



Promotional art for Daredevil Vol. 2, #1 (Nov. 1998). Art by Joe Quesada and Jimmy Palmiotti.

DEVIL'S ADVOCATE

BUILDING SPEED DEMONS PART I

By Carl Valle CSCS USATF II
For Elitefts.com

Note: This exposé is a response to a few sprinting articles that claim that speed is an easy component of performance to train, and, that track coaches of all professionals are confused about developing it. Like cockroaches that scatter in the light, many of these “elite consultants” seem to hide in darkness of vague protocols because they are not developing speed. The first part of this article series will go into the necessary requirements of warming up for speed training only, while the other two parts will cover the actual sprinting and agility details. A special thanks goes to Adam Lockhart, an elite performance coach from Calgary. Coach Lockhart shared his key factors of program design when warming up for speed training that he uses himself with his bobsled athletes.

Part I- Preparing for Speed Training

You can tell a lot about how an athlete was coached by how they warm-up before training by just watching carefully. Within a few minutes one can tell if that athlete was well coached or if they were products of what I call performance posers, those that feed athletes a steady diet of too many toys and gizmos from training catalogs. Currently my concern is that there is a lot of emphasis on over prescribing exercises as a means to cure problems with muscle function that are side effects of bad program design such as the basic warm-up. Now that we have online businesses selling DVDs on how to start speed camps in the summer, I decided that I had enough of the “speed greed” and wrote an antithesis article to put coaching back into our industry. To combat the ugly trends we are facing I decided to make a few calls to the guys in the trenches with athletic preparation. One of the most impressive performance coaches in the field in my opinion is Adam Lockhart from Calgary, a real coach that trains Olympic athletes full time. We talked for about an hour on program design and focused on the art of warming-up, and it was clear that expertise is a rare commodity today. Coach Lockhart’s wisdom is a rare gem in an industry littered with balance clowns (1) and this article will share what I feel is important to coaches when developing quality warm-ups.

Preparation Checklist- What you need for Speed

Over the last ten years I have found what I believe is a great list key elements to place into your warm-up routine. Although the Dynamic Preparation title used currently is arguably more accurate, (and definitely sounds cooler) I will use warm-up here to keep things familiar for the regular guys- like me. (2) The reason I try to use the term warm-up is that it reminds athletes that temperature is a priority in preparing for training or competition. The three elements for preparing for speed work are:

1. Increasing core temperature specifically while activating the nervous system
2. Evaluating what you can do for the immediate workout session in particular
3. Tweaking and adjusting what you have so you can maximize the training session

Increase Core Temperature

Does anyone warm-up to increase body temperature means anymore? Seriously, perhaps the most obvious need in training preparation is forgotten because of the narrow focus on the mechanics of movement and corrective exercises popularized now. We as coaches forgot to step back and see the big picture and look at the raw needs first before we started splitting hairs on the details. So many times I see performance coaches fresh out of college (or newly certified) spewing too much Latin and Greek (anatomical phrases) to their athletes to sound knowledgeable. Nowadays, I rarely see thorough warm-ups that cause an athlete to break a sweat because of a lack of just moving around and brevity. Simply put you need heat up the body slowly and that requires time and gradual increases of intensity. Much of the needs of sprinting can be achieved by just getting the body “hot” and this can save you a lot of headaches by eliminating much of the activation and range of motion sequences you see today.

Before one addresses the range of motion of various joints and muscle groups, remember many track coaches value the effects of heat from warm-ups. As John Smith says to his sprinters, “cook the bird to the bone, but stay juicy”. I could not agree more with John on the importance of getting the body hot. While it’s impressive to see weekend warriors doing various exercises to “fire their posterior chains” better, they are ice-cold body temperature wise and are doing more harm than good when placing their muscles in extreme ranges of motion too early. No matter how fancy or innovative a motion looks, placing joints in deep positions cold with high levels of force (from your internal bodyweight) will likely create unnecessary strains that can cause small tears. After months (years as well) of warming up this way, you can imagine the build up of adhesions and trace amounts of scar tissue. It’s like death by a thousand cuts.



Note: To the left is Spider-Man doing a deep lunge like movement that is very demanding and should only be used with athletes that have progressed a high level of range of motion. Similar to strength training, flexibility must progress to higher levels of intensity slowly and not jump into levels that are not appropriate. I also suggest doing this posture only if you have sufficient static range of motion as well as great functional leg strength first*; and depth should be increased by fractional increments. Finally don’t do any specific dynamic work until you are very warm and ready. Using any flexibility to warm-up is analogous to using the cardiovascular responses of deadlifts to prepare runners for a marathon.

