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Aspects regarding the level of coordination abilities in both athletes and non-athletes

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Abstract

Coordination abilities facilitate the fast learning of new movements and the efficient adaptation to a variety of situations. Our paper aims to determine the level of coordination abilities and to analyze them. Our research comprised 34 subjects, aged between 11 and 14, who were tested using the 505 Agility Test, Ruler Test, jumps rope, Stork Test. Significance differences were detected between groups for agility, reaction time and coordination, and no significant differences for both balance tests. We noticed that the level of coordination abilities was significantly higher in the case of athletes in three tests and not relevant in two tests.

Keywords: coordination; performance; balance; agility

1. Introduction

Coordination abilities are expressed with the involvement of higher nervous segments. This fact has a special importance in the execution of all voluntary motor actions, characterized by higher qualitative indices.

Although the opinions of various authors on the concept of coordination or skilfulness capacities may differ, there are also common elements regarding their components. Coordination abilities are determined by the gesture guiding and regulating processes and they are the foundation of an effective sensor and motor learning capacity. Coordination abilities enable athletes to coordinate motor actions safely and economically in possible (stereotypical) and unpredictable (adjustment) situations and to acquire sports gestures relatively fast (Frey, 1997; Tudor, 1999).

According to the theory of motor activities, coordination abilities generically designate a complex of mainly psychomotor qualities that involve the ability to learn rapidly new movements, the rapid and effective adjustment

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to various conditions, specific to the different types of activities, by restructuring the existing motor fund (Dragnea & Bota, 1999).

Some authors systematize coordination abilities as follows: motor learning ability (made up of perceptive and cognitive factors); ability of leading movements, kinaesthetic differentiation ability, respectively, sense of orientation and sense of balance; motor adaptation and readaptation ability, based on previous motor experience and as a reaction to demands (Weineck, 1995; Epuran, 2005). We have found five components of coordination abilities: space-time orientation ability, kinaesthetic differentiation ability, agility, rhythm ability and balance ability (Hirtz, Hotz and Ludwig, 2000). The most cited classification of coordination abilities refers to movement sequencing and combining ability, kinaesthetic differentiation ability, balance ability, motor reaction ability, movement transformation ability and rhythm ability (Blume, 1981; Manno, 1996).

Some of these components are included in the motor learning ability, while others are included in the direction and control ability. In this paper we will study some of the coordination abilities: balance ability, agility, movement sequencing and combining ability, and coordination.

Balance is a mechanical condition indispensable for the motor function, as it ensures the stability of positions (posture) and the orientation of movements in space; hence, it is required in daily, professional, and sports activities (Cordun, 2009). Balance is the ability to maintain equilibrium when stationary or moving (not to fall over) through the coordinated action of our sensory functions: vision, hearing and proprioception (Mackenzie, 2005). The optimum age for developing the balance capacity is between 10 and 13 for boys and between 9 and 13 for girls and the intensive period for developing balance is between 7 and 11 for both sexes (Hirtz, Hotz and Ludwig, 2000; Hahn, 1996).

The motor reaction ability is a rapid whole body movement with change of velocity or direction in response to a stimulus (Sheppard & Young, 2005). In order to be considered an agility task, the movement will not only involve change in speed or direction, but must also be an open skill, wherein a reaction to a stimulus is involved and the movement is not specifically rehearsed. The ability to combine movements enables relations between automated motor skills, the technical elements and proceedings specific to certain sports branches, as well as segment coordination (arms – legs – torso – ambidexterity – object). Coordination abilities never work in isolation; they are all closely related. They are the underlying foundation for agility and the prerequisite for technical skills (Drabik, 1996).

2. Methods

2.1. Methods

Participants participated in five tests to assess their coordination motor capabilities profile involving static balance with open eyes and blind, agility, speed reaction and coordination. To measure balance we used the Stork test and the blind Stork test (Mackenzie, 2005). For both Stork tests, the subjects completed the test on the dominant foot. From standing on one leg, hands on the hip and the toes of the non-dominant leg placed against the knee of the other leg. Subjects performed lifting on the toes and maintained the position as long as possible. We recorded for how long the subjects were able to maintain their balance. We used the same protocol as for the Stork test, but with closed eyes.

We performed the 505 test to assess the capacity of agility in horizontal plane (Mackenzie, 2005; Sheppard & Young, 2005). The subjects began the test in an upright position with the leading foot placed on the start line. They sprinted maximally to the timing gates from 10 m, touched the second line (15 m) with the foot, changed direction, and sprinted back through the timing gates. Two trials were performed with a minimum of two minutes of rest.

For speed reaction, the subjects had to grab a ruler as fast as possible between the index finger and thumb after it had been released by an assistant. We recorded the distance between the bottom of the ruler and the top of