Electronic Timing for Speed Development

Speed Kills! How to Develop Faster Running for Team Sports

By Chris Gallagher

Whether it's Gareth Bale in full flight roasting a defender and scoring the winning goal in football, a whippet of a rugby winger sprinting the length of field to score a try, or fleet rookie wide receiver J.J. Nelson nearly breaking the all-time 40-yard record at the 2015 NFL Combine in American football, the ability to express speed on the field of play is the single most valuable quality for team sports athletes. The key moments that decide the outcome of a match are typically the high-intensity, max-velocity actions. In fact, straight sprinting is the most frequent action preceding a goal in football.[1]

Hopefully, you don't need much convincing that speed development is important for team sports. Armed with the knowledge that speed is a critical determinant in performance, key incidents, and match outcome, we can focus more on how to develop speed rather than debating its importance. Accordingly, this article will focus on speed development in field-based team sports such as soccer (hereafter referred

to as football), rugby, and American football from the perspective of the strength and conditioning professional.

It is usually best to focus on what people should be doing rather than explaining what they should not be doing—the positive aspect of "do this" rather than the negative of "don't do that." Telling athletes exactly what they should do reduces their focus to that one thing, rather than the numerous alternative actions they should not be doing. Keep cueing concise to enhance an athlete's focus. Begin and end instruction with what you want rather than what you don't. Here's a good article on this subject.

Your athletes have a limited capacity for coping with stress, limited powers of recovery, and a multitude of different physical and technical qualities to develop. Therefore, there is no room in your program for non-essential, ineffective, or potentially detrimental exercises or practices.

Planning, Models and Strategies

To coach a group of athletes in a given task you need a clear, solid technical model of the ideal performance. Track sprinters are obviously the gold standard when it comes to running fast and elite coaches in track will have concrete technical models for sprinting and its different phases.

While you may rightly argue that team sports athletes are not track sprinters, the biology, physics, physiology, and biomechanics are largely the same. So are body and joint angles, ranges of motion, and application of forces.

This leads to the next point. To effectively and efficiently coach speed development, you need to observe your athletes in speed sessions or in game play to identify performance deficiencies, and then implement strategies to correct these faults.

Are your athletes physically deficient in maximal strength or power? Do they lack the required mobility or range of movement in certain joints? What technique errors do they exhibit? How can you tackle these deficiencies? Is the solution in the weight room, targeted flexibility work, technical refinement, or even physical therapy intervention?

The most important factors in developing speed is a trained coach's eye and effective training interventions. If you don't have the experience, skills, and knowledge required, either bring in someone who does or educate yourself. Good places to start the learning process are the work of master coaches such as Charlie Francis and Tom Tellez, and biomechanical texts such as *Running: Biomechanics and Exercise Physiology in Practice* by Frans Bosch and Ronald Klomp.

Video 1. Gareth Bale in full flight roasting a defender and scoring the winning goal.

While team sports players are not track athletes and straight-line speed is not their only concern, linear speed should be developed first. Sports-specific movements and agility can come later. It may not even be the job of the strength and conditioning coach to transfer straight-line speed into sports-specific movements and game play. That could be the domain of the sports technical coaches, or something you develop in conjunction with the technical staff.

So you need a technical model of sprinting to consistently work toward. You must be able to detect and correct errors and deficiencies as they arise. In addition, you need a structured plan of development across the season. Different volumes and distances, different technical emphasis, different aspects of sprinting (acceleration, transition, max speed) will be required at different stages. It is not enough to merely aim to replicate a specified model and refine technical errors—the plan for speed development

must complement and be constructed within the overall yearly plan for the athlete's overall development.

In summary:

- Define your model for sprinting and speed development
- Observe, identify errors, and implement corrective strategies
- Design and follow a periodized plan for speed development

Defining a Technical Model for Speed Development

While your athletes come in many anatomical shapes and sizes—different heights, lengths, breadths, capabilities of mobility and flexibility and hence variance in optimal biomechanics—there will be commonalities in optimal performance you strive to attain. What body positions are you looking for in the different phases of sprinting? What joint angles and limb movements?

In acceleration, for example, you know your athlete's body should be angled somewhere around 45 degrees and the legs should be driving back and forth like pistons with a lower heel recovery. At maximum velocity, your athlete should have a more upright posture and a cyclical running action with heel recovery tucked close to the butt. You need to have an exactly defined model against which to measure your athlete's technical performance.