**Spider-man has an enormous power to weight ratio (100x bodyweight) and this strength quality with exceptional flexibility allows him to crawl in extreme joint angles without strain. This is great for superheroes with super powers but not for most athletes unless they have good coaches.*

Below is my rationale why you want to “get hot” from a physiological perspective and how to do it with some pointers:

- While the nervous system may get ready instantly (fight or flight) and muscle enzymes **(i)** and other reactions may be ready in a few minutes, it takes about 40-45 minutes to get connective tissues warm due to their poor blood supply. The most important lesson I can share is that both the warm-up duration and the gradual build-up are a must, and anything less will increase not only the risk of injury but overtraining as well. Three possible paths of overtraining are explained below:
 - ✓ Heat lowers the viscous resistance of working muscle and improves economy of movement and will allow athletes to be more elastic (read more “free energy”) and conserve fast acting substrates for higher intensities. Solid warm-up procedures will spare loss of glycogen and keep anabolic hormones primed. Warm-ups will preserve high-octane glucose for the demanding elements and the light work is like revving-up the engine with oxidized fat. **(ii)** With athletes engaging in multiple training sessions and intense training, any means of conserving glycogen stores will be vital to training. **(iii)**
 - ✓ Higher temperatures from quality warm-ups improve nerve transmission and aiding in motor unit recruitment. While heat may improve the electrical efficiency of the nervous system it will not necessarily recruit more motor units. What will indirectly help motor unit activation is having the body relaxed and elastic so high intensity actions can be done safely, therefore increasing more of the “deeper” motor units **(iv)**. Many can argue that less motor units is more efficient but the reality is more units the more power. Power efficiency is having motor units used at precisely the right time, not racing at lower speeds with better fuel efficiency. Speed training is about building maximal contractile qualities and efficiency should be thought as removing unnecessary waste **(v)**.
 - ✓ The body’s antioxidant pool adapts to the stress levels of training and must not be overloaded from unprepared enzymes poor internal buffering. Research shows that both slow and fast twitch fiber types have their own pathways to increase antioxidant enzymes based on intensity **(vi)**. Gradual increases of intensity will allow adaptation but shocking the body will cause an alarm response that is just too much to counter. The key is to prevent unnecessary stress first, reduce stress load second (via internal circulatory mechanisms), and cope with the resultant stress third (internal antioxidant defenses), and support any remaining stress fourth (with supplementation).

References Cited: Overtraining via Impaired Warm-ups

Note on cited references- Most of my observations are very difficult to be validated through research because I tend to look at very small details of program design that are overlooked by studies. Some of my observations are rather clear or justified with logic and reasoning so I don’t bother arguing the realities of gravity to unstable junkies. I decided to cite only areas I thought would be targeted by others believing I am over-analyzing things. This preemptive strike is not against anyone specifically, but it is a kind reminder I have done my research to justify my coaching instincts.

- i.** Martin, B. et al. 1975. Effects of warm-up on metabolic responses to strenuous exercise. *Medicine and Science in Sports* 7:146-49.
- ii.** Hetzler, R.K. et al. 1986. Effect of warm-up on plasma free fatty acid responses and substrate utilization during submaximal exercise. *Research Quarterly for Exercise and Sport* 57:223-28.
- iii.** Robergs, R. A., D.D. Pascoe, D, L. Costill, W. J. Fink, J. Chwalbinska-Moneta, J.A. Davis, and R. Hickner. 1991. Effects of warm-up on muscle glycogenolysis during intense exercise. *Medicine and Science in Sports* 23:37-43
- iv.** Gorassini, Monica, Jaynie F. Yang, Merek Siu, and David J. Bennett. 2002 Intrinsic Activation of Human Motoneurons: Reduction of Motor Unit Recruitment Thresholds by Repeated Contractions. *J. Neurophysiol.* 87: 1859-1866
- v.** Semmler, J.G. and Nordstrom, 1998. Motor unit discharge and force tremor in skill- and strength- trained individuals. *Experimental Brain Research* 119: 27-38

vi. C. Leeuwenburgh, J. Hollander, S. Leichtweis, M. Griffiths, M. Gore and L. L. Ji. 1997. Adaptations of glutathione antioxidant system to endurance training are tissue and muscle fiber specific. *American Journal Physiology-Regulatory, Integrative and Comparative Physiology*. R363-R369

