Periodization for Sport, Part II

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In Part I of this series, we discussed the overall definition of periodization, its origins, and explored a few different periodization models. In this article, we will examine a new approach in periodizing training programs for sport.

Understanding Sport Demands

I receive many inquiries on how to design training programs for particular sports. It really isn't that difficult; you just have to remember what you are training your athletes for. As strength coaches, we must breakdown the demands of the sport from movement patterns encountered to distances traveled to energy systems utilized. Only then can we sit down to design the program.

The next thing to understand is which physical attributes the athletes' will need at the beginning of the preseason. This may sound a bit strange, but when writing a training program, decide where you want your athletes at the start of preseason and work backward from there. In most sports, preseason is often the most difficult part of the year from a physical standpoint. There are multiple practices/training sessions daily, lots of conditioning, and great amounts of soreness due to the volume and unfamiliar movements. According to the linear model of periodization, a peak phase will coincide with the preseason in which there is a low volume of strength work done at extremely high loads. Now, you must ask yourself how will performing this type of work prepare your athletes to play their sport (in the preseason). The preseason period is a time for coaches to implement systems and game plans, not worry about if whether or not the athletes are in shape.

Force-Load-Velocity Relationships

Sport occurs at extremely high speeds with high forces, is chaotic, and is performed in all planes of movement. As coaches, we must prepare our athletes to handle these stresses and perform at high levels. Performing extremely high load strength exercises at a very low volume prior to preseason will not prepare athletes for what they will encounter in sport. To understand this, we must look to the force-velocity curve.

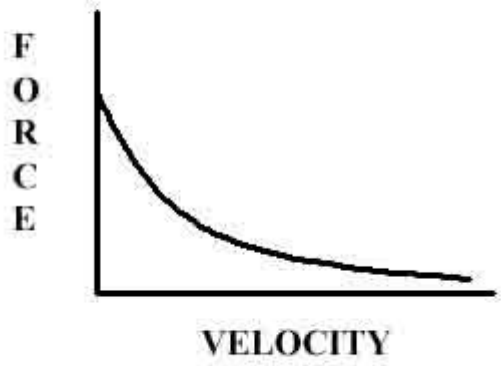

Figure 1. Force-Velocity Curve

According to this curve, high forces are produced at low velocities and low amounts of force are produced at high velocities (for concentric contractions). Call me crazy, but I do not believe this to be true. Sport happens at extremely high velocities and high forces. Speed training and plyometrics both occur at high velocities and high forces due to ballistic muscular contractions. I think the more appropriate term for force should be “load.” The curve below shows how load is more applicable, and where sport and weight training occur on this curve. According to this curve, it is easy to see that sport occurs at high velocities and with low loads (the sports to which I’m primarily referring are most team sports, not weightlifting or powerlifting). A high amount of force can be produced anywhere on the curve, but it is highly dependent upon the intent of movement, and at what speed it is produced.

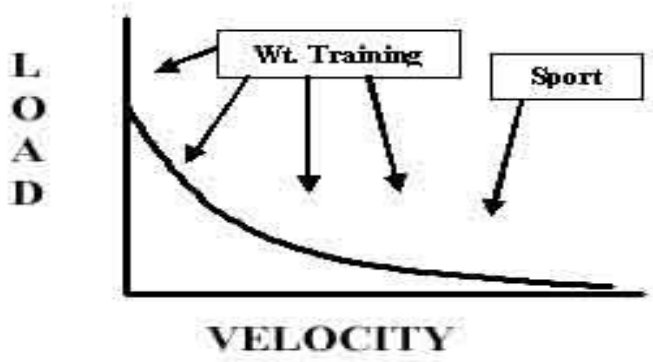

Figure 2. Load-Velocity Curve

This graph helps us to understand how to ultimately periodize for sport. As we get closer to the season, we must shift our emphasis from performing a vast majority of high load, low velocity exercises, to those that mimic sport, which should be lower load, high velocity exercises. This doesn't mean that your entire workout will include low-load exercises. It is imperative that higher loads are also incorporated to maintain maximum strength levels. On a side note, all strength qualities (speed-strength, strength-speed, maximal strength, strength endurance, etc.) should be trained throughout the year, but the emphasis of each will change according to the time of the year. This type of training typifies the conjugate periodization model.

One way to consider the above model and, in turn, this method of periodization, is to appreciate that we are periodizing the speed of contraction. The rate at which force is developed and applied is a key component to remember when designing training programs. Force is the product of mass and acceleration (F = M*A), and this equation can be manipulated a number of ways to increase force production. The following table is adapted from Christian Thibaudeau's Theory and Application of Modern Strength & Power Methods and shows basic force training methods.

