M2S Laboratory

REAG

Summary

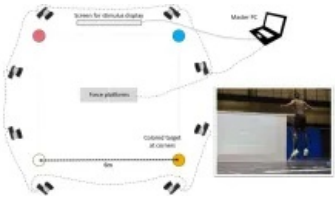
The aim of this doctoral project is to develop a standardized and controlled agility protocol to compare the performance of elite athletes under two conditions: reactive and planned. Reactive agility is defined as the ability to change direction in response to an external stimulus, whereas planned agility involves directional changes without any element of uncertainty (Sheppard and Young, 2006). Building on the previous work by Sorel et al., we will develop a laboratory test using light targets to collect kinematic and dynamic variables with motion capture systems. This setup will allow us to distinguish elite athletes based on their level of reactivity.

Objective

The objective is to optimize the agility protocol developed by Sorel et al. in the laboratory to create a controlled and standardized agility test (Figure). This test will allow the same task to be performed under both reactive and planned conditions. The goal is to collect kinematic and dynamic variables from athletes using motion capture systems to identify the biomechanical variables responsible for reactive agility performance. Indeed, in sports with high uncertainty, such as football or rugby, where predicting the future state of the player's environment requires perceptual-cognitive, decision-making, and motor skills, it is essential to study the components leading to the execution of a motor action: sensory integration, decision-making, motor response selection, and its implementation.

Secondly, the objective is to adapt the test for on-field evaluations. To achieve this, markerless motion capture solutions, force sensors integrated into cleats, and augmented reality glasses to display tasks will be employed. This in-situ protocol aims to analyze players under the ecological conditions of their sporting practice.

Understanding the biomechanical parameters influencing reactive agility performance, by comparing them to the mechanisms involved in planned agility tests, will provide insights into the motor adaptations and preventive mechanisms employed by elite players in unplanned situations. The adaptation of players under fatigue conditions, as well as the monitoring of athletes during rehabilitation after injury, will also be investigated.



Participants are instructed to sprint toward one of four targets located at each corner of a 6-meter square, starting with a mandatory jump on central force platforms. The target was displayed on a front screen under two anticipation conditions: either the target was already displayed before jumping (planned condition), allowing the player to plan his motor action in advance, or it appeared 0.2s after takeoff (reactive condition).

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