- Proper attire is a must if you wish to raise and maintain body temperature. The most common error is that most athletes don't invest into getting high quality training clothing. I suggest athletes get thermoregulatory spandex (Underarmour) to keep loose and hot for training. Any excuse to make athletes feel and look like superheroes is a good idea in my mind.
- When muscle is constantly being repaired from intense training it can remodel with adhesions to the fibers, causing an array of possible muscular problems that will show up during maximal speed work (including acceleration) later that session or phase. This phenomenon of what I call "junk tissue build-up" I have seen with athletes that don't include enough low intensity conditioning work or those that are training through a lot of small strains overtime.
- Power work requires elastic responses, and hot athletes tend to have less overall tissue damage due to the suppleness of warm muscle. It is better to prevent unnecessary damage than to depend on post workout recovery methods. Regeneration modalities are to improve the completeness of recovery and not to "speed up the time an athlete can train hard again."
- Warm-ups should be structured have the same composition as Stairway to Heaven. Start out with simple drills gently and then build up and finish hard like Jimmy Page – live at the Boston Garden. Since we are talking about music, get a Bosch Box and blast your CD or MP3 player to keep things fun for you and the athlete. (3)
- Training should be incorporated seamlessly so that warm-ups are not workouts themselves but themes of the early part of training. Simply put you can place light conditioning units as well as other elements into the program to cover your system requirements without compromising their individual needs if they are organized shrewdly. (4)
- Biofoam rolling is frankly overrated and should used sparingly during the competitive season as a tissue restoration tool and not before a warm-up because you are not moving. Some clever coaches use them to help with athletes before squats to improve the quality of the movement such as Coach Landon from Illinois State University. I have seen only a few programs use biofoam rolling effectively and it should be coached just as well as an Olympic lift or heavy squat. Tossing a few biofoam rollers out to athletes in hope for a better "regeneration" program is like dumping Lincoln logs to a toddler and expecting a scale replica of the Pentagon. Biofoam rolling is like cough drops, you can keep putting them in your mouth to deal with throat irritation but washing your hands to keep free of germs in the first place is better. I use biofoam rolling selectively and find ways to pay for real therapy from the use of carwashes, boosters, and working with massage schools. Sometimes you must the massage yourself when needed. My motto is "Don't flirt with Styrofoam, date human massage."
- Use a pre-workout supplement that has a good blend of nootropic agents and other catalysts to internally prepare your body for speed and power days. This should be done for many reasons; first I have found that regenerative products with pre-workout activators actually protect athletes from both acute strain and "Brain Mitochondrial Death". While research is limited on the CNS, we do know that fatigue at the higher centers of the nervous system are likely to render an athlete tired from intense training acutely and chronically. Using a pre-workout product early will

transport the formula through the entire body from the cardiovascular response of warming up. I highly recommend the BSL product GO! For several reasons and more information is available at the end of the article.

Gage Readiness to Train

Presently, gauging an athlete's readiness to sprint is still more an art than a science because very few sprint coaches can share concrete biomechanical/biochemical measures that don't require Omegawave machines or 20 years eyes of experience. Most of us must survive with a decent pair eyes and good questions to ask athletes near the end of a warm-up. Here are my top five questions and observations for athletes:

Energy Levels- Before an athlete begins training ask how they are feeling energy wise. Make sure you observe them first for clues before since many athletes vary in honesty and effort. Very tired athletes that are known to be hard workers should be steered toward general conditioning or lowered volumes and or intensities of their speed training. In rare occasions a day off may be needed. The choice of what to do should be up to the coach because he or she will know the entire program and can but input from the athlete is important.

Tightness and Mobility- Athletes should communicate what feels abnormal in terms of restricted muscle groups. In addition to localized muscles, joints and movements should be gauged and evaluated. Usually rearranging following training units as well as extending the warm-up period will open things up. The best stretch is not a stretch at all. As they say in hot yoga, "Even iron bends when it is heated" so try to use exercise and body temperature to increase range of motion. Note: for adjustments see the last section on below.

Soreness and Aches-Delayed onset muscle soreness (DOMS) and tendon/ligament pains are common with high speed running due to the heavy stress of doing speed work. The trick to dealing with repair management (rate and duration of recovery of the neuromuscular system) is to estimate the slope of how fast the athlete is rebuilding their structural locomotive tissues and peptide pool (CNS fatigue) (5). The coach has the burden of trying to hit the sweet spot of both intensity and volume of training in order to keep the athlete progressing in a steady fashion by placing just enough of the right work that day to maintain qualities as well as improve overall preparation for the future. I can't even try to suggest training protocols because it's beyond the scope of an article, but many times coaches will need to decide what should be done today by thinking of tomorrow and next week. Speed and power training is like surfing lunar waves, don't miss the next wave by staying too long on one, and don't be stranded on the beach by waiting for the perfect tube and miss perfectly good riding waves. Many coaches tend to rest not enough but those that rest too much find their athletes flat by waiting for complete recovery and become stale.

Elasticity and Alertness- Building on the wave and timing of speed and power work concepts above, elasticity and alertness are two major components that optimize speed training and competition. Many times athletes will come to the track or playing field feeling good (without DOMS or aches to joints) but feel slow or "flat". Strangely they don't feel tired, but they feel groggy and are perplexed why they don't seem to be 100% ready. I will not get into unnecessary anatomy and physiology but the nervous system will sometimes need to be stimulated with a spark of light power work to turn on the engine a bit. Good warm-ups will build up from aerobic/rhythmic work to more power and neural stimulatory means so the nervous system will be activated. If those two qualities are not optimal, coaches should reduce intensity slightly and add more acceleration work if possible. A training load adjustment is to decrease the length of the sprints and add more repetitions of slightly reduced velocity may be useful. Many adjustments are possible but you must look and listen to what is going on with athletes.