Priorities for Speed Development in Team Sports

- Phases of Sprinting
- Technical Mastery
- Physical Qualities

At every stage of the coaching process, from planning and design to delivery of the program, everything is underpinned by your coaching eye and experience. Can you identify the key performance indicators (KPIs) required for your athletes? Can you conduct an effective needs analysis of the sport and your athletes, identify strengths and weaknesses and implement effective interventions to develop these characteristics, or diminish any observed inefficient movement patterns?

You may have a model you want your athletes to achieve and you can outline a plan taking them from the beginning of the process to mastery. But can you assess the athlete(s) in front of you, identify how far along the process they are, and apply the appropriate training methods to move them on to the next level?

While technical models derived from world-class track sprinters give you your ideal starting point in terms of how you want your athletes to look and the shapes they need to make, the typical distances your athletes cover in games are far shorter. Research and time-motion analysis studies show that 96% of sprints in football are shorter than 30m, with almost half shorter than 10m.[2,3] The Australian Institute of Sport reports that average sprint distances in rugby are around 20m.[4] Other research studies quote 1.5-2.5s and 10-20m.[5]

Further studies have shown that sprint times over the first 10m differ between professional and sub-elite players.[6,7,8] With the knowledge that the majority of sprints in sports such as rugby and football are less than 30m and that sprinters reach their top speed well after 30m, it seems logical that acceleration is the priority for speed development.[9]

While acceleration is the priority, max speed must also be trained. Speed sessions incorporating

maximum velocity running of 40m or more will be present in an effective speed development program, utilizing a short-to-long approach. An example can be found in Dan Lewindon and David Joyce's *High-Performance Training For Sports* (Chapter 10 by Derek Hansen):

Table 11.2 Sample Short-to-Long Speed Workouts for Team Sport Athletes

Phase	Sample workout
1 10 m emphasis	• Arm mechanics drills from seated position • 4 × 15 m marching A • 4 × 15 m skipping A • 5 × 10 m running A • 5 × 10 m from push-up start, 1 min rep recovery, 3 min set recovery • 5 × 10 m from supine starts, 1 min rep recovery, 3 min set recovery • 4 × 15 m from 3-point starts, 1 min rep recovery, 3 min set recovery • 4 × 10 m acceleration plus 10 m maintain, falling start, 1 min rep recovery • Total speed volume = 240 m
2 20 m emphasis	• 4 × 20 m skipping A • 4 × 15 m running A • Arm reaction drills on start commands • 4 × 10 m from push-up start, 1 min rep recovery, 3 min set recovery • 4 × 10 m from medicine ball push-up start, 1 min rep recovery, 3 min set recovery • 4 × 20 m from push-up start, 2 min rep recovery, 3.5 min set recovery • 4 × 20 m from three-point start, 2 min rep recovery, 3.5 min set recovery • 3 × 20 m acceleration plus 10 m maintain, falling start, 2 min rep recovery • Total speed volume = 330 m
3 30 m emphasis	• 4 × 20 m skipping A • 4 × 20 m running A • Arm reaction drills on start commands • 4 × 10 m from push-up start, 1 min rep recovery, 3 min set recovery • 4 × 20 m from 3-point start, 2 min rep recovery, 3.5 min set recovery • 3 × 30 m from falling start, 3 min rep recovery, 4.5 min set recovery • 3 × 30 m from three-point start, 3 min rep recovery, 4.5 min set recovery • 3 × 30 m acceleration plus 10 m maintain, falling start, 3.5 min rep recovery • Total speed volume = 420 m
4 40 m emphasis	• 4 × 20 m skipping A • 4 × 10 m running A • 4 × 10 m from push-up start, 1 min rep recovery, 3 min set recovery • 4 × 20 m from 3-point start, 2 min rep recovery, 3.5 min set recovery • 3 × 30 m from falling start, 3 min rep recovery, 4.5 min set recovery • 3 × 40 m from three-point start, 3.5 min rep recovery, 5 min set recovery • 3 × 40 m from falling start, 4 min rep recovery • Total speed volume = 450 m

Technical Mastery

Most of your athletes will never look like sprinters in terms of technique. In fact—except in a few instances—they probably shouldn't. However, in sessions designed around developing the quality of speed, athletes should aim to exhibit as close to technical mastery as possible.

