The Science of Speed: Determinants of Performance in the 100 m Sprint

A Response to Commentary

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INTRODUCTION

Science alone cannot explain all features and aspects of human exercise performance, and there is no doubt that coaches hold tremendous insight into determinants of athletic success. The challenge has and remains to be how to promote a marriage between science and coaching to stimulate improved understanding of human athletic performance. Our review, in combination with the commentary from Yannis Pitsiladis, Anthony Davis and Dennis Johnson, is a good example of how such a marriage can occur and be fostered by pertinent academic and coaching journals.

An interesting component of Pitsiladis, Davis and Johnson’s commentary is the comparison they make of the “demise” of athletics in Europe and the United States to the “thriving” and “religious” popularity of athletics in Jamaica and other Caribbean islands. This is a compelling story of socio-economics in sport and athletics, and yes, it is tempting to assume that it is contributing to Jamaica’s dominance in elite sprinting.

PHYSIQUE

As we revealed, and was supported by Pitsiladis, Davis and Johnson, there is a surprising lack of research of sprint running performance. We thank Pitsiladis and his colleagues for their addition of determinants and explanations that have a socio-cultural-economic perspective. Such commentary certainly adds to the complete picture of sprint performance, but it is hard to scientifically balance race, genetics, and socio-cultural-economics to sprint running without data to provide empirical answers. Certainly the predominance of West-African ancestry to success in elite 100 m sprint performance is clear, and this may be expressed through the genetic attributes we did raise in the review (sections on “Physiological Elements” and “Muscle Composition”). However, one area we did not cover in any detail was body physique. While athletic commentators are quick to state a ‘sprinter’s physique’, we made the simple observation that there is considerable variability in the physique of the world’s best male and female sprinters (Tables 1 and 2). Do future sprinters need to be built like Usain Bolt to have any chance of challenging his performance? Can a Caucasian man or woman have any chance of challenging 100 m sprint world records? Acceptable answers within the lay public are probably ‘yes’, and ‘no’, respectively, but there
is no scientific evidence to support any clear answer at this time.

TECHNOLOGICAL VS. NON-TECHNOLOGICAL IMPROVEMENTS
Improvements in technology may explain some of the slopes of the segments of improved times (see Figure 1), yet do not explain recent improvements (since 1980) given that track features have not differed that much in recent times. Furthermore, the recent deviations in record times for men, and lack of such progress in women since the late 1980’s, both combine to reveal non-technological determinants to continued improvements in record performances. The deviant performances of Usain Bolt are the most obvious proof of this.

CONCLUSION
In twenty years time, and if Usain Bolt’s record still stands, then we will know that he really is/was something extraordinary, and we were blessed to witness a recipe of genetics, training, physiology, psychology, coaching and socio-cultural-economics that produced a near miraculous human sprinting specimen.