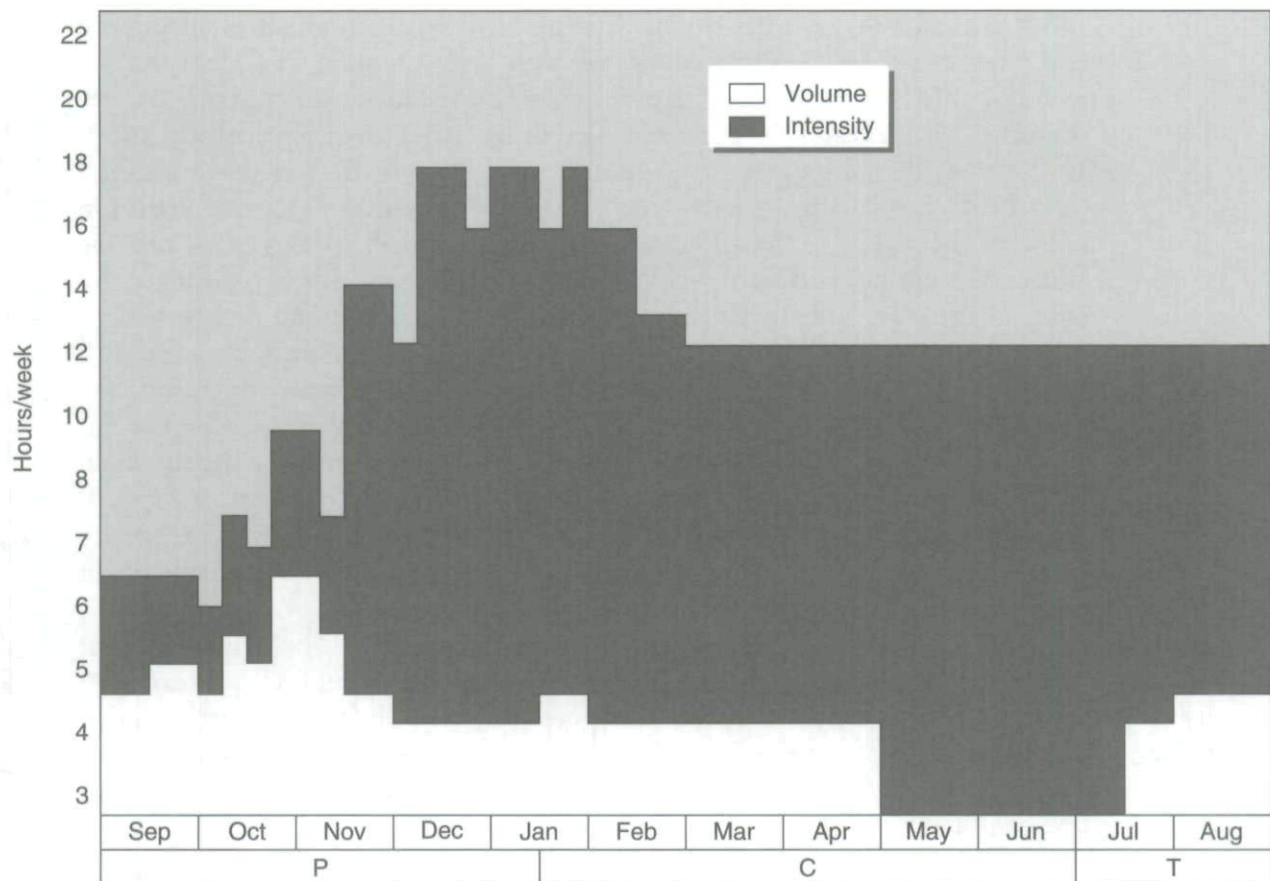


Figure 12.8 Dynamics of volume and intensity for a college football team.

meters with repetitions at 60 to 70 percent of maximum velocity for that distance), strength training using lower loads (below 80 percent of 1RM), and technical drills of low intensity. For intensity, on the other hand, training includes technical and tactical drills performed with high velocity and quickness, speed training, and power and strength training with loads over 80 percent of 1RM.

