Introduction
Reaction times can be an important determinant of success in the 100-m sprint, where medals are often decided by hundredths or even thousandths of a second. Therefore, a poor start or long reaction time can rule an athlete out of the medal hunt in a 100-m sprint competition. The aim of the present study was to quantify world class sprinters’ reaction times as a function of performance level, gender, body height, finalists’ heat round development and age.

Methods
In the present study, reaction times from 1319 sprinters (100-m) were defined as dependent variable, while 100-m performance level, body height, gender, heat round and age were defined as independent variables. All data were collected from different IAAF world championships for youths and seniors in the time period 2003 – 2009, which were presented in the IAAF official website through the competition archive and biography section. Only the 100-m competitions were included because it has been shown that reaction time increases from short dashes to longer sprints. World championships before 2003 and after 2009 were excluded because of different false start rules. The 2004 and 2008 Olympic Games were also excluded from this investigation because of different reaction time monitoring systems.

Results
There was a significant (p<0.01) relationship between reaction time and 100-m running time for both male (r = 0.292) (reaction time = 0.166 ± 0.030 s) and female (r = 0.328) (reaction time = 0.176 ± 0.034 s) sprinters. Male finalists had a substantially (p<0.05) shorter reaction time (0.142 ± 0.017 s) compared to semifinalists (0.153 ± 0.022 s), athletes from round 2 (0.155 ±0.020 s) and athletes from round 1 (0.161 ±0.024 s). Semifinalists achieved the shortest reaction times for females.

Discussion
The percentiles in this study show that the reaction times of male and female 100-m sprinters generally vary between 0.14 and 0.20 s (Figure 1). The 10th percentile of reaction times was approximately 0.02 s faster than the average. These relatively modest variations can still be decisive in a sport where competitive placing is separated by mere hundredths of a second. Our data show a weak significant correlation between reaction time and 100-m running time for both males and females. Reaction time and 100 m running time shared only ~10% of common variance. The reaction times of the male athletes were significantly shorter (p<0.01) than the females’ reaction times. Practitioners should explore possible training methods in order to improve the athletes reacting skills. Future research could focus more on the cause-effect relationships between reaction time and performance level. Mental training of sprinters might ensure an optimized arousal level at the start line in order to obtain fast reaction times. A poor reaction time can definitely rule an athlete out of the medal hunt.

Figure 1: Reaction time for men and women in percentiles
Figure 2. Mean reaction time and 95% Confidence Interval for athletes who went out of competition at different performance level categories.