2012-02-02

Powering Athleticism – Old School Meets New School

We all know a jock. You know the basketball player who switches to football, the tennis player who also is fantastic at hockey & volleyball, the motocross rider who skateboards and rocks the swell or the wrestler who quickly masters kickboxing. These are just a few carefully chosen examples of athleticism, a term meaning the capacity of an individual to perform a variety of complex movements, unique to their sport with the coordination and precision of a ballet dancer. Athleticism comes in a lot of forms. But, successful athletes in all the sports listed above have 2 things in common.

1. They all have to read and react to the changing, somewhat unpredictable environment they play and compete in.
2. Their body's muscular system will be challenged to defend against and produce movement in multiple planes.

Yet, while we commend each of the aforementioned for having great athleticism, each would have a tough, but not impossible time, switching outside of the grouping I placed them into. That's because each of the sports, contain underlying, and unique physical attributes. The read and react athleticism required to jump 30ft in the air, maintain body and bike is very different from going up and ripping down a rebound. The athleticism required to sprint down lane 5 of a track is very different, running routes and avoiding high speed collision on a football field. Yet for some reason our 'lifting' programs for the aerial athlete, court / field athlete and track athlete all seem very similar. Why do you think that is? Well, here's a little background on how the field of strength conditioning in North America has evolved.

Until the 1960's, most athletes rarely lifted weights to enhance sport performance or athleticism. Gymnast tumbled, swimmers swam, team sport athletes played the game. Numerous reasons were given for their athlete's exclusion from 'lifting'. Sports requiring great flexibility said their athletes would become to muscle bound; sports requiring endurance for success said that training any muscle beyond the heart and sport practice was counterproductive. And team sport coaches said the athletes would lose their fine motor skills. The sad part, while we have made great strides proving almost all of these theories wrong, strength and conditioning has its own old school, new school 'power' struggle.

Those with a weightlifting background will often cite their personal success and research showing significant impact of cleans, snatch, jerk on athletic performances like sprinting and vertical jump. Bodybuilders cite research clearly indicating that a bigger muscle is a stronger muscle, and powerlifters who bench, squat and deadlift for a living state that force is ½ of the Power = Force x Velocity. If that wasn't a large enough rift in the ranks, lets add those who believe whole heartedly in the SAID principle and sports specificity. This group believes you train movement, not muscle; that the more closely a movement matches the specific demands of the activity, the better. While, it's true that all of the above listed physical attributes are often required for sport success, one if not several of the other groups would quote or perform research disclaiming the capacity of the other to

impact performance. Table 1 list the primary benefit and counterclaim for each of the models mentioned above.

Table 1

Training Paradigm	Performance Benefit	Performance Decrement
Weightlifting (WL)	↑ Rate of Force Development (RFD) Vertical Jump & Sprint Performance	↓ Strength & Size Gains ↑ Increased Ground Contact Time ↓ Transfer of Learning to Performance
Powerlifting (PL)	↑ lb for lb Strength ↑ Strength of Tendons and Ligaments	↓ Power Due to Low Velocity Training ↓ Specificity of Movement ↓ Proprioception & Stretch Shortening Cycle Performance
Bodybuilding (BB)	↑ Overall strength & Size ↑ Strength of Tendons and ligaments	↓ Power Due to Low Velocity Training ↓ Specificity of Movement ↓ Proprioception & Stretch Shortening Cycle Performance
Sports Specific (SS)	↑ Transfer of Learning to Performance Due to Similarity of : • Movement • Energy Required • Velocity of Movement • Enhanced SSC	↓ Strength & Size Gains ↓ Power Due to increased velocity

So, who's right, what is the best way to give athletes the physical 'power tools' they need? The answer is, all of them, but neither in exclusivity. At this point, you're probably thinking, ok I see the problem, but what is the solution? Back in the 70 and early 80's, some of the genius's in the field of North American strength and conditioning decided to ask the following question: what are the best, most powerful athletes on the planet (I.e. Russians & Germans) doing? They discovered that the eastern bloc countries were taking the best of the above methods and placing it into a cyclic form of programmed variation called periodization. After a lot of tinkering and scientific exploration we've come to a point where the basic system periodization looks similar to Figure 1 below.

Figure 1.

	Annual Plan									
Phases of Training	Prepatory					Competitive				Transition
Sub Phases	Gen. Prep		Spec. Prep			Pre Comp	Comp.			Prepair to Perform (P2P)
Marcocylces (3-8wk blocks)	PL	BB	WL	WL	SS	SS	All + P2P	All + P2P	All + P2P	Vacay + P2P + Recreation
Microcycles										

Adapted From Bompa (1999)

Maximizing Power

Power isn't the only the only tool an athlete should possess but it's definitely an important determinant in many athletic endeavors and thus worth developing. In sport, explosive power is witnessed with game breaking offensive attacks, hitting a 400 ft home run off a 98 mile an hour fast ball, or the reactivity to cut and elude a defender. While we won't tackle reactivity until Part 2 and 3 of this article, it is important we define it now. Reactive directional changes to a previously desired movement have been referred to as 'reactive agility' (Jeffrey's, 2011). Power has been defined as a rate of generating force. Therefore, the faster a person can apply his or her strength, the more power they possess.