During the early preparatory phase (P), most work may be done independently by the individual player, anywhere between 10 and 16 hours per week. Tempo training is used to build an anaerobic-aerobic endurance base. Repetitions of 400 meters at 60 percent (i.e., 8×400 meters) and then 600 meters at 60 percent (i.e., $6-8 \times 600$ meters) are successful in building this base. As June approaches, tempo running is performed at shorter distances (i.e., $10-12 \times 200$ meters at 70 percent and $12-15 \times 80-100$ meters at 70 percent). From July on, players must work on position-specific maximum speed: 40 to 80 meters for wide receivers and 20 to 40 meters for players at other positions (i.e., $8-12 \times 50$ meters at 95 to 100 percent of maximum). Strength training must follow the periodization of strength discussed in this chapter.

INTEGRATED PERIODIZATION

Periodization, as the key element in successful planning and training, is not limited in application to how to cycle an annual plan or how to sequence the devel-

opment of motor abilities for a given sport. Periodization also incorporates nutrition and mental and psychological training.

Sport psychologists, physiologists, and nutritionists often develop their training plans and programs without considering the planning-periodization process or the specific objectives in each phase of training. Mental and psychological training focuses on the athlete, often in connection with the competitive environment. This is also true for nutrition programs. Seldom are the sport scientists in these disciplines aware that athletes and coaches need their help throughout the annual or long-term training process, not just before competitions.

Integrated periodization represents the process of combining all components of training and matching them to the periodization of motor abilities. The periodization of the motor abilities dictates the diet and psychological skills best suited for a given training phase. An instructor, therefore, should learn what kind of diet and which psychological skills are best for training aerobic endurance, maximum strength, or any combination of such abilities. Armed with such information, the coach will be able to improve athletes' abilities and, as a result, their performance.

Figure 12.9 illustrates a model of integrated periodization for a sport in which speed and power are the dominant abilities. In the top of the chart are the months, training phases, and subphases. Because training dates differ among sports, the months of the plan are numbered rather than named.

Because this model of integrated periodization refers to a sport in which speed and power are the dominant abilities, the figure refers only to the periodization of speed, strength, mental and psychological attributes, and nutrition. Under normal conditions, the periodization of nutrition would also incorporate the periodization of training supplements.

Both psychological training and nutrition are periodized according to the periodization of strength because strength training represents a vital quality for all speed-power sports. Therefore, for each of the strength-training phases, the corresponding psychological techniques to employ and the primary nutrients necessary to supply the body with the fuel needed in training are given. To establish integrated periodization, use the following process: (1) define the periodization of motor abilities, (2) select the psychological technique to support the physical endeavors, and (3) produce the diet necessary to energize the body.

SUMMARY

The fundamental concept for good annual planning is periodization, which is especially useful in structuring the phases of motor abilities and maximizing training efforts. The periodization of strength, speed, and endurance represents the manipulation of different training phases with specific goals, organized in a specific sequence, with the ultimate goal of creating sport-specific adaptation. When this adaptation is complete, the athlete will be physiologically equipped to produce better sport-specific performances.

A good understanding of periodization will assist the coach in producing better annual plans and training programs. The schedule of games or competitions guides the timing of training phases. The coach should also integrate the periodization of nutrition and psychological training into the plan.

Months	1	2	3	4	5	6	7	8	9	10	11	12	
Training phases		Preparatory					Competitive					NC	Trans
Subphases	General	Specific		Pre-competition	Official/league competitions					Trans			
Speed	• Anaerobic/aerobic, endurance	• Maximum speed short • Maintain anaerobic endurance	• Maximum speed short • Maximum speed medium • Maximum speed long	All in sport-specific proportion					Play/fun				
Strength	Anatomical adaptation	Maximum strength	Power	Maximum strength	Conversion	Maintenance					Compensation		
Mental/psychological	• Evaluate skills • Learn new skills • Quiet setting	• Mental skills to attain training objectives • Visualization • Imagery • Relaxation • Energy management	• Mental rehearsal • Energize • Positive self-talk • Visioning • Focus plans • Simulation • Coping	• Mental skills to cope with specific opponents • Stress management/relaxation • Energizing • Focus plans • Mental rehearsal • Motivational positive thinking/optimism • Positive thinking/optimism					Cessation	• Active rest • Regenerate, de-stress			
Nutrition	Balanced diet	High protein	High carbs	High protein	High carbs	Fluctuates according to the schedule of competition					High carbs	Balanced diet	

Figure 12.9 Integrated periodization for a speed-power sport.

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