Emotional Balance- One obvious factor is that many athletes bring their emotional baggage to practice and you can see an array of physiological side effects that must be

alleviated or training will suffer. Although many great athletes are notorious for having tunnel vision and are known to be fiercely independent, some are human and you can't help be in a position to help them with their problems. Athletes can be overly excited, sad or depressed, nervous, and angry. Your role as a coach is to take those emotions and find ways to work through those emotions with cues as well as being someone they can trust.

Tweaking the Sprinting Stockcar: Advanced Methods

Adjusting the neuromuscular system for speed should be done tune what you have presently, not to "raise the dead" or fix someone last minute. The current trend now is to activate muscle groups with what I call **Patch Programs**, or tiny exercise prescriptions of a few sets of a special exercise to stretch or "fire" muscles or remove hypertonicity from localized regions. Some of the new advancements are useful only if the coach knows what is going on but could be wild goose chase if thrown into a program like a dash of salt to a lame recipe (6). The root of the problem with many training elements is that many just add things into programs thinking it will enhance their program because some guru said so. If you are not sure you need it, don't use it. Remember that your program now might be the experiment to a speakers program next year.

Physiological Adjustments

There are about five qualities (I will share three) you can adjust with your athletes if you are doing speed work. Be warned though, "***it is better to adjust what your program to the athlete and not your athlete to your program***". Tinkering with someone's body requires a lot of experience you can't get from a book or seminar. Here are some analogies that might help you adjust your athletes "handling". Using NASCAR as the model, the driver represents the athlete and the coach represents the crew chief and your goal is to improve each race with good communication.

Removing Tightness- When a professional racecar driver complains his car is running "tight" the mechanics adjust the suspension, tires, and other parts to improve performance. Athletes may complain that they are running tight and most coaches try to adjust the flexibility of the athlete and this is when things get tricky. Perhaps the most confusing aspect about training is flexibility and it's relationship with athletic preparation and performance with all of the research saying one thing and everyone doing something else. With the research indicating that acute stretching before speed can reduce performance (7), why are some elite coaches still doing stretching before sprints? From what I have seen in the literature and what people are doing in front of my own eyes it looks like three factors could explain the discrepancy:

Timing- Many programs typically have long training times. Much of the research is acute (just before exercise) and not an hour after and this alone could be the factor why not too many programs loose the stretching before training and competition. By the time one needs to sprint maximally, the temporary loss in maximal contractile qualities has passed and performance is still optimized. In my own experience it looks like the duration of 30-40 minutes is the period of time that the neurological "shut down" will last depending on the intensity and training history of the athlete. Also, it's rare that one just stretches and waits

to compete for any period of time. Most athletes do some light acceleration work or some bouncy strides to get back a feel (psychological) of their stride and this may revert the optimal stiffness of the muscle.

Modality-Some elite programs use various forms of sophisticated PNF techniques as well as methods to release tension that disrupts the optimal stiffness ratio of the lower extremities. Theoretically the coaches may be using light training after range of motion work to undue the neurological “shut down” of the stretching. Many of the coaches use light bounds and drills to reset the tone of the legs, it is obvious that program design can influence flexibility as well. It would be interesting if some new research would study the whole warm-up procedure of elite programs as whole instead of just an isolated part.

Adaptation- Theoretically the SAID principle should allow athletes to adapt to acute stretching and it’s negative side effects over time. Perhaps the body is familiar with the stress to the muscle fibers and golgi tendon organs and builds a tolerance to the neurological “shut down” phenomenon. It would be nice to see new research on various programs instead of just parts of an entire program in a longitudinal study.

Protocols- The key factors to ensuring optimal joint mobility are program design, skeletal alignment, and range of motion work (flexibility). Instead of trying to chase symptoms with various activation sequences and dynamic movements it is better to evaluate the indirect training elements such as volume, program architecture, and restoration methods. It would be convenient for me to say do “this” or “that” when “this is tight” but here is a classic example with dialog:

Athlete: Coach, my hamstrings are still a little tight even after the warm-up. What stretches should I do before I sprint?

Coach: Let’s do some dynamic work to open those muscles up so we can sprint.

Zen Master Coach: Wait. It is clear that the previous actions were not optimal. I suggest you evaluate the training load of his lower extremity work two days ago, his post workout stretching, and what sprint protocols you will do today.

Coach: Yes, I do think we did a little too much speed work and our low intensity days did not incorporate enough muscle length restoration work. I will make sure we do something light with our speed work today so that Thursday is optimal.

