

THE IMPORTANCE OF THE PROPRIOCEPTIVE TRAINING AND ITS RESULTS IN JUNIOR HURDLE ATHLETES

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Abstract: *In this study we aim to demonstrate the fundamental role of proprioceptive training as an integral part of the junior sports training in the 110 m hurdle test. For this we subjected the tests, before and after the training period, using proprioceptive techniques and exercises to influence the hurdle runner technique in the two subjects chosen for this experiment, and the results obtained revealed their progress in within the parameters we considered relevant to the study. The aim of this study is to reveal the importance of proprioceptive training in correcting the technique of hurdle running, but also parameters that change and their value.*

Key words: *proprioceptive training, 110 m hurdles, proprioceptive capacities, hurdle runner.*

1. Introduction

In this study we aim to demonstrate the fundamental role of proprioceptive training as an integral part of the junior sports training in the 110 m hurdle test. For this we subjected the tests, before and after the training period, using proprioceptive techniques and exercises to influence the hurdle runner technique [8] in the two subjects chosen for this experiment, and the results obtained revealed their progress in within the parameters we considered relevant to the

study. The two chosen subjects are multiple national champions in the 60-meter hurdle, with prospects for the national team.

In the initial test, subject 1 made the impulse in F1 to cross over the hurdle at a distance of 1.99 m and at an angle of impulse foot with the soil of 120.2 °, approaching pretty much the hurdle. For this reason, it will have a higher passage of the CGM over the hurdle at a distance of 1.44 m from the ground. The landing, however, due to the short impulse and the high passage, makes it at a horizontal

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distance of 1.76 m to the hurdle, too long and also uncertain, having to decrease the steps between the hurdles, otherwise it is approaching again too much of the next hurdle, the passage being not an optimal one. Thus, the landing angle is 78.5° and the flight time is 0.43 seconds. The impulse angle after the hurdle is 131° in F4, which will allow a good departure on the next step, but inefficient due to the

proportions of the driving distances. We note that S1 needs automation [4] in the first phase of the impulse position before the hurdle, a better climbing phase and an optimal CGM trajectory relative to the hurdle plane. It is also necessary to lower the attack foot after the hurdle and to increase the landing angle to reduce the flight time.

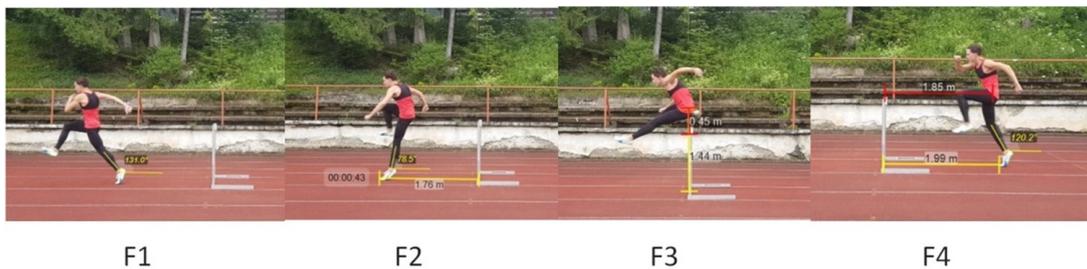


Fig. 1 - Subject 1 - Vectorial representation angular dimensions – initial test

For landing from the initial test of subject 1, we recorded 92.3° and 93.4° , unsuitable values for a balanced landing and an optimal CGM route. The foot of the landing foot is closer to the center of the treadmill, but the basin's hinges deviate quite a bit from the vertical, creating an imbalance in the biomechanics of the hurdle runner [9].

After the individualized proprioceptive training program and detailed analysis of execution errors, S1 finishing testing records improved kinematic parameters in almost all phases of overhead hurdle. In phase 1, the horizontal distance from which the attack is triggered increases from 1.99 m to 2.06 m, and the impulse angle is increased to 121° . This makes it possible to lower the CGM to 1.36 m from the ground, allowing it to be more drained and grouped. The distance from the hurdle at the end of the flight is 1.64 m, the angle of 81.9° , the flight time remaining constant. The fact that S1 manages to land closer to 12 cm. versus

the hurdle, compared to the initial testing, denotes that the proprioceptive exercises acting on the spatial-temporal analyzers were effective, managing to optimize almost all the monitored parameters. The impulse angle in F4 decreases to 128.7° , adjusting the proportions between the tracking parameters and the desired path. S1 felt much safer in attacking the hurdle and during the passage, and in this case we can say that hypothesis 2 from which we assumed the assumption is confirmed.

