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Periodization Made Really Simple

by Thomas Kurz

Periodization means shifting focus of athlete's work to different abilities during several months of training leading up to a major competition. The focus falls first on those abilities that form a foundation for developing the abilities dominant in a given sport, which in turn provide foundation for the "finishing touches" that give the winning edge in competition. And so, in a sport in which speed is the dominant ability, good aerobic endurance improves efficiency of recovery between efforts and thus provides foundation for strength and speed training, which in turn provide foundation for speed-endurance needed to keep constant pressure on the opponent.

As long as one's sport does not require extraordinary levels of conditioning abilities (strength, endurance, speed), one can work on all these abilities in unchanging proportions every week or even every day. But if the sport does require the athlete to go beyond mediocre in conditioning, then periodization becomes necessary. One simply cannot work on extraordinary strength while developing one's maximal endurance or speed. This is because developing great aerobic endurance puts demands on the body that conflict with developing maximal strength or maximal speed. However, maintaining the already achieved level of any given ability takes much less work and thus puts less demands on the body than developing it in the first place.

Periods and Cycles

The few months during which the athlete focuses mostly on those general abilities and skills that lay foundation for improving sport-specific skills is called the general preparation period. The months during which most

work is done on sport-specific abilities and skills is the sport-specific preparation period. And the competition period is when important competitions are scheduled.

Proper periodization and division of training into workout cycles are not some arbitrary schemes a coach works out on graph paper. In a rational training program, both the structure of cycles and periodization result from an athlete's adaptation to training. If the training is not strenuous enough, then periodization is not needed. This is why at the first stages of training, with children and youth or with any beginners, no periodization is done and cycles are most rudimentary. As the training loads grow, eventually periodization becomes necessary and cycles become varied. (By the way, cycling of training and periodization are not the same thing. Cycles may occur without periodization.)

Cycles of various lengths (for example, weekly—like a typical microcycle, or monthly—a typical mesocycle, and longer) and the periodization of the training process are dictated by several factors: the oscillation of work capability; the various recovery times of various systems of the athlete; the correlation between volume and intensity of work; and the fact that a high volume of low-intensity training loads influences athletic form differently than training loads of high intensity and low volume.

Intensity vs. Volume of Training

To put it very simply, during a macrocycle (a training cycle lasting several months and ending with important competitions), the volume of training gradually increases at its beginning, reaches its peak usually at the end of the general preparation period, and then gradually decreases until the end of the

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competition period. At the same time, the average intensity of exercises gradually increases. (This is a great simplification. For more details on how intensity and volume change in various types of exercises, see [Science of Sports Training](#).)

A long time ago, it was noticed that athletes could do intensive sport-specific training for an average of 7–8 weeks, maintain top form for 3–6 weeks, and if they kept on pressing with high intensity, then they overtrained (Prokop 1963). However, if before their intensive sport-specific training they developed a basis of great general fitness with less intensive exercises, then they could take their form higher than without that basis.

A high volume of training loads is necessary to cause lasting morphological and functional changes in the athlete. A high intensity of training work is necessary to develop sport-specific form. These two mutually exclusive factors dictate the need for periodization. To avoid overtraining or injury, increases in intensity of work must be based on sufficiently great morphological changes resulting from long training with a high volume of work.

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Periodization Made Really Simple

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Weekly Training Cycles

Frequency of workouts to improve or just to maintain a trained ability depends on the half-life of cellular components synthesized as a result of training. So, because enzymes needed for anaerobic efforts have a brief half-life (a couple of hours to a few days), two or three workouts per week are needed to maintain anaerobic fitness. Enzymes needed for aerobic efforts have a longer half-life, so two workouts per week may do. Muscle's myofibrillar proteins have an even longer half-life, and so one can maintain maximal strength with just one strength workout per week—but not forever. Eventually more workouts per week will be needed. How soon that will be depends on the length of the original training program. The longer the training, the more durable its effects (Plisk and Stone 2003).