Table 1. Basic Force Training Methods (1)

Ballistic Method	Speed-Strength Method	Strength-Speed Method	Controlled Repetition Method	Maximal Method	Supra-Maximal Method
F=M*<u>**A**</u>	F=M***A**	F=M*A	F=**M***A	F=<u>***M***</u>*A	F=<u>***M***</u>*A
Acceleration is very dominant. Mass is low.	Acceleration is dominant. Mass is low.	Acceleration and Mass are contributing equally.	Mass is dominant. Acceleration is low.	Mass is very dominant. Acceleration is very low to nil.	Mass is very dominant. Acceleration is very low to nil.

In sport, we must consider which variable will play a greater role in success: mass or acceleration? More often than not, it is acceleration. Initially, we must increase the ability of our athletes to produce a great amount of

force (using higher loads) and progress this to more dynamic movements that emphasize acceleration through a full range of motion. This will help to produce more efficient athletes because they will possess the ability to apply usable force. This describes power, which is the product of force and velocity. Below is the same graph from above, but with a power curve. Maximum power occurs at approximately one-third of the maximal velocity and one-half of the maximal load (2). It is important to realize that power can be increased both by heavy strength work as well as lighter speed work. For optimal results, both methods should be employed. The ability to produce a great amount of force quickly is an objective of training, and to accomplish this we must understand the demands of the sport to properly focus our training on improving our athletes for their sport.

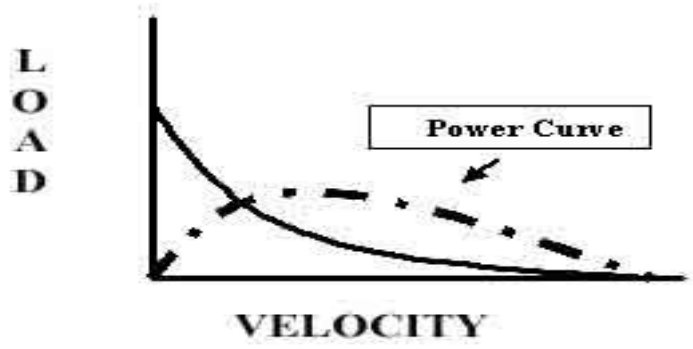

Figure 2. Load-Velocity-Power Curve

Progressions

Below, I've included a table depicting how different components of training can be periodized to prepare athletes for their sport. This doesn't mean that all exercises have to be performed the same way, but they should progressively change as the season approaches.

Table 2. Progressions for Components of Training

	COMPONENT	POST-SEASON	OFF-SEASON 1	OFF-SEASON 2	OFF-SEASON 3	PRE-PRE-SEASON *(3-6 Weeks before Pre-Season)*
	STRENGTH	Moderate Emphasis	Moderate Emphasis	High Emphasis	High Emphasis	Moderate Emphasis
	POWER (speed-strength)	Low Emphasis	Moderate Emphasis	Moderate Emphasis	High Emphasis	High Emphasis
	PLYOMETRICS	Long Response	Long Response	Medium Response	Short Response	Short Response

	LINEAR SPEED	5 yds	10 yds	15 yds	20 yds	Specific Distances to Sport
	LATERAL SPEED	Eccentric Control	Change - Lateral	Change – Linear/Lateral	Programmed Change	Random Change
	CORE/TORSO	Stability/Re-education	All Movements	All Movements	All Movements in Sport Position	All Movements in Sport Position
	IMPLEMENT	BB/DB's	BB/DB's	BB/DB's/Bands/ Cables	BB/DB's/Bands/ Cables	DB's/Bands/Cables/ Med Balls
	STANCE	Bilateral	Bilateral	Staggered	Step	1 Leg
	LIMB INVOLVEMENT	Bilateral	Bilateral	Bilateral/ Alternating	Alternating	1 Arm

As the off-season progresses, training should move from non-specific to specific to sport activities/exercises. This includes performing a greater number of exercises that emphasize rate of force production, using implements that can simulate some sport movement patterns, and performing exercises in positions that are specific to the sport. The chart above shows that not only strength can be periodized, but also movement training, torso training, as well as stances and limb involvement.

Summary

I hope you realize that periodization is not a fancy method than should be relegated only to the training of elite athletes. It is can and should be used for all levels of athletics and sports. Use it to help plan, organize, and coordinate your training throughout the year. Remember that it is imperative that you understand the demands of the particular sport for which you are training and that you periodize your program accordingly.

References:

1. Thibaudeau, C. *Theory and Application of Modern Strength & Power Methods*. 2003.

2. Zatsiorsky, V. *Science and Practice of Strength Training*. Human Kinetics. 1995.