

Using a Weighted Sled for Acceleration Improvement

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Before even beginning, let's clear up one point.

Sport is about acceleration, not speed.

We have a problem in sports. Coaches consistently use the wrong term when discussing the quantity they covet most. Tests like the ten, twenty and forty yard dash are actually tests of acceleration not speed. You only need to look at world-class sprinters to realize that top speed is not even achieved until approximately 60 meters. As coaches our interest is not in top speed but, rather in acceleration, the zero to sixty of the auto world. How rapidly an athlete accelerates will determine success in team sports, not what the athletes absolute speed is.

Why does this matter? A great deal of the research on speed development focuses on speed in track and field context and not in a sport context. In track the shortest event is the 55 meters, in sport the long event is a forty yard dash (although baseball will go 60). The track influence may in fact have limited application to sport due to sports frequent use of acceleration mechanics versus speed mechanics. In training for track, coaches frequently make reference to the pulling action in running and work on drills to develop a pawing action against the ground. In sport the action is primarily pushing with the center of gravity slightly ahead of the feet, kind of a reverse Michael Johnson. This may mean that much of what we currently view as speed development may have limited application to team sport athletes.

Numerous studies have discredited the weighted sled as a tool for speed development citing the sleds limited effect on top speed. In truth, the evidence that weighted sleds may not improve top speed running, does not apply to acceleration and may have led us to undervalue a potentially valuable piece of equipment. In fact many authors who have stated that the weighted sled did not improve speed, do indicate that it will improve acceleration. Our problem has been that we misinterpreted the results of the research. Most coaches spend time working on form running and technique to improve speed. These same coaches also include lower body strength workouts to improve strength. Although these are both obviously important there may be a missing link. The development of specific strength. How often do we see athletes who run "pretty" but not fast? In my opinion many coaches attempting to develop speed spend far too much time on technique drills and far too little time on developing the specific power and specific strength necessary run faster. In fact in 2000 The Journal of Applied Physiology published an article called Mechanical Basis of Human Running Speed. The article synopsis begins with the line "faster top running speeds are achieved with greater ground forces, not more rapid leg movements". This has become known as the Weyland study after lead researcher Peter Weyland. Weighted sled drills target the specific muscles used

in sprinting and help to bridge the gap between form running drills and weight room exercises like squats and Olympic lifts. .

Many athletes can squat large amounts of weight. Far fewer athletes seem to be able to run fast. Any student of speed will tell you that many of the strength exercises commonly recommended for speed development work hip extension but, not hip hyperextension. In running speed all of the force production is from hip hyperextension. The ability to apply force to the ground and create forward movement can only occur when the foot is placed under the center of mass and pushed back Although squats etc. will train the muscles involved, the training is not specific to the act of sprinting. This may be one reason we see a higher correlation to vertical jump improvement than to speed improvement through strength training. A weighted sled teaches strong athletes how to produce the type of force that moves them forward. The sports scientists like to break this down into special strength and specific strength. Although I believe the difference is minimal. It is important to understand the difference between the two quantities.

Special Strength- movements with resistance that incorporate the joint dynamics of the skill. Sled marching would fall into the special strength category. I believe that sled marching may in fact be the best tool available for speed development. An athlete's inability to produce force in the action of sprinting becomes glaringly obvious in sled marching.

Specific Strength- movements with resistance that are imitative of the joint action. I would place sled running in the specific strength category

In the past coaches have recommended that resisted speed development work must not slow the athlete down more than 10% or must not involve more than 10% of the athletes bodyweight. These recommendations seem to be based on motor learning research that indicated that excessive loads would alter the motor patterns of activities like sprinting or throwing. I have always felt that there was a missing link to speed development but, until a few years ago this so called "10% rule" kept me from aggressively pursuing my gut feeling. Presently, my feeling is that loads up to and exceeding the athletes' bodyweight can be used for special strength work as long as the athlete exhibits a similar motor pattern. Think of sled marching as a special type of leg press. Athletes incorporate the joint dynamics of sprinting through hip hyperextension against resistance. This can be an extremely heavy movement as long as we get a technically sound march action (perfect posture)

With sled running, the approach moves toward specific strength. In sled running the loads will obviously be lighter but, I still do not follow the 10% rule. The main variable in sled training is not the weight on the sled but, the motor pattern. If an athlete can hold an acceleration position and run without altering mechanics than this is a specific strength exercise for sprinting. Why should we be limited by arbitrary guidelines like a 10% load or a 10% decrease in speed. Over twenty yards, ten percent is 2 one-hundredths of a second. The key should be to look at the athletes posture and motor pattern. If the athlete has to alter the mechanics to produce the desired action than the load is too heavy. The

so-called 10% rule does not allow us to apply progressive resistance concepts to this form of training.

Another obvious but overlooked variable that alters the so-called 10% rule is the surface being run on. Loads placed on the sled will be lighter on grass and heavier on AstroTurf. This simply relates to coefficient of friction. Less weight produces a large amount of friction as the sled moves through grass. On Astroturf or a similar surface, the same weight would be too light. Another variable is a flat sled versus a double runner sled. A flat sled will again produce greater friction and as a result will necessitate a lighter load on the sled to get a similar effect. I have gone so far as to surf on towels indoors behind our athletes in a well-waxed hallway.

The reality is that we may have misinterpreted the message when it comes to resistance training for sprints. Although research shows that sled training may not improve the athletes ability to run at top speed, it will help the athlete to get faster. Remember, sport is about acceleration, not top speed. Very few team sport athletes ever get to the what track coaches like to call absolute speed mechanics. The weighted sled may be the most underrated tool for speed development due to our misinterpretation and misunderstanding of the research and terminology surrounding speed development.

Michael Boyles new Sled Training DVD is available at [performbetter.com](http://www.performbetter.com)

<http://www.performbetter.com/detail.aspx?QID=4563&CategoryID=259>