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Has the false start detecting machine affected the reaction time and performance of school level sprinters?

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Abstract
Reaction time is considered an important determinant of success in sprint events. Indeed, a good start can make the difference between winning a gold medal and losing one in the attempt to get out of the blocks as fast as possible; athletes try to react quickly to the start signal. However, during competitive races, anticipation of the starter's gun may result in a false start. The aim of this study was to determine how far the false dictating machine has influenced the reaction time of school male and female athletes in sprint event, more specifically, are athletes more cautious because there is a greater risk of disqualification. Essentially, the study would be supported if consistent differences were apparent in the reaction time of high level athletes when competing under the sensor technology. The performance times and reaction time of sprinters' competing in school championships in athletics were analyse. Overall, the reaction time was significantly different in athletes competing in the competition had an average, or slower time in the performance.

Keywords: Reaction Time, False Start & Performance Time

Introduction
In sprint events, where hundredths of a second can make the difference between a gold medal and silver, minimizing reaction time can be the key to an athlete's success [1]. Reaction time (RT) in sprint events, the duration of the period between firing the starting pistol and the first observable movement of the athlete, has been identified as one determinant of success in sprinting. However, the acceleration distance, the maximum speed attained and the speed endurance of the athlete are the most important factors. The relationship between RT and performance time (PT) is controversial but the shorter the race, the more important the RT is for the final PT. Usually, sprinters dedicate some of their training time to practice aimed at improving their reaction to a starting signal. Indeed, studies have been conducted to investigate if it is possible to improve RT, either by training the attention to the starting signal or to the motor response. Paying attention to the motor response was found to be most beneficial for improving RT. All sprinters, when they are in the "set" position, aim to push-off, away from the starting blocks, as fast as possible immediately after hearing the starting gun. In an attempt to reduce the latency period, there is a tendency for athletes to push-off at the same time as they hear the signal. As a result, athletes sometimes anticipate the starter's signal and commit a false start. If the RT is under 100 milliseconds, the athlete is deemed to have "jumped the gun". Therefore, the main task of the judge, aided by technical apparatus, is to identify if any athlete(s) has indeed moved before the gun. Unfortunately, on some occasions, decisions have caused disagreement between athletes and officials. The old rule on false starts allowed every athlete competing in a race to commit one false start before disqualification. In an attempt to "improve the image of the sport on television and to make sure schedules run to time", a new rule was agreed at the Congress of the International Association of Athletics Federations (IAAF) during the 2001 IAAF World Championships in Athletics held in Edmonton. This rule states that "only one false start per race shall be allowed" (excluding combined events). "Any athlete(s) making further false starts in the race shall be disqualified from the race". However on 12th August 2009 the 47th IAAF Congress, Berlin, Germany IAAF Member Federations approved that except in Combined Events, any

athlete responsible for a False Start shall be disqualified and in Combined Events only one false start per race shall be allowed without disqualification of the athlete(s) responsible for the false start. Any athlete(s) making further false starts in the race shall be disqualified from the race. The new rule has increased the probability of disqualification but has the new rule influenced athletes' RT at the start. More specifically, are athletes more cautious given the potentially greater risk of disqualification had led to the introduction of FSDM in competitions under Rule 12.1(a), (b) and (c) which direct the starting blocks must be linked to an IAAF approved false start apparatus. Based on this the study aim's to investigate whether the influence of False Start Detection System (FSDS) had affected the reaction time and performance of schools' men and women 100 mtrs sprinters from the qualifying rounds. The Reaction Time (RT) False Start Detection System captures reaction times and start data by using internationally patented technology in sensor units attached to athlete starting blocks. The system which is comprised of block sensors on each starting block, a command center and has an integrated Public Address system to facilitate clear transmission of the starter's commands to the athletes by which during a start, the reaction time technology relays athlete reaction data to the command center instantly analyzes starts in accordance with IAAF rules every 1/1000th of a second.

Methodology

Subjects: The subjects of the study were male and female participants of Kerala state level school athletics championship.