Small intra-thematic adjustments can make a great program better by increasing the precision of a program without hurting the overall plan of the day or training phase. When an athlete complains of a restriction it could be a neurological hint to CNS fatigue and it may not just a “tight” muscle. This phenomenon is yet to be fully understood but those that attempt to exploit the body with various stretching methods that force range of motion under poor conditions make me wonder if they are doing more harm than good. I find that you want the body to have an even tension throughout the propulsive muscles so that the natural coupling ratios are not distorted. I have sent two of my athletes to one expert sprint coach that utilized an ART practitioner who adjusted the tonus of each run based on the coaches observations and the experience was quite humbling. Here are some of my stolen principles:

- You are only as good as your last restorative day with post workout stretching and those routines better be as sophisticated as your strength training programs. If one’s planning and administrative efforts with stretching are not in par with one’s strength training program, athletes will put in the same effort. A good stretching program should be brief because most athletes don’t get excited about flexibility. During a test day in the bench (most D1 programs) you will hear a roar of encouragement and energy when someone improves. I predict very little screaming when an athlete has increased their hamstring range of motion. Most programs do a crappy job with

flexibility because many have not reaped big benefits from it and those with a sound program can exploit bad efforts with a great program.

- Name your flexibility routines and cycle them like any other part of training. If they have a title it athletes feel like the routine is meaningful and will place more attention to them. Each stretch movement, position, and even the transition should be as detailed and coached as well as the strength exercises and like mentioned before be coached with the same standards as Olympic lifts or other technical exercises. This is something I have been guilty of not doing myself when I am tired or on a tight schedule.
- Flexibility must be “forged” like a Spanish sword by constant repetition and heat. Many times simple programs that are run dedicatedly have made some of my overanalyzed approaches look inferior. The first step is doing what you know and then get more sophisticated later only when the foundation is excellent. I remember trying to add in a very effective but technical component into my program with some high school athletes with no success because the team didn’t get the “feeling” of optional tension of good stretching in general. Most just tried to mirror the movements I was doing and didn’t listen to their body’s physiological responses. I try to use the phrase *forging flexibility* now and hope for some time to write some more things I have learned from my mentors later in an article.
- One problem with flexibility is that it is hard to measure accurately without testing equipment and expertise. Someone getting two more reps for a record in pull-ups is obvious but someone gaining a half a centimeter statically over the last two weeks is hard to appreciate. This is why most efforts fail if one is not present in a stretching program to encourage incremental improvement. Goal setting for flexibility should be reaching for a tangible point of reference, a specific angle, or a specific marking on a rope.
- Static range of motion has a direct and indirect relation to mobility and those that say it doesn’t correlate are missing the point that the ease of the dynamic motions. Just because you can use force to get to a certain range of motion doesn’t mean you are flexible. Strong athletes will create ground reaction forces that will place huge strain on the stretch shorting cycle of muscle tissue. This may be problematic if the joint ROM is not optimal and athletes could be tearing tissue greatly.
- Dynamic movements have less effect increasing tissue length if they don’t include too much torque from bodyweight or external loads (including velocity from ballistic techniques). Sometimes activating antagonists will relax the agonist that is tight through reciprocal inhibition if done with natural motions. Most of the natural movements can be human motions or animal mimickers to prevent artificial education of the nervous system. Most dynamic work should be the finishing touches to adjusted motions (muscle groups treated with conventional methods earlier) and they should be done closer to the start of the speed training.
- Several types of PNF stretches are very effective for speed and power athletes because they unlock neurological areas in slight spasm without causing the tearing effects of overzealous static approaches. The coach and athlete must communicate effectively to investigate patterns of tightness so that the body will not be overloaded through artificial methods of tissue adjustments. If the body is tight you must listen to the hints of possible fatigue and overtraining. Also PNF work should be done earlier after the first part of the warm-up. Also remember that I warned earlier about spasm being a hint of CNS fatigue and PNF should be done under expert guidance.

Improve Neuromuscular Patterns- Some coaches are adding various drills and **patch programs** to their warm-up to improve muscle recruitment and injury prevention. Most of the subroutines I see are glute/groin activator sequences placed before training and are starting to become popular with coaches to fix a recruitment or movement problem or to

prevent injuries. My question to those who use them is when do they get off of them? Can the athletes' muscle groups wake-up on their own and not be dependant on an artificial alarm clock? Why does your program cause glute amnesia if you have been working with the same athletes for a few years? Most of the preceding questions I asked can be traced from too much artificial isolation motions and current addictions to corrective exercises instead of general training. While most quality training programs have a balance of natural and artificial means (compound vs. corrective) some programs might need some activation patch programs because of pattern overload and time restrictions.