Structuring a microcycle (a cycle lasting a week or less, rarely longer than a week) also depends on the magnitude of training loads. If not much is being done, then all kinds of efforts can fit in each workout, and similar workouts may be repeated as soon as an athlete feels rested. As training loads increase, they reach a point at which different abilities have to be stressed in different workouts. Then the workouts will need to be arranged in sequences that were experimentally arrived at in Eastern Europe and are described in *Science of Sports Training*.

Monthly Training Cycles

The length of a mesocycle (a cycle lasting about a month) is set by observing and talking to athletes. It is time to end a mesocycle when an athlete feels accumulated fatigue and needs to extend rest periods between main workouts in a weekly cycle. For example, if instead of a day of active rest, the athlete needs 2 days to be ready for the next main workout. Usually mesocycles end up lasting 3 or 4 weeks, followed by a week of active rest.

Planning Training in Yearly Cycles

To plan a training program, one has to know the following:

1. What is the long-term goal (achieving a certain level of skill and abilities, reaching a certain level of competition) and is it realistic considering an athlete's limitations such as health, body build, personality, and resources?

2. What is the short-term goal (learning some skills, improving abilities, passing a test, qualifying for and winning a competition appropriate for the athlete's age and skill level)?

3. Where are the athlete's skills and abilities at this time in relation to his or her short-term and long-term goals?

4. Is there enough time and resources to achieve the short-term goal without over-exploiting the athlete and impairing or destroying his or her chances of achieving the long-term goal?

Answering these questions requires measuring, testing, and observing the athlete. Do not rely on numbers alone, as a coach's personal observation of an athlete gives valuable information beyond the numbers from measurements and tests. What test to use depends on the age and skill level of the athlete. For example, do not do sport-specific tests for wrestling with someone who has not mastered techniques that are required in the test.

Compare the athlete's test results with those of successful competitors. For a beginner, compare tests of general abilities and skills with the same tests of more advanced athletes when they were beginners, or if those are not available, then with tests of their general fitness now. (Not for the beginner to attempt to reach this level of fitness soon but to decide what is needed and achievable and to make a plan.) Experienced athletes also see how they compare in sport-specific tests. (Some sports associations, for example in Russia, publish general and sport-specific fitness requirements for athletes at all stages of training.)

Next, review the athlete's training experience to see how much time and effort it usually took to reach and maintain desired levels of skills and abilities. Prepare fall-back plans (plan B and plan C) if things go differently than expected.

Experience and observation of this athlete and of other athletes should give the coach a general idea of the minimum volume, intensity, and frequency of work for developing and for maintaining each aspect of the athlete's fitness at a required level. Examples:

- How long does it take for the athlete to prepare for intensive sport-specific training? (This determines the duration

of the general preparation period.)

- How long does it take for high-intensity sport-specific training to bring the athlete to required sport-specific fitness? (This determines the duration of the sport-specific preparation period.)
- How long can the sport-specific form be maintained? (This determines the duration of the competition period.)
- How much low-resistance/high-rep work does the athlete need to stabilize his or her joints and prepare for high-intensity work?
- How much of this low-resistance work does the athlete have to do during the period of high-intensity work for the joints to be well?
- How often and how much does the athlete have to work on fundamental skills so the advanced skills do not deteriorate?

It is good to have approximate figures for all of these elements. If not, then the picture will emerge during training and testing. In any case, one has to observe and test the athlete often to see if the training is on course.

It is important to observe the athlete during tests and not look at numbers only. Just knowing that the athlete matches or exceeds the norms is not good enough. A trained eye can see trouble from miles away, but it must be looking for it. For example, grimaces reveal excessive mobilization to overcome discomfort, movement compensations, and control problems that indicate dysfunctions, which if unattended to, may lead to injuries.

Means for continuous monitoring of the athlete's progress and adjustment of training load are described in *Science of Sports Training*. These include simple everyday self-observations and self-tests by the athlete and observations by the coach. Most informative tests are very simple, for example, the MAF test for aerobic endurance, which can be done daily, or measuring moment of force to adjust weekly load in strength training.

Most of the time these observations and tests should show improvement or no deterioration of form, except during the shock microcycles.

