3D ANALYSIS WITH SIMI MOTION DURING A 110m HURDLES RACE
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INTRODUCTION
Collecting data during an official competition is very useful for coaches: the analysis of individual performance parameters allows to build an effective technical training.

AIMS
The purpose of this study is to compare, during a 110m hurdles race, the support and clearance flight time, the displacement data between the hurdle and the center of mass (COM) or foot position during:
1- the take off before the hurdle
2- the hurdle clearance
3- the foot strike after the hurdle

METHODS
During the Golden Gala 2005 (International Track and Field meeting taking place in Rome) the hurdle clearance of Dominque Arnold (World Champion 2005) was filmed for 3D motion analysis. 3 synchronized cameras filming at a rate of 50 Hz were employed. 2 cameras were placed on the grandstand before and after the considered hurdle; the angle between the optical axis of cameras and running direction was 45 degrees. The third camera was placed in front of the finish line. For the calibration a solid made up of 4 hurdles (height 1,06m; width 1,22m) and the known space between these hurdles (9,14m) was used. The body’s centre of mass was calculated with a 11-segment model (Dempster). The movies were analyzed with the Simi Motion System Software.

RESULTS
The length of the step hurdle (SH) is 3,31m, less then the values reported in other studies. The distance between the take-off foot and the hurdle is 2,15m (65% of SH) while the space between hurdle and foot strike after the clearance is 1,16m (35% of SH). The literature confirms these data (1,2,3).

The maximal height of the COM in SH is 1,46m (similar to 1 and 3, higher than 2).

The vertical COM displacement between the take off and peak height is similar to the literature data, while the displacement between the peak height and foot strike after the hurdle (landing step) is smaller.

About temporal data, the flight time is 0,36s as in the literature, the contact time of the SH and the landing step is 0,10s. In other studies the first value is similar, the second is shorter: 0,08s (1) and 0,09s (2 and 3)

CONCLUSIONS
This study show that D. Arnold presents a very good clearance technique; his values show a technique like that of Colin Jackson (1) and other top level athletes (2). The Simi Motion System can be very helpful to collect 3D data during an official race, using for the calibration the height and width of the hurdles and the distance between them.

REFERENCES
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Keywords: Hurdle Sprint, 3D Analysis, Biomechanics