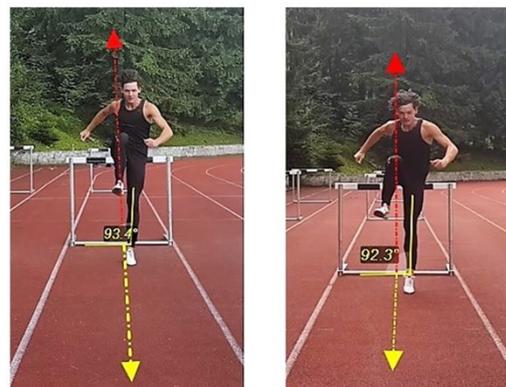


Fig 2. Subject 1 frontal plan - initial test

The angular values in the final phase 3 test of the hurdle have improved considerably following the proprioceptive program in which it has predominantly acted on equilibrium, mobility and automation of movements, reaching 90.7 °, even the 90th ideal° (Figure 4), allowing the athlete to achieve a safe, comfortable landing for optimum impulse in the continuation of hurdle running.[20]

Subjects surveyed participated in the training, according to a program proposed at national competitions.

Between the Initial Testing and the Final Testing, a specific training program based on specific technique of the hurdle runner technique [13] was applied to the 110 m hurdle and nonspecific sample, which were developed in the Preliminary Testing. The dynamics of the effort [15] was planned in the months of the experiment in an individualized manner on each subject, taking into account the somato-functional characteristics of each individual. [6]

The dynamic effort engine in the specific and non-specific training [3] on each subject is organized and presented in the following tables with the percentage of effort components as well as the results obtained in the initial, intermediate and final control samples during the experiment.

The engine program applied between the initial test and the final test is based on a training optimization adjustment system, focusing on the balance of transition and reassessment of the kinetic sensations from impulse to landing, taking into account a series of transformations made during the two tests through which the athlete consciously corrects the technical mistakes and implicitly improves them.

This correction is based on a tailor-made differentiation of analyzers on which the levels of faster co-ordination skills depend. These aspects are mainly found in the dynamics of the effort [10] in the specific training of technical training, as well as in the dynamics of the effort [1] for the harmonious and harmonious physical development and the coordination stimulated by the analyzers.

Records were made from both the lateral plan to capture as accurately the angles and distances as possible between the hurdle and the frontal passage phases to capture the angle between the attacking foot and the ground when landing.

The room was located at a distance of 7 m from the hurdle and at a height of 1.20 m, leaving the plan to the left of 4.55 m and the right one to the 5.05 m to be able to surprise as much as possible more and more faithful from the phases of the passage over the hurdle, and at 5 m and 1,20 m height for the front plan.

In the kinematic record that took place on the sports ground Poiana Braşov, with results processed by the Dartfish program, the following parameters were obtained (table 6).

After the initial testing, the kinematic records were presented to the subjects, and together with Mr. Prof. univ. dr. and coach Dragoş Ionescu Bondoc, the technical execution errors were studied, interpreted and corrected. The subjects were advised on the potential for correction of errors and the progress that can be achieved by repeated and continuous analysis of their mistakes in the phases of the hurdle runner, but also by an individualized proprioceptive training program, oriented to an impulse with a as sharp as possible [22], a faster,

clustered and balanced flight phase, and a safe landing towards a forward projection of the CGM to allow for an optimum run-in between the hurdles.

These aspects are to be attained by a faithful approach to cinematic parameters of the world champion of the sample, absolute model) [18].

In the first phase of the debut, the passage over the hurdle, the impulse and the attack of the hurdle, the distance from which the detachment is made is 2.02 m, and the impulse angle between the detachment foot and the ground is 134° , with a difference (130°), which causes the

athlete to keep the CGM very close to the optimum level over the hurdle and a higher passage at 0.45 m.