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Shock Training

Extraordinary accumulation of fatigue may spur extraordinary levels of rebuilding and supercompensation. In shock microcycles there are more heavy workouts than in other microcycles, which prevents the athlete from fully recovering by the beginning of a new microcycle. Shock microcycles are followed by lighter microcycles during which the athlete may show a greater than usual increase of strength, endurance, or whatever ability that stressed in the shock microcycle.

During the shock microcycle the athlete is increasingly fatigued, so results of tests are expected to worsen. If the athlete is not pushed into overtraining, then after the shock training, the athlete's form and test results will rebound higher than before. But again, for this rebound to happen, the athlete should not be overtrained by excessive training loads.

The first signs that the load is excessive in the shock microcycle are mood disturbances and sleep disorders. If a driven athlete does not want to work out, that too is a sign that it is better to skip a workout, a day of workouts, or more. This applies to driven athletes, of course. Those who need pushing or prodding are not my concern.

Precompetition Tapering

To determine the right duration of the taper and the right reduction of training loads, use experience and monitoring.

The experience is obtained during preparations for previous contests (real or model), or just any periods when training loads were reduced deliberately or not. The other tool for designing the taper is constant monitoring of the athlete's mood states and of performance during workouts.

An Alternative Explanation

There is an alternative way of naming periods of training (Zaremba 1982). Knowing its terminology may make understanding the purpose of each period easier.

The three training periods—accumulation, intensification, and transformation (corresponding respectively to the general preparation period, sport-specific preparation period, and competition period)—lead to the start of the main competition.

In the period of accumulation, the athlete accumulates morphological and functional changes by performing a high volume of

training work with an intensity or speed of movement that is naturally easy for him or her to maintain. This level of speed is called "individually stable speed."

In the period of intensification, the athlete uses sport-specific exercises with a form of movement specific to his or her sport and a speed of movement increasingly greater than the individually stable speed. That intensity or speed of movement, called "individually unstable speed," cannot be maintained for a prolonged time and requires longer periods of rest than the time of work spent in exercise. Older, more advanced athletes can increase the length of this period at the expense of the period of accumulation.

In the period of transformation, form accumulated and intensified previously becomes transformed into sports results. Exercises in this period are highly specific as increasingly important starts lead to the main start of the season. To prevent overtraining and a loss of general form, some work of the type used in the period of accumulation (general exercises) is done. Prolonging the period of transformation beyond 2 or 3 mesocycles leads to exploitation of the athlete.

The final 1 or 2 microcycles of the transformation period are filled with the ultimate efforts of the main competition and with a recovery of competitive form.

The period of transformation is followed by 4–6 weeks of detraining in which general exercises of low intensity and increasing volume are performed.

Summary

Now, see how ridiculous are all those orderly schemes some propose, with numbers of sets and reps and percentages of maximal resistance down to a single point, charted out for all workouts and whole training cycles?

Training plans of successful athletes are not to be slavishly copied but to be studied for regularities and principles of training.

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Q and A on TRAINING

■ *I am not sure where plyometrics fit into the weekly training cycle. I know such exercises should be treated as strength exercises, so does this mean they should be done on strength training days? (That is, do plyometrics, then do other strength exercises like squats, lunges, etc., all in the same workout?) Or should they be done on different days—and if so, what days—speed days, or endurance days, or technical days? In short, I am not sure how to fit both strength training and plyometrics into the same week! Also should they be trained twice a week or is once enough?*

In my experience it is best to do plyometrics in strength workouts, just as you describe. Doing otherwise, plyometrics and other strength exercises in separate workouts, would mean doing either kind of a workout when not fully recovered and before the supercompensation phase from the previous workout.

But if you recover quickly, you can try doing workouts with plyometrics and workouts with other strength exercises on separate days. For example, do plyometrics in workouts that precede the strength workout, such as technical workouts or speed workouts. Observe yourself and if you do not feel muscle soreness and feel full of energy the next day (or whenever your next workout is scheduled), then work out. If your results improve, then keep on working out like that. If your explosiveness or jumping ability improves and your maximal strength improves too, then good for you.