- I have seen (8) some activation methods used at Boston University Hockey with success but not everyone has an environment like Mike Boyle. I find that most "activation" methods are rarely effective for sprinting, but work great with strength training and should be used to maximize traditional lifts.
- By having your strength system contain both the maximal strength qualities as well as the efficiency of movement (muscle function/length tension relationships), a program can have a big effect in sprint performance later. From my holistic perspective most activation methods show either a weakness in program design as a whole or demonstrate the reality of pattern overload (elite levels or masters) with sport. I admit many of my errors are fixed by good massage therapists and corrective exercise instead of being better at juggling the interaction of all training elements, and is something that takes years to master.

Increasing Elasticity- Sometimes athletes finish their warm-up and communicate that they don't have their "spring" in their stride but feel rested and free of soreness. While I am not sure what the physiological cause of this due to lack of research, I do believe that the reason is that the loss of rebound may have similar roots to pre-workout acute stretching. My theory is that tissue has an optimal tonus to the requirements of sprinting after working with Travis Skaggs (world class soft tissue therapist) for a few years in late 1990s. After hearing the same belief vocalized by some high level coaches, I felt that you could adjust the tonus up and down depending on need of the athlete. Tweaking elastic responses to sprinting is for Michelangelo sprint coaches and not paint-by-number franchise programs that use carbon copy clone templates. (9)

Example of a Football Warm-Up for Speed Training

Important Considerations: *Since you made it this far let me share how I do my speed training with a small group of football players at the high school level during the summer. My experience is that you need 12-16 hours a week to prepare most football athletes to become complete and anything else is due to a business model first mentality. I encourage those to be creative with billing and explain your value. If you use factory methods of selling training you will hurt the industry and find yourself victim to other coaches that don't sell out. Results are first and it takes hard work and time, something that isn't easy to bill when you are trying to make a good living.*

When designing a workout you must look at how things overlap to improve efficiency and to remove deficiency. Most of the programs I see are extremely poor with their time and resources. I have spent a lot of time in less than optimal conditions with facility and equipment access (not to mention talent) and those lessons have made me much better as a coach. Since the early summer is a time to work on maximal qualities (a high school off-season with three sport athletes) I do two primary linear speed days with

complementary secondary agility components. The middle day is reversed and I tend to go more lateral/Agility as a primary component with a secondary emphasis on straight ahead speed. I am also a believer in work capacity and aerobic capacity over traditional “endurance” training methods so I tend not to use too much running to prepare the heart and lungs because the body breaks down if you have athletes that are 200 pounds or more doing Kenyan like runs in the woods. My favorite way to condition football players and most ball sports is from the use of team dodgeball in the gym because kids enjoy the game and get specific conditioning without moaning and groaning. **(10)** I use catabolic energy system work first (so long as it’s not too taxing) and then do anabolic work after. Here is a general outline **(11)** that we did last summer.

[1] Kerberos Speed and Power Protocol–The first part of training is more of an administrative period of interacting with athletes *while* they set up the equipment to make sure you know how they feel in terms of energy levels, injuries, soreness, and tightness. After you know how people are feeling, you can make changes to their training in parts 2-5 later in the workout. Duration: 5 minutes.

[2] Raven Imprinting Script–Most performance coaches that hate track drills are likely to be more a trainer than a coach and I await an article to counter this statement. Sprinting mechanics are not to be underestimated but sprint drills tend to be poorly integrated by some coaches because physiological and anatomical factors play a big role in mechanics. Due to time restraints and transfer limits I choose to use drills that force athletes to do the right thing without causing athletes to become paralyzed by fears of not “doing something right”. Since it takes time to warm-up and doing drills in a dense manner can create some work capacity, I feel that you are not losing valuable training time like Adrian Faccioni believes. **(12)** Faccioni advocates in his Dynamic Warm-up Routine article 5-15 minute warm-ups to save time for training and I question his wisdom here. If training is part of the warm-up than you are not wasting time and it is most likely not going to have athletes in the training room asking you why your inchworms didn’t help them prevent their pulled hamstring. All of my drills are stolen from previous coaches like Gerard Mach and other legends of sprinting. I suggest one read the works of Coach Francis to better understand what it takes to become a great teacher. Duration: 20 minutes.

[3] Tonus Regulator Procedure– After about 20 minutes athletes should feel ready to go and most of the residual tightness from the previous training day and cumulative days should be removed without a single passive stretch. If the athletes still feel a bit tight some dynamic work can be used to take advantage of reciprocal inhibition to address some spastic tightness without tearing tissue. Some elite sprint coaches have been known to use some of the eight types of PNF patterns to release tension as well as build up a capacity to handle heavy sprinting loads that feel is developed after years of day to day work. Some light microstretching may serve useful if done at a therapeutic intensity. Duration: 5 minutes

