TEXAS COACH















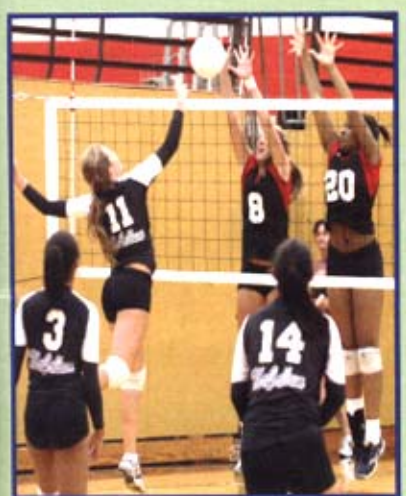

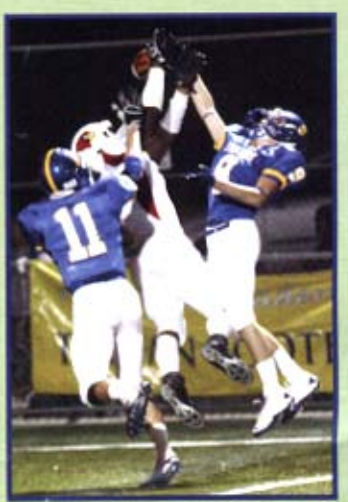


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Bridge the Gap
Sprint Resisted Training

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"Heredity only deals the cards; environment and training plays the hand." (1 p.1) It is possible for an athlete to improve in every phase of playing speed, whether it be maximum miles per hour, stopping and starting, feinting, faking and cutting, or multidirectional high speed acceleration with a complete "holistic" speed development plan. (1 p.1) Genetically gifted athletes may be fast with little work or preparation, but they are nowhere near their genetic limitations with regard to maximum speed.

The most important factor to work on in order to increase your start, acceleration, and maximum speed is to increase "ground contact forces." These forces are determined by the speed-strength of muscles pushing action away from the ground in the start, acceleration, maximum speed, and speed endurance. The athlete's speed-strength to bodyweight ratio comes into play here. (1 p.5) Ground contact forces determine the maximum speed an athlete can reach. (1 p.5) For each pound of body weight 2.15 additional pounds of ground contact force are needed just to maintain an athlete's starting, acceleration, and maximum speed. (1 p.5.) So, if an athlete packs on an additional ten pounds of mass, he will need an additional 21.5 pounds of ground contact force, regardless of the composition of the added mass.

The deadlift, in my opinion, is the single best test for speed-strength (ground contact forces). It is technically simple and an athlete should strive for 2.5 times his body weight, though 2.2 times his body weight is considered good. Other good tests are the double leg press, and single leg kick back. One must also test for muscle imbalances, an example being the leg extension and leg curl. Ideally the ratio would be 1:1, however a 3:2 leg extension to leg curl ratio is acceptable. Testing the strength of the right and left leg comparatively is recommended.

If athletes want to maintain their speed with added mass, they must focus on training speed-strength. Sport loading is the preferred method, using free weights (deadlifts, cleans, etc.). Resistive sprinting, with sleds, harnesses, weights, inclines

(1 p.5), and, of course, sand, which my good friend Matt Poe introduced to me, also are helpful. We are going to look at how to effectively apply sprint-resisted training.

The object of sprint-resisted training is to use resistance without retarding sprint mechanics. (2 p.483) The idea of "work fast" is crucial in any power sport and in improving speed. (1 p.4) A 10% or greater change in external resistance in general negatively impacts on movement kinetics and overall sprint technique, in most cases. (2 P.484) This formula is a guideline, not a rule set in stone. Analyzing sprint mechanics by a qualified professional is more valid than any formula. Two aspects of sprint mechanics must be emphasized to get the desired speed training effect: Explosive arm and punching action and explosive leg drive off the ground. (2 p.483) When performing sprints, try not to drop below five percent of your maximum speed. (1 p.84) As long as a coach is timing, this is not hard to track.

Weighted body suits, vests and shorts can distribute the load over each segment of one's body. Stan Plagenhoef invented a weighted strap system that accomplishes this, probably the best on the market. (1 p.72) Plagenhoef's suit has four sections: upper body, arms, upper leg and lower leg. This suit distributes the weight to attain specific sprint loading. (1 p.72) Bosco's research in 1985 showed that with proper use of sport loading, power output and sprint performance improved. The average improvement in vertical jump was ten centimeters after just three weeks of training. (1 p.72) A similar study at BYU on female athletes confirmed Bosco's findings. Subjects increased vertical jumps five centimeters, using weight vests an average of ten percent of the participant's body weight. (1 p.72)

Some athletes are concerned with injury of the back, knee and ankle joints. Other's prime concern is deterioration of form, function and range of motion. This is highly unlikely, unless the vest or other weighted clothing fits poorly or the athlete ignores presented guidelines. Proper use of a weighted vest will strengthen key muscles and convert the gains made into the neuromuscular pattern of sprinting. (I p.72)

The National Association of Speed and Explosion (NASE) has guidelines on which vests to use for different phases of training. For strength endurance 1 to 20 pounds can be used, and for speed and quickness 1 to 8 pounds.

The question now is how to properly integrate this information into a training program. For a minimum of 20 minutes and up to thirty minutes, focus on proper mechanics and technique mastery, with no added resistance. Focus on a specific skill of your sport; a basketball player might

practice a jump shot. The next step is drill mastery. You can begin by slowing the movements down, and as your confidence increases, move towards game-like conditions, with no added resistance. During the third step add the weight vest and shorts. They will serve as a superb training aid for strengthening, integrating and automating movement patterns. (1 p.77)

Here are some guidelines for using speed vests: For the starting zone from 0-20 meters with 1-20 lbs of resistance for 15 to 30 minutes; Working the acceleration zone of 0-30 meters, use 1-20 lbs of resistance for 15 to 30 minutes. For the flying zone of 20 to 40 meters, use 1-4 lbs for 15 to 30 minutes. The 90% zone should use 1-4 lbs for 100 to 300 meters for 15 to 30 minutes. The speed endurance zone should use 1 to 8 pounds for 15 to 30 minutes, and for aerobic work use the same weight for 30 to 60 minutes.