Tool

False Start Detection System (Lynx System Version 2.0)

The Competition Reaction Time system detects false starts (as defined by IAAF rule 162.10) also to an accuracy of 1/1000th of a second-and instantly signals this information to the starter. It measures reaction times to 1/1000th of a second. The system also have wireless adapters eliminate to lay out cables to each of the starting blocks reaction time software for windows allows the power waveforms for all the athletes in a race to be graphed, compared, saved, and automatically prints reaction times of the athlete's trackside

Procedure

Prior to the test, a meeting of all the participants were held and they were explained regarding the objectives of the study, test procedure and effort they had to put in. The necessary data was collected by administering the tests for the chosen variable. Reaction Time Championship System generally contains 8 Block Sensor components and one set of Command Centre components. Reaction Time interfaces with Finish Lynx results for seamless integration of athlete data. The individual Block Sensors can also be used as a reaction training system. Unlike some simpler systems, RT has no contact pads and the system cannot be tricked or overloaded. The system is rugged and easy-to-use. The battery or AC powered blocks are weather-resistant and designed to withstand the tough demands of a year-round athletics environment. When used as a stand-alone personal training system to help sprinters improve their starting technique, an individual Reaction Time module can be used to record and display an athlete's gun-to-motion times to an accuracy of 1/1000th of a second. The Competition Reaction Time system detects false starts (as defined by IAAF rule 162.10) also to an accuracy of 1/1000th of a second-and instantly signals this information to the starter. Measures reaction times to 1/1000th of a second detection mechanism clips to virtually every manufacturer's starting blocks. Control centre for the starter is lightweight and portable and Battery operated and rechargeable or AC powered. The system has the helps athletes to hear the starter's commands or the sound of the gun simultaneously. The machine contains all required cables as well as headsets for the starter and recall starter including the ability to store the reaction time of the athletes with printing system. The system also have wireless adapters eliminate to lay out cables to each of the starting blocks reaction time software for windows allows the power waveforms for all the athletes in a race to be graphed, compared, saved, and automatically prints reaction times of the athlete's trackside.

Statistical analysis of data

All statistical analyses were conducted using SPSS (release 2.0, SPSS, Chicago, IL)

Results and discussion

The results of the Kerala state level school athletics championship were collected and analysed specifically, the RTs and PTs of 100 metres races of males and females. The mean (±SD) RT and PT performances from the championships were compared anomalously slow performances were ignored such that for the male's 100m, PTs under 12.0sec in the heats and under 11.0sec in the other rounds were considered. For the female's 100m, PTs under 14.0sec in the heats and under 13.0sec in the other rounds were considered. The average PT and RT gained in the heats, quarter-finals and semi-finals for 100m males were compared for each athlete. For females, the average PTs and RTs from the heats, quarter-final, semi-final and finals were considered. All statistical analyses were conducted using SPSS (release 2.0, SPSS, Chicago, IL) The result showed that PF and RT of male and female sprinter's found to be decreasing and slower from heats to quarter and from semi-finals to the finals after the introduction of the FSDM. (See table.1 and 2) The result also shows that there was a tendency for RT to be slower in the performance (PF). (See table 3 and 4) From the above result it is evident that reaction times play a crucial role in the success of sprinters. The present result goes hand in hand with the study conducted by Massimiliano Ditroilo and Andrew Kilding [2] shows that reaction time where slow by the introduction of the FSDM in 100mtrs sprint and hurdles event. Similar findings by Pilianidis, T. *et al.* [3] shows that the start reaction time and the sprinting performance in 100-m sprint race finalists, on top-level sprinters found that the start reaction time is strongly correlated with the sprinting performance. Further results shows that start reaction time seem to improve equally with the superior performance of the modern sprinters. The graphical representation of the mean score of performance and reaction time of men and women sprinter presented below in Fig 1, 2, 3 and 4

Table 1: Performance Time of male 100 metres race.

Round	N	Mean	Std. Deviation
Heat	74	11.01	0.14
Quarters	38	11.22	0.17
Semi-Finals	15	10.81	0.15
Finals	8	10.61	0.38

Table 2: Performance Time of female 100 metres race

Round	N	Mean	Std. Deviation
Heat	54	13.06	0.27
Quarters	31	13.52	0.20
Semi-Finals	16	12.81	0.16
Finals	8	12.67	0.19