[4] Elastic Power Generator– I find that agility has a huge strength and elastic influence and I don’t think Barry Sanders learned his moves from a DVD or speed coach it was from having the gifts and maximal strength to perform his reactive work. The problem with top speed work as being a stimulus for elastic work is that many heavy athletes have poor maximal speed abilities and this makes this type of work risky. I prefer minimal top speed work (not because of play distances and game demands) and using power balls to help with jump throws and power swings. Due to the elastic work the body is getting higher activation qualities and the internal heat generated will prepare the body for speed work later. Various mini jumps/hops and landing drills are also useful from a progression perspective because most plyometric exercises are too demanding for non-jumping athletes. I prefer to do 80% of my plyometric work with two legs even though most actions are on one leg. Light dynamic flexibility work should be placed here and most explosive movements include such qualities as coordinated lengthening of muscle fiber. The torsion forces on the lateral knee are too much with all the choreographed cutting movements I see and it’s best just to give the body a taste during the off-season. Duration: 15 minutes.

[5] Acceleration Module—If the previous 45 minutes of training was done right you will have the time to do 6-8 great sprints with adequate rest. Remember that the **[4]** EPG subprogram should have placed the finishing touches to the speed preparation. Since most runs are 20-30m a rest time of 2-3 minutes should be long enough to regenerate ATP to improve sport speed. I don't like coaching mechanics at this point because the last thing I want to do is tame or train a tiger. Some mini hill sprints do cue arm speed to drive the body and I use them to get athletes to naturally value arm action. One problem with some programs is the political influence of head coaches wanting to see their football players be in "fourth quarter" shape and despise any "standing around" during conditioning. Like some medieval inquisitor, some of the coaches equate pain with performance and wonder why their athletes have little gas for games after marathon practices. Speed requires rest and many times you will have to use illusions of conditioning by doing some active recovery between sprints. Duration: 15 minutes.

Extended Notes and Comments-

(1) My belief is the real problem with the balance addiction we have now is that many coaches can't get athletes strong anymore. Instead of years of hard work getting yourself and other athletes strong, many got into balance because it could be learned quickly, and, make strong athletes look foolish if thrown into a demanding exercise to show need for their balance programs. I do think single leg exercises work but they are just the first step to leg strength.

(2) Don't get too fancy with titles to warm-up or you may get called on it. I visited one facility about six years ago and they used five words in a phrase to describe their warm-up. To make the story short, their Dynamic Training Preparation Motion Progression didn't work well enough to keep their star athlete (football combine client) from getting a grade two groin pull after doing a ballistic stretch within the first five minutes of training.

(3) Yes, I did translate their musical composition into a warm-up with two weeks of research on Led Zeppelin's most famous song complete with guitar tabs. Many of my training programs have mathematical musical qualities because my brain was on too much Dunkin Donuts coffee.

(4) Mike Robertson and I wrote a useful three part article series for T-Nation.com last year. I suggest you read it if you are designing workouts and want to improve your results with athletes or those training for physique enhancement.

(5) When creatine became huge in the early 1990s many athletes had joint issues from their strength levels improving too fast from muscular tension. Connective tissues remodel about 7-8 times slower so you must be careful with anything that works well. Also what is interesting is that the CNS may induce fatigue to protect the body from too much stress on connective tissues by shutting down the body a bit to force it to rest. This is why I cringe when I saw a program that lifted lower extremity Monday, did plyos Tuesday, and then sprinted Wednesday at a high school program. The joints need rest and that requires time and unloading of impact movements.

(6) A big influence of wisdom comes from David Kerin, a fine track coach from Vermont who explained the difference between great coaches with a use of a clear cooking analogy. The irony here is that some of the great chefs do come from Vermont's culinary programs if they don't become ski bums first.

(7) The best research article I have read on acute stretching and performance was one from LSU about a year ago. Not only did they use rather elite track athletes, they measured sprinting performance instead of the cliché vertical jump. If you are interested in the article please visit the flexibility section of elitetrack.com and read it.

(8) One of the most bizarre visits was to Boston University this past February because for the first time in years I was actually invited to watch a coaches program in action. I was so used to spying on programs (I do get permission but it's nice to see what really goes on after NSCA presentations) I wasn't comfortable observing "in the open". It was a great learning experience to see a D1 program use both classical programming (Olympic and barbell lifts) and progressive training methods.

(9) I have nothing against templates since my own program is based on one but you must be able to blend the paints a bit and not be too stuck on precise numbers. As you get better you will be able to predict things in training as you learn about reactions to stress and learn your athlete's tendencies. The Westside Template has some great elements but when I see 150 pound high school football players doing dynamic bench work with a "personal trainer" I start projectile vomiting. The Carbon Copy Clone reference is from the Tom Bombich program used to clone configurations of Mac

computers. During my other job in IT I realized some important lessons about the limits to cloning things and this is a separate article that I will write later. So when you follow things very carefully you may find yourself with more problems than you think. This is why I am awaiting for certain performance enhancement facility to go bankrupt. You can order a #4 Whopper with cheese complete with french fries and coke but it doesn't work too well for developing athletes.