This will require them to perform regular sprint sessions accelerating and running at max velocity and practicing drills that help provide context and refine inefficient movement patterns. Many coaches spend a lot of time practicing form running drills like A and B skips, when arguably the time could be better spent ensuring that their athletes have the required flexibility, mobility, and strength in specific muscle groups to assume the correct position for efficient sprinting.

Video 2. Bryan Habana dominates the field with his ballistic speed.

Many athletes lack both the required mobility in the hips or shoulders and the kinaesthetic awareness to get into and maintain correct sprinting posture. You may find that additional flexibility and mobility work, as well as drills such as hurdle walks, provide benefit to your athletes' performance. Sprinters spend

many hours, weeks, and years in the formative part of their careers perfecting these drills. Yet poorly coordinated (in the context of sprinting) footballers and rugby players think that performing A-skips like a drunken uncle dancing at a wedding will transfer to Justin Gatlin-esque sprinting.

Open up your athletes' hips and shoulders with self-myofascial release (or therapeutic intervention where necessary) and utilize hurdle drills early in the session to free your athletes' joints so they can assume correct sprinting mechanics and see how this affects performance.

Physical Qualities

Strength is the physical quality that underpins all others. Acceleration and movement velocity have been shown to have a significant relationship with squat 1-rep max strength relative to bodyweight.[10] And maximal strength in half-squats determines sprint performance and jumping height in high-level soccer players.[11]

If your athlete is weak, heavy emphasis on strength training will reap rewards in power output and speed. Rugby and American football players really should be hitting a minimum of double bodyweight squats and there is no reason why historically less gym-absorbed football players cannot aim for the same.

This is not to overstate the importance of strength nor diminish the value of speed and power training modalities prior to this benchmark. Qualities of strength, speed, and power should be developed throughout the season with emphasis placed more on certain qualities at specific stages.

If you are not strong enough—get stronger. At some point, though, the law of diminishing returns applies and you need to transfer this strength into more sport-specific qualities and movement. Strength training can take more of a backseat as the emphasis now is on developing power, rate of force development, and speed of sprinting.

Speed Development Considerations in Team Sports

Working with track athletes somewhat simplifies the process. Simplified, however, does not mean easier; it is likely more difficult to improve the high-end performance of an elite track sprinter than that of a moderately fast team sport athlete.

Improving speed in team sports athletes can be more complex for a number of reasons. Speed is not the only physical quality that these athletes require and often it is not even the focus the head coach wants to take in training. You may be trying to simultaneously develop max strength, power, agility, and aerobic and anaerobic conditioning. The training for some of these may overlap and even be complementary. But often they are not and the different training sessions compete for the athlete's limited ability to recover and adapt. This is where a keen understanding of human physiology and periodization science is essential.

Because team sports athletes have so many demands on their time, the training principle that everything you do must have a specific purpose becomes non-negotiable. If a certain drill or activity does not have a specific purpose—get rid of it. If it doesn't make your athletes better or faster, it is a waste of energy and effort—scrap it. Everything you do taxes your athletes' time and ability to recover. Refine your coaching menu by keeping and using only what works.

You may not have a lot of time to work on specific speed development sessions. With the aforementioned multi-factorial approach dictated by team sport performance, you may be limited in what you can do with your athletes. In some situations, you may only get one speed session a week and/or 15 minute warmup

period prior to other training sessions. With this in mind, you need to streamline your training menu items to get what gives the best bang for your buck.

The difference between working with track athletes and squads of 15-30+ football or rugby players is that you can individualize the training of sprinters to their specific needs, strengths, and weaknesses. This is not logistically viable in team sports for many reasons. You must observe your athletes and identify commonalities in performance and errors. You can then write training programs aimed at tackling the most consistently displayed and debilitating faults.

Speed Development Issues in Team Sports

My biggest concern with coaching speed development is the enduring fondness for speed and agility ladders and similar tools. The common misconception (but understandable to the untrained) is that moving your feet quickly equates to sprinting speed. Particularly in acceleration, it is the force athletes can apply to the ground that will see them quickly covering distance, not river-dancing like Michael Flatley over the rungs of a ladder. These speed ladders are actually detrimental as they can teach improper mechanics, reduce force into the ground, and teach athletes to move with their vision centered on their toes. Who plays any ball sport with their head craned to look at their own feet?