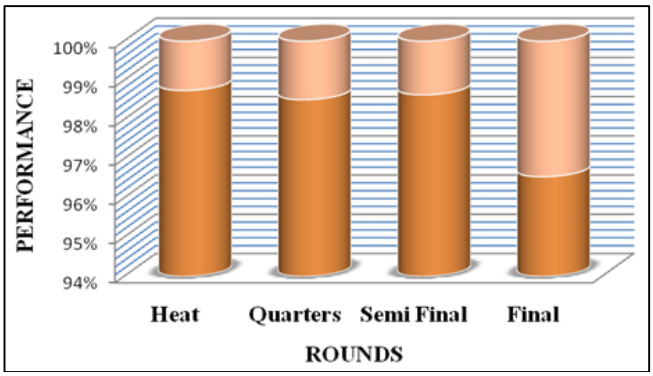

Fig 1: Performance Time of male 100 metres race

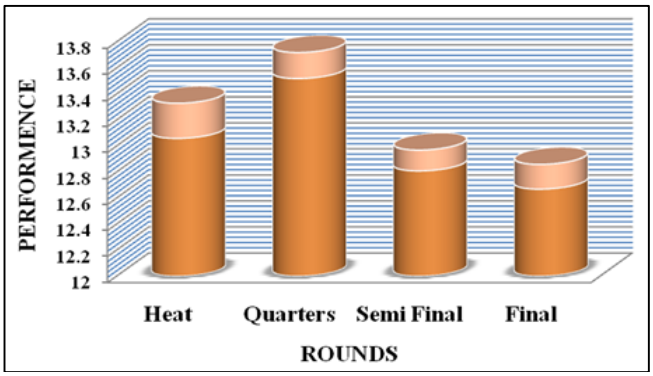

Fig 2: Performance Time female 100 metres race

Table 3: Reaction Time of male100 metres race

Round	N	Mean	Std. Deviation
Heat	74	0.149	0.0019
Quarters	38	0.46	0.017
Semi-Finals	15	0.160	0.012
Finals	8	0.67	0.0021

Table 4: Reaction Time of female100 metres race

Round	N	Mean	Std. Deviation
Heat	54	0.151	0.020
Quarters	31	0.146	0.014
Semi-Finals	16	0.140	0.016
Finals	8	0.145	0.122

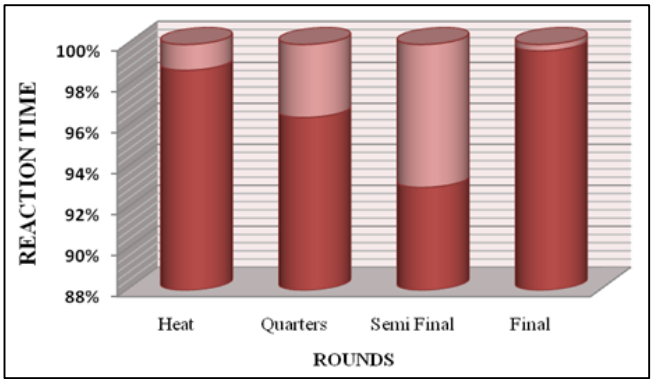

Fig 3: Reaction Time of male 100 metres race

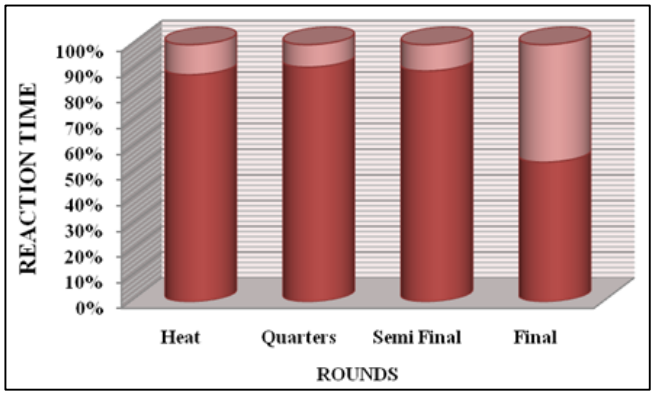

Fig 4: Reaction Time female100 metres race

The result showed that PF and RT of men and women sprinter's found to be decreasing and slower from heats to quarter and from semi-finals to the finals after the introduction of the FSDM. The result also shows that there was a tendency for RT to be slower in the PF. From the above result it is evident that reaction times play a important role in the success of sprinters. The shorter the race, the more important an athlete's reaction time becomes, because it "accounts for a greater proportion of the total time of the run which gives coaches and athletes access to live reaction and to development the muscular-skeletal system by applying complex sequential skills and on the improvement of the sprinter's concentration in order to achieve faster starts reaction times which can lead to an outstanding sprinting performance.

Conclusions

The use of FSDM play an important role in bringing the performance of a sprinter's participating in major competitions, also the training system can also be used by athletes as a powerful tool during personal and off-season training routines without the need for a coach to simulate the start and help sprinters improve their starting technique and individual RT module also can be used to record and display an athlete's gun-to-motion times to an accuracy of 1/1000th of a second.Since do to the constrain of financial support to procure this sophisticate equipments at a large extent for the training and coaching center that directly affect the performance component of the sprinter. However, if the machine's technology developed as indigenous that will helps to create better result for sprinters in competitions to achieve from silver to gold medal.

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