

Sprinting Science and Coaching Collaboration



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In a high performance sports structure, the primary role of a sport scientist is to provide the coach with information that he/she can use to support their coaching decisions. Scientific principles, empirical evidence, and the multitude of data points that can be collected in the assessment of individual athletes, contribute to a vast pool of potentially useful information. The sport scientist needs to filter through this information and determine which pieces will be most valuable to the coach and have the greatest impact on athlete performance. Together, the coach and scientist will examine and question this information, until the coach decides which components to implement and how to transmit the information to the athlete.

This process doesn't happen overnight, and it rarely occurs in isolation. In sport, most of the challenges and questions we have are the same as those that others are dealing with, or have dealt with previously. So, a trusted network of like-minded people can be a huge asset to your programme.

In the sprinting context, some of the biomechanical data we collect includes visual analysis of technique using high-speed video, acceleration analysis to determine an athlete's force-velocity-power profile, and analysis of race performance. Together, this information tells us about the individual strengths and weaknesses of the athlete, and allows us to monitor changes through different training phases, over a number of seasons, or when there is an injury or other disruption to the programme.

I had been working with a number of sprint coaches, including Werner Prinsloo (coach of Akani Simbine), when I was invited to Jamaica by the Division of Sports Medicine at the University of the West Indies in 2014. The University is also home to Racers Track Club and, in between delivering

lectures for their Sports and Exercise Medicine Masters programme and the Jamaican Sports Medicine Association Conference, I was able to spend some time with Glen Mills, who has coached Usain Bolt and other Jamaican athletes to over a hundred World Championships and Olympic medals. We discussed all things sprinting, and I showed him clips of athletes I'd been working with and asked his views on the approach we'd been taking. After I'd asked many questions, he promptly pulled out videos of his own athletes and asked my opinion on how he could improve Bolt's start! The willingness to learn, no matter how much you've already achieved, is vital for continual improvement and is a common trait in successful people.

Sprinting performance is determined by how the athlete applies force to the ground with each step. During the early acceleration phase, the direction of force application is more important than the size of the force – better sprinters don't necessarily produce larger forces, but they exhibit the technical ability to orientate the force vector in order to maximise the horizontal component. Using video analysis, we examine the athlete's movements to ensure that he/she positions the body and limbs in a way that is believed to maximise horizontal force. My discussions with Mills and Prinsloo have largely centred on identifying these movement patterns and finding appropriate coaching cues to help the athlete make the desired changes.

In 2015, I was able to visit the National Institute of Sport and Physical Education (INSEP) in France and see how sprint coaches such as Guy Ontanon (coach of Jimmy Vicaut) and Giuseppe Rabita (INSEP biomechanist) work together using objective measurements in conjunction with subjective observations. Rabita and a group of French sport scientists, led by Jean-Benoit Morin, had a developed

a method of quantifying horizontal force and power during sprint acceleration, using velocity measurements from a radar gun instead of prohibitively expensive force plates. We now utilise this method to analyse Simbine and other sprinters' acceleration profiles. This gives us an objective measurement that we can use to assess whether technical changes that we observe are having the desired effect.

This two-year process of building the coach-scientist relationship and gathering and filtering relevant information placed us in good stead during the preparation for the 2016 season. In Simbine's case, we saw the improvement in acceleration mechanics that has greatly improved his start this year. We knew what his physical capabilities were and what we could expect from his performances, especially after returning from an injury in April.

Records will show that Simbine had a superb year on the track, but we know that there is still room for improvement because we have the data to show it. Simbine competed in the Racers Grand Prix in Jamaica in June and spent some time training with Bolt and co, under the eyes of Coach Mills. The feedback from Mills about his start agrees with our observations and the work that he has been doing with Prinsloo. When training resumes, there will be a clear picture of what needs to be done in pursuit of continual improvement.