(10) Remember what it's like to be an athlete. I find if I am not having fun as a coach it is likely that my athletes are bored as well. After doing a conditioning circuit for a few weeks I snapped from the need for something more entertaining. One of my favorite childhood experiences was dodgeball and I decided to use it for conditioning because of the game's work to rest ratio and it wasn't too hard on the legs at all. I put on a polar HR monitor on myself and found it to be perfect for work capacity training and specific endurance. If you want to develop athletes I suggest a few games because it provides agility, throwing, and catching.

(11) Some coaches and athletes ask if I keep their entire training program in my head and the answer is yes. Don't think I make things up as I go along because I do plan workouts daily and weekly with written notes. I like using modular blocks of training to keep athletes thinking and my knowledge of computer programming. The use of various programming and scripting languages that design my training programs helps me individualize the workouts by letting athletes make decisions under my parameters. My feeling is that the bigger the group of athletes the more internal flexibility is needed for customization or you will get a lot of non-responders. One of my best friends is a project manager for large software firm (also a great swim coach) and his brilliance made my training programs radically better. If you still use a template card for your athletes I suggest you ask yourself how many adjustments (without losing the needed elements) you and your athletes are making per workout to find a sweet spot.

(12) I went to elitetrack.com and looked at the great article library (in pdf format) and downloaded Adrian Faccioni's article on dynamic warm-ups and wondered how many people use microwave (read 5-15 minutes) duration warm-ups to get ready for training. Some his points were informative though, and I agree with his belief about placement of static stretching after training.

Activating and Regenerating the Central Nervous System

Supplemental Nutrients



Many athletes ask what products I use for my clients and I give a short list of key supplements after they have proven to maximize their current eating habits. Most of your food budget should be organic and free-range sources and some of the grocery budget should include protein powder to aide in muscle repair. Due to the fact that even the most expensive protein powder is cheaper than conventional protein (fish, chicken, beef), using protein powder is a great way to save money while enhancing your recovery program. Nearly all of your supplement budget should be regeneration products such as high quality fish oil, antioxidants, and ZMA. I consider PWO formulas not part of the supplement budget because they are simply protein and carbohydrates and that should be classified as part of one's grocery bill. In the past, muscle and nervous system enhancers such as pre-workout stimulants were the frosting to the cake but now are the initiators of the regeneration process. Some products such as the BSL product GO have protective qualities to athletes because they assist the warm-up (via fat oxidation) and prevent mitochondrial death to neurological cells of the brain. For about the cost of two mochas from Starbucks you can get an entire month's supply of a pre-workout formula. Key buffering agents with a caffeine and tyrosine stack prime the neuromuscular system for power related work and of course the ALCAR saturates the upper centers of the neurological system to protect against mitochondrial damage. CNS supplementation is still in an infancy stage and definite answers are not available, but athletes find the GO formula effective so far. A 20-serving tub for \$9.99 (powder) is a great value and the two flavors (grape and fruit punch) are excellent. Visit www.blackstarlabs.com and order 3 so you can get a free tub (random flavor). The GO internet special will run for a limited time, so order before the GO formula is acquired (by another company).

1. Tagliatela G, Angelucci L, Ramacci MT, Werrbach-Perez K, Jackson GR, Perez-Polo JR. Stimulation of nerve growth factor receptors in PC12 by acetyl-L-carnitine. *Biochem Pharmacol* 1992 Aug 4;44(3):577-85
2. Liu J, Atamna H, Kuratsune H, Ames BN. Delaying brain mitochondrial decay and aging with mitochondrial antioxidants and metabolites. *Ann N Y Acad Sci* 2002 Apr;959:133-66
3. De Angelis C, Scarfo C, Falcinelli M, Perna E, Reda E, Ramacci MT, Angelucci L. Acetyl-L-carnitine prevents age-dependent structural alterations in rat peripheral nerves and promotes regeneration following sciatic nerve injury in young and senescent rats. *Exp Neurol* 1994 Jul;128(1):103-14
4. Virmani MA, Biselli R, Spadoni A, Rossi S, Corsico N, Calvani M, Fattorossi A, De Simone C, Arrigoni-Martelli E. Protective actions of L-carnitine and acetyl-L-carnitine on the neurotoxicity evoked by mitochondrial uncoupling or inhibitors. *Pharmacol Res* 1995 Dec;32(6):383-9
5. Hongu N, Sachan DS. Caffeine, carnitine and choline supplementation of rats decreases body fat and serum leptin concentration as does exercise. *J Nutr* 2000 Feb;130(2):152-7
6. Thomas JR, Lockwood PA, Singh A, Deuster PA Tyrosine improves working memory in a multitasking environment. *Pharmacol Biochem Behav.* 1999 Nov;64(3):495-500.