I said it above but it's worth repeating. Training and recovery time is limited. Athletes' ability to deal with stressors and adapt is limited. If an exercise doesn't improve your athletes' performance—trash it!

Due to the previously mentioned insufficient training time to improve a multitude of qualities, athletes and coaches often try to rush through speed sessions. They only have 30 or 45 minutes to fit a speed session into their training day and week so the quality often becomes compromised. Athletes don't rest long enough between reps and sets to target speed development effectively. Speed and acceleration sessions become glorified conditioning sessions. If you aren't resting sufficiently, you aren't training for speed. Take a leaf out of the sprinters' book—full recovery between sprint bouts.

Video 3. J.J. Nelson at 2015 NFL Combine.

Split your athletes into groups. If you have 20 or more, make them sprint in pairs. You get a competitive drill that ensures the maximal effort needed for high-quality acceleration and speed work, and without doing anything to the session you have a built-in 1:10 work-to-rest ratio. Throw in some specific and targeted feedback at the end of each rep and you can easily guarantee optimal recovery periods between bouts.

Another issue with team sports is how you progress the level of the workouts. With individual athletes you can plan training specific to their needs. In team sports, how do you ensure that training is at the correct level for both the most advanced sprinters in your group and the less-developed ones? It is a difficult balancing act and you often see training programs that progress too fast or too slow for the bottom- or top-end performers.

As with all aspects of an athlete's development, you have to apply the principle of "earn the right." Athletes don't move on to an advanced training method or increase the load until they demonstrate competency in the current task. This can prove a challenge with a variety of competencies displayed among the squad.

Once again squad size can work in your favor. You can assign athletes into groups of similar competency to complete a specific variation, progression, or regression of a drill according to their current level of proficiency. You likely have more than one strength coach, sports scientist, or skills coach at any given

session and can often assign additional coaches to follow a specific group.

Extra Time, or the Last Few Strides

Speed is the quality that will make the difference between you and your opposition—for your striker to burst through the defense onto that through ball and slot the winning goal, for your fullback to make that try-saving tackle on the opposing winger, for your running back to make that explosive burst dismantling the defense.

If you are to effectively and efficiently develop speed in your athletes, you must have an ideal technical model your athletes are working toward emulating. You need to understand the physiological and biomechanical characteristics that allow your athletes to express this model, and you need a logical and periodized plan to develop these qualities and remove inhibiting deficiencies.

This periodized plan allows you to develop the required physical and technical skills for enhanced sprint performance within the constraints of the overall program. Factor in the other demands on the athletes' time and recovery and adaptation abilities.

Identify a hierarchy of physical qualities your athletes need to improve upon to enhance sprinting performance. Do their joints have the necessary mobility and flexibility? Do they have the necessary levels of max and relative strength of power and rate of force development? Emphasize the right quality for the athlete at the right stages of the season for optimal speed development and performance.

While you can't turn a cart horse into a race horse you can make anyone faster (read regular Freelap contributor Craig Pickering's article, "You Can't Teach Speed"). If you are an athlete, remember that the key concept in speed sessions is intent! Every drill, every rep, every sprint is a maximal effort. Attack—be explosive and aggressive. Run through the finish line on every drill. Too often athletes slow down and decelerate before completing the defined sprint distance.

Another factor is the effect of body composition. Excess body fat can have a negative effect on your sprint performance and you should ensure that your training and nutrition are in balance to produce optimal performance. This will depend on your sport, your position, and you the individual athlete.

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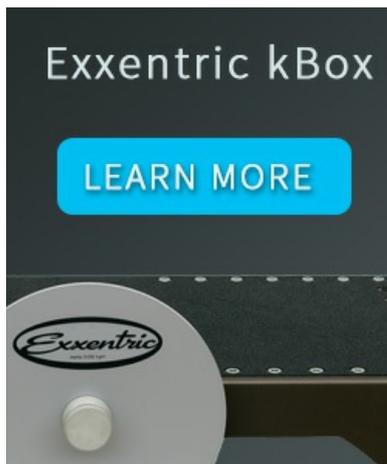
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