In the landing phase, the angle is 84° , which also causes a horizontal landing distance to the larger hurdle of 1.65 m. The flight time is also 0.02 sec. higher than that of the reference model, also caused by the excessive rise of CGM in F2 to 1.52 m from the ground, the ideal being 1.29 m. In F4 the impulse for the next step between the hurdles is made at an angle of 132° , and we will later notice that it is quite open and unbalanced.

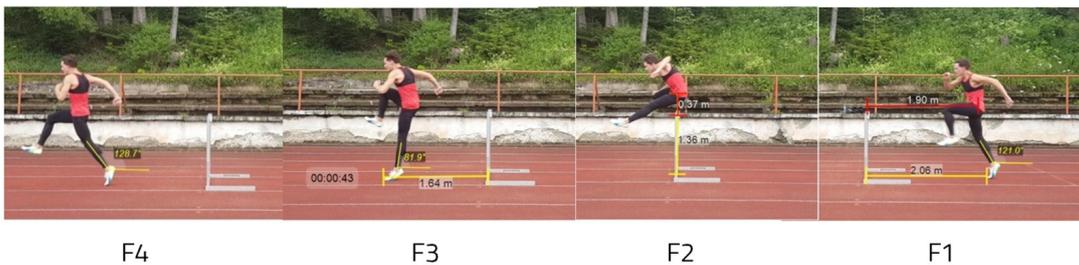


Fig. 3 Subject 1 - Vectorial representation angular dimensions – final test

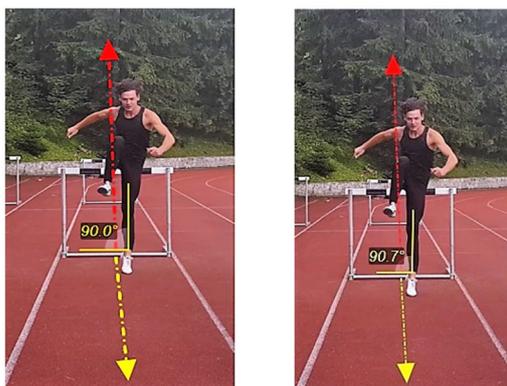


Fig. 4 – Subject 1 frontal plan final test

Following the proprioceptive training program [2] that took place between the two tests as well as the detailed analysis

of the technical faults and the repeated passes under the conditions of the competition, the athlete obtained at the final test stage improved parameters closer to those of the tracked model, was also found in the times of the specific control samples during the training and competitive stages.

In F1 we can see that the detachment was made from a distance of 2.12 m, and an angle of 137° , which allows the subject a better grouping in the flight phase. We also notice an automatism formed for the detachment, with the athlete having many passes in the final test phase where there are no great differences between the horizontal distances from which the attack is triggered.

Table 1

Kinematic parameters registered for subject 1 – comparison between initial and final testing

No.	Cinematic parameters 100 m hurdles	Initial t	Final t	Dif
1	Raising CGM to the ground	1,44 m	1,36 m	-0,08 m
2	Maximum CGM lifting above the hurdle	0,45 m	0,37 m	-0,08 m
3	The magnitude of attack angle	120,2°	121°	0,8°
4	The size of the landing angle	78,5°	81,9°	3,4°
5	Flight time	0,43 sec	0,43 sec	-
6	Horizontal distance from which the attack starts	1,99 m	2,06 m	0,07 m
7	The horizontal landing distance to the balanced hurdle	1,76 m	1,64 m	-0,12 m

Due to a better attack of the hurdle, from a slightly larger distance, the CGM trajectory is much closer to the ideal trail, rising above the ground by 1.45 m, much

better in the case of initial testing, the athlete feeling a lot better the height of the hurdle.