Usually one strength workout per week is enough to maintain strength for a few weeks. This means that after a few weeks, one workout per week is not enough, and you should see your strength declining.

Experiment, observe, and adjust and you will find a schedule that will work well for a while. When it stops working well, then again experiment, observe, and adjust...

■ *In the past 6 weeks I've started my running program (continuous training with constant intensity), starting at 8 minutes and increasing by 2 minutes every workout. I'm now at 30 minutes, and I do this twice a week. Now what I understand from **Science of Sports Training**, from now on I should be increasing intensity. I currently run at*

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HR 134–172, at my pace I usually hang around 171. What I understand is that if I increase too much on my heart rate, I'll be working more on anaerobic endurance than aerobic. The book says that after increase in intensity I should lower the duration of the workout. How much should I decrease my workout duration after that?

You do not make it very clear but I guess that you refer to the first and second stages of continuous training with constant intensity, described on pages 202–203 in *Science of Sports Training*.

What follows is the commonsense explanation of two stages of this type of endurance training.

First stage:

Exercise (in your case, run) at a pace at which you can maintain steady HR below your anaerobic threshold. Initially this pace may be well below your maximal aerobic pace (see page 351 in *Science of Sports Training*).

When during your exercise your HR climbs over your anaerobic threshold (you enter the critical intensity), even though your pace of movement is not increasing, it is time to slow down, cool down, and end your workout. Actually, you should not let your HR climb that high, so next time you work out, begin to slow down before you feel that your HR is about to get above the aerobic pace.

Gradually extend the time you can exercise at this same pace until the duration of your exercise is the same as that of your target effort (i.e., a typical intensive sport-specific workout). Another sign that you do enough aerobic work is not getting winded during your intensive sport-specific workout.

Second stage:

Increase the exercise pace gradually, from workout to workout, until it reaches your target pace. If your purpose is to increase your maximal aerobic pace, then end the exercise when your HR reaches your anaerobic threshold, or better, before that. If you want to increase your mixed aerobic–anaerobic endurance, then set your target HR about 10 beats higher than what it is at your maximal aerobic pace. As the set pace of your exercise increases in

subsequent workouts, you will see that it takes less time before your HR gets over the assigned limit, and so your exercise time gets shorter.

If you want to work above the anaerobic threshold, then you should do repetitive training and eventually interval training (see pages 203–208 in *Science of Sports Training*).

To manage your endurance training, observe yourself and if you see signs of insufficient aerobic fitness (see page 201 in *Science of Sports Training*), either decrease the volume of anaerobic efforts or increase the volume of aerobic efforts.

The heart rate range you exercise at shows that you have not paid attention to what is written about it in *Science of Sports Training* and in my columns (19 and 29).

To keep your exercise aerobic, do not let your heart rate exceed the difference between 180 and your age, if you are older than 16. If you are 16 or younger, you may run with a heart rate of 165 bpm. This rule applies to the majority of your training—such as most of your technical drills and sparring or grappling. The reasons are explained in *Science of Sports Training*.

■ **I have read at Amazon.com that Tudor Bompa invented periodization. Is this true? I thought that periodization was known long before he published any of his works.**

You are right. Tudor Bompa's works are not even firsts in the English language on the subject of periodization of training. L. P. Matveev's *Osnovy sportivnoy trenirovki*, originally published in 1977, was published in English in 1981 as *Fundamentals of Sports Training*, and it includes an extensive explanation of periodization. The first book, that I know of, to deal extensively with periodization was published in 1936 (*Legkaya atletika* by Bogdanov et al.). Even earlier works, published in 1922 and 1925 (*Nauchnye osnovy trenirovki* by V. V. Gorinevski and *Sushchnost' trenirovki* by G. K. Birzin), dealt with the structure of year-round sports training. The current understanding of periodization and its physiological basis was systematized by L. P. Matveev. His book on this subject, titled *Problema periodizatsii sportivnoy trenirovki*, was published in 1964.



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