Force contributes to explosive power via F x V, suggesting that training to increase power is a function of both force and velocity. From the currently accepted practice seen in Fig1, the greatest gain in explosive power would be the result of training protocols that systematically combine maximum maximal force, maximal power and sports specific velocity.

It is well cited that as movement velocity increases, maximum strength production decreases (Siegal et al. 2002). Therefore, training programs designed to increase maximum force, while beneficial to power and high force sports, also result in compromises to maximum velocity. The opposite argument is also true; as movement velocity decreases, the capacity to generate or exert force increases. For this reason when strength and conditioning specialist develop training programs, there are a continuum of designations we give to specific positions in different sports. Here are a few examples of prioritized strength and conditioning designations:

- 1) Endurance – 2) Speed – 3) Force = Soccer, Hockey & Basketball
- 1) Speed – 2) Force – 3) Endurance = Baseball & Sprinting
- 1) Force – 2) Speed – 3) Endurance = Football Lineman & Discuss, Shotput

Here is the issue of identifying based on Force, Velocity and Endurance only. There is no consideration given to either the aforementioned reactivity or the *directionality of movement*. The biomechanical load of a relatively linear sport (nascar, sprinting, running, bobsled, broad jump, swimming) is vastly different than multidirectional sports listed earlier. Training the previously mentioned team and reactive sports exclusively with linear, non reactive patterns is a mistake.

While the concepts of velocity and direction specific increases in speed and power have been well supported in scientific literature, it appears, at least theoretically to contradict current practice, particularly when it comes to 'lifting'. A commonly accepted approach to training requires athletes to build a base of strength with powerlifting, before progressing to maximal power and weightlifting methods. Upon first analysis, one might accept this approach to be the most effective or optimal method to achieve athletic performance.

However, my theory on 'lifting' is simple. If training slowly (i.e. BB or PL) causes the trained muscles to move more slowly, or WL in a linear fashion doesn't optimize the multidirectional performance, why train BB, PL or WL exclusively. Training predominantly with one or the other is exactly how the traditional periodized model works. You train using one of the aforementioned paradigms, move to the next phase with the intention of training another component of explosive power and at the end of your training plan connect the dots. The belief is that the previous phase's velocity and force gains can be transferred via sports specific application into the elusive athleticism and power most coaches desire and require for success.

A much better approach would be to ensure that multidirectional power initiation & stretch shortening cycle activities were included in all phases of the training model. Compare Figure 2 below to figure 1. You will note:

1. the addition of stretch shortening macrocycles which run parallel and in concert with the lifting marcocylces.
2. I have added a vertical row to many of the SSC and some of the lifting macrocycles of training. This signifies a vertically prioritized training plan that combines SSC activities and explosive lifting for this phase.

	Annual Plan																																			
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Lifting Marcocylces (3-8wk blocks)	PL		BB		WL			WL			SS			SS			All + P2P			All + P2P			All + P2P				Vacay + P2P + Recreation								
								SS			WL																									
SSC Macrocylces	PI + DEC		PI + DEC		Mamp Plyo			Mamp Plyo			Hamp Plyo			Hamp RAg														P2P = Mob & Stab								
	LAMP SAQ		LAMP SAQ					Mamp RAg			Hamp RAg			Hamp Plyo																					
Microcycles	1	2	1	2	1	2	3	1	2	3	1	2	3	1	2		3	4	5	6	7	8	9	10					1	2	3	4	5	6			

In the 2nd macrocycle of spec. prep, I've introduced a co-priortized lifting phase. The top WL is the main priority so it will be given top billing when programming but SS and high velocity training can be introduced in the form of complex and contrast training. Research has proven that both high force and high velocity parameters can be trained simultaneously, without interference to the prioritized area of physical development. Therefore, it makes no sense to train either force of velocity then the other. In this way, basic periodized models often fall short. My suggestion, never allow your athletes to:

- TRAIN SLOWLY,
- BECOME SLOWER AS A RESULT OF YOUR TRAINING PROGRAM
- REDUCE THEIR STRETCH SHORTENING / KANGEROO CAPACITY

From practical experience, athletes today and even those of tomorrow will spend far too much time in a weight rooms talking to and replicating the biggest guy they can find. The strongest men in the world generally combine powerlifting with weightlifting (Winwood et al, 2011), yet they make the worst multidirectional athletes. I have seen a number of these individuals try to play sports – when you train exclusively to become bigger, stronger, or more powerful, your athleticism suffers. Why is that? Well, they have implied very specific demands, perhaps via old school periodization which have caused very distinct adaptive responses. These adaptations are unfortunately incongruent to maximizing athletic coordination and explosive multidirectional movement. They train in linear planes, sometimes moving heavy weights relatively slowly compared to high speed athleticism and are compulsive about having complete control of their training environment. Neither of which optimizes performance or develops athletes with the capacity to read, react, or move with the reactive precision of a navy seal, the quickness of a kangaroo or the finesse of a ninja. Now there's a super athlete combination ☺

In part 2 of this article I will examine and update the current power development & lifting model. I'll be taking the the best of current weightlifting practice and adding:

1. *A mechanical breakdown approach to training for sport and power*
2. *3D lifting techniques*
3. *The science of myofascial biomechanics.*

In part 3 of this article I will examine and update current periodized practice to include:

1. *a movement literacy & master of movement approach*
2. *a progressive SAQ model*

within the SSC marcocycles.

All references for both articles will be listed at the end of Part 3.