(1 p.78) Be aware of the periodization factor in resistance and intensity, and look at energy systems being used.

The Austin Leg Drive machine is a helpful piece of equipment for specific sport loading sprint resistance. This piece of equipment is expensive and most people do not have easy access to it. We won't look at it in depth because of this. The action closely mimics the start and acceleration phase of sprinting. (1 p.78) Be aware of this piece of equipment and take advantage of it if you have access to it!

Harness sprinting requires wearing a harness on your waist. You can pull another person or a sled. (3 P.262.) An advantage to harness sprinting is that near maximal velocity is achieved, but a constant load is placed on the hip flexors. Mike Boyle MS, ATC says of weighted sleds, "Weighted sled drills target the specific muscles used in sprinting and help to bridge the gap between form running drills and weight room exercises." Boyle goes on to say, "Many athletes can squat large amounts of weight. Far fewer athletes seem to be able to run fast. A weighted sled teaches strong athletes how to produce the type of force that moves them forward." Some coaches may spend too much time on sprinting technique and not enough on force application. Boyle has made this same point.

The surface an athlete trains on is important, whether it is grass, turf or sand. If your mechanics or speed is suffering, look at the resistance you are using and the surface you are training on. Both may need to be changed. With sleds keep the rest periods long to allow for full recovery.

Russian sprint coaches developed speed parachutes. They overload the muscles during high speed sprinting. (3 P.262) Once the parachute is attached, short sprints of 20 to 50 yards are run for 3 to 15 repetitions. (3 P.262) Make sure proper sprint mechanics are mastered before using the parachute. A technique some athletes use is to run 10 to 20 yards with the parachute, then release it. This will cause the athlete to surge forward and overload the fast twitch muscle fibers. (3 p.262) Again allow long rest periods for recovery.

An old school technique for developing leg power is running stadium stairs at the local stadium. The entire body will be overloaded during the sprinting motion. (3 p.262) First find stairs that will support your weight. The number of repetitions will vary because of the size of the stadium. Sprinting up the stairs at the Rose Bowl is different than sprinting up stadiums at a 2-A high school. Start conservatively and gradually build up intensity. (3 p.262) Perform different variations of stadium sprinting: One stair at a time, two stairs at a time. Advanced athletes may even add a weighted vest. Sprinting stadium stairs forces your legs to extend vigorously during the push off phase of the running stride, and you have to absorb shock as you land. This will develop dynamic leg strength, not possible using a stair stepper machine, that will require minimal stride length with very little impact. (3 p.263)

The law of acceleration states "a force applied to a body causes an acceleration of that body of a magnitude proportional to that force, in the direction of the force, and inversely proportional to the body's mass." (4) In terms an athlete can understand, if you weigh 200 pounds, the ground puts back 430 pounds of force, 2.15 lbs times the athletes body weight. This is true if you have mastered correct biomechanics while sprinting. Assuming correct technique, your body is in motion (4). Now add a 45 pound plate behind you. This added factor is going to put your body in a stage of muscle cell recruitment. The amount of energy being used is enough to just pull the sled. (4) When the athlete takes off the without the sled, he will feel faster. His muscles have remembered using the added resistance and they make sure those additional muscle cells will be ready for the next sprint. (4) With multiple repetitions the feeling turns into actually being faster.

The ground works like a trampoline. Shock is absorbed by the ground then shot back. Sand has multiple levels. In soft sand that is 3 feet deep, the athlete will sink around 3 inches with each step. The average shoe sole is one half inch. Every inch of sunken sand means you are running on two different levels. If you sink 3 inches, you will run on six different levels. The soft sand absorbs 100% of the applied force, yet only throws back a small percentage at the athlete. You will be required to pull your legs and body out of six different levels. This will require a greater energy supply and greater muscular strength than a hard surface. (4) "Anaerobic hell" is the result, like late in the game when you have to dig deep. Acceleration must be accomplished without depending on the ground's primary force reaction. Your ATP stores from the phosphagen system will de depleted at a much more rapid rate. (4) Training in sand, with a proper program design, will make you feel like you are accelerating down hill.

This is a program Matt Poe, a speed training mentor of mine, recommends. These are his words and his template, to increase your forty yard dash time. This is for someone with six weeks to prepare for the combine, looking to decrease his forty time.

With a sled and enough weight added to keep the correct biomechanics, try this pyramid at 200% effort:

Four 10's in the sand, Four 10's on the field.
- 2 minute break
Three 20's in the sand, Three 20's on the field.
- 3 minute break
Two 30's in the sand, Two 30's on the field.
- 4 minute break
One 40 in the sand, One 40 on the field.
- And please do not throw up in the sand!

Sprint resisted training, utilizing proper mechanics, is crucial to any speed development program. If an athlete gets stronger in the weight room, he has to be able to create greater ground contact forces. Sprint resisted training bridges the gap between weight room strength and speed potential. Sprint resisted training will allow an athlete to perform when the rubber hits the road.

Sources

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2. Janet C.Harris, et al. Essentials of Strength Training & Conditioning.
3. Fahey, Thomas D. ISSA Specialist in Sports Conditioning
4. Poe, Matt "Understand the Sand." Intensity Magazine