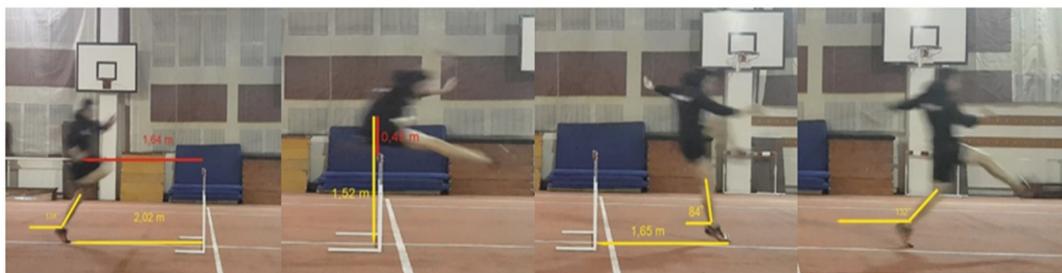


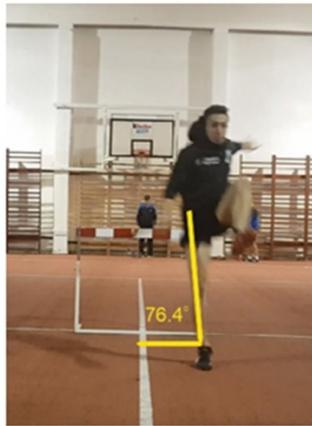
Fig. 5 - Vector representation of the distal and angular dimensions of the side plan S 2 - initial test

In the third phase of the crossing over the hurdle, the landing took place at a distance of 1.56 m and at an angle of 82 degrees, which indicates that the athlete has lowered the attack quite well after the hurdle, and due to In this way, the angle approaching 90 ° of the absolute model allows a better departure for the next step of the jog, at an angle of 145°. The landing angle approaching the vertical indicates that the forward CGM projection, the kinetic balance of landing balance improves.

Following the initial testing of the third phase of the passage over the hurdle, the

angular value of 76.4 was recorded (Figure 6). These values indicate that the landing was unbalanced, between the foot of the landing foot and the CGM, there being a small gap that contributes to destabilizing the path of a path that we want to be optimal.

The landing took place over the middle of the aisle at a fairly large distance, the unbalance being an obvious one and not allowing the athlete a normal and straight track of the run and no easy escape of the step between the hurdles.

Fig. 6 – *Initial test*Fig. 8 – *Final test*

It can be seen that the landing angle is significantly corrected following the proprioceptive training program, reaching 82.7° (Figure 8), thus achieving a much safer and more balanced landing than in the initial test. Improvement of the

coordinating capacities, essential in the driving forces in the phases of the hurdle, was accomplished by proprioceptive exercises that act on stimulating kinetic sensations, equilibrium, mobility and the automation of speed movements.

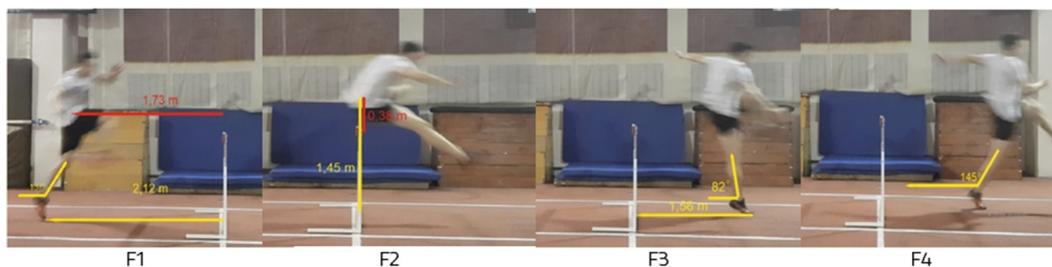


Fig. 7 - Vector representation of the distal and angular dimensions of the side plan S 2 - final test

Table 2
Kinematic parameters registered for subject 1 – comparison between initial and final testing

No.	Cinematic parameters 100 m hurdles	Initial t	Final t	Dif
1	Raising CGM to the ground	1,52 m	1,45 m	-0,07 m
2	Maximum CGM lifting above the hurdle	0,45 m	0,38 m	- 0,07 m
3	The magnitude of attack angle	134°	137°	3°
4	The size of the landing angle	84°	82°	-2°
5	Flight time	0,36 sec	0,34 sec	-0,02 s
6	Horizontal distance from which the attack starts	2,02 m	2,12 m	0,1 m
7	The horizontal landing distance to the balanced hurdle	1,65 m	1,56 m	- 0,09 m

The conclusion we draw from the tests of the two subjects is that, as a result of proprioceptive programs and dosing of effort from training plans, they have considerably improved their perception of the hurdle and the parameters of the hurdle runner.

The more engaging proprioceptive capabilities in the junior, the more likely it is to correct its hurdle runner and acquire a technique closest to the reference model, the world champion of the test will be one more bigger.

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