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**BIO-MECHANICAL STUDY OF RUNNING SHOOTING FROM  
BASKETBALL GAME**

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***Abstract:** By this study (biological and mechanical) we try to relaise a better comprehensioan of a base device at the running shooting in basketball game. So, it makes a descriptions of running shooting in basketball, from biological point of view (describe the musculature concerned in the mouvement) and a mechanical representations of this shoot.*

***Key words:** biological muscle, base device, mechanical representations*

***References field:** biomechanical shooting in the basketball game*

The dynamism of the basketball gaem is marked by promptitude of sequence the game phases, rapidity conferred by rules (offense time is 24 seconds). Running shooting could be preceded by dribbling or pass.

The running shooting is compose by:

- Dribbling in running
- Catch the ball (from dribbling or from passes)
- Realise the two steps,
- Push off
- The flight
- The shot
- The landing

***The descriptions of the correct tehniqye:***

1. At the running shoot (lay-up) precedeed by dribbling, before catching thr ball, the player will sent to the ball a stronger hitch, do that the catching could be made on the foot which is equivalent of the shooting arm (ex: if the shoot is made by right arm, the ball will be catch on the right foot.)

- After catching the ball, on the first step (the right one / which is the longest) it will be lifted on the chest.

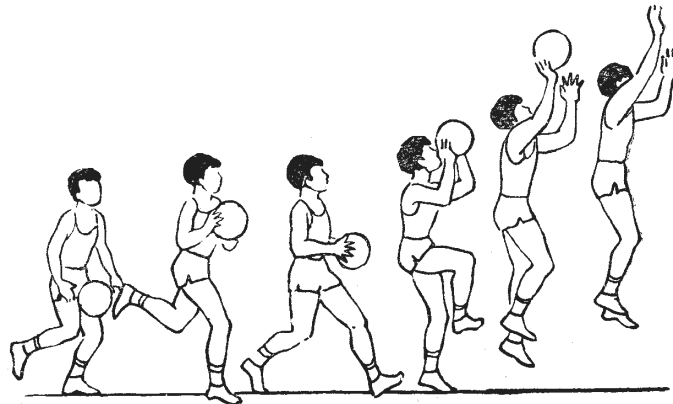
- It is followed by a step (shorter than the first one) which had the role to brake the translation speed of the player and to prepare the detach from the ground (rolling the foot from heel to tiptoe). Along of this step, the player rise the ball in the shot position.

- The detach from the ground is made on vertical way, by swinging the right foot (bent from the knee joint) from back to before, and carry the thigh on orizzontale and much more (the bound step from athletics). In this moment the jumping leg (left one) and the body are very stretched and orientatet from the front. Along with the jump the shooting arm is been stretched.

- The shoot is made in the maximum point of the jump and the tehniqye is the same like in the flip shoot. Finalization of shoot is made by the impulse gave to the ball by middle finger (this is the last one who touch the ball) by palmar flexion from wrist joint ( arm is stretched, the palm is orientated down, the fingers are scattered).

- The landing is made on the jumping leg (detach from the ground on the left leg – landing on the left leg) and the amortisations is made by drooping the right foot and flexions of the knee.

Fig. 1 – lay-up, dribbling



precedeed by

**Frequently mistakes:**

- Default of coordonations between arms and legs, catching the ball is realises on the oposite leg of shooting arm.
- Making more or less steps (failure the steps rule).
- Deficient oscillations at the leg of the shooting arm, which determinat an inadequate springiness, jump is longest then highest.
- Uncomplete the shoot by whippings palm, which determinat persussion the ball in the backboard or in the ring (goal not made).
- Landing on the leg of the shooting arm, because the jump is made in the long way not in the high way.

**Biomechanical analyses:**

Because is a complex shoot, which combine the characteristics of running with the jump's one, the lay-upprequore a very good neuromuscular coordination. Along the shoot we distinguish three tips of muscular activities:

- Dynamic activity of defeat – running phase and flight phase
- Dynamic of transfer activity / brake the translations speed and transform that in high jump (triple chain of flexion – triple chain of extensions)
- Static activity at balancing / antragonist muscles of the trunk and the legs (moment of landing).

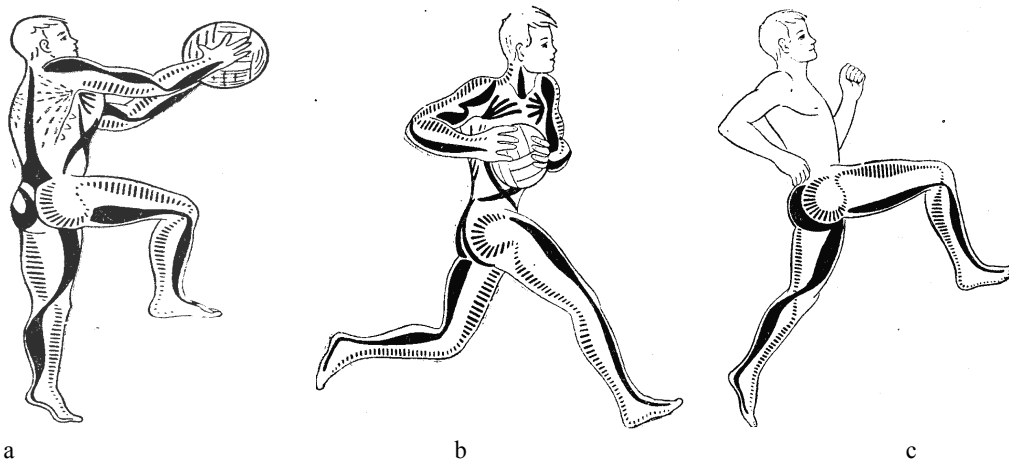


Fig.2

- a) Muscular chains which come between lay-up (the moment of detach from the ground and the moment of shoot).

- b) Muscular chains which ensure the amortisations on the right foot.
- c) Muscular chains which ensure the motion pulse at the left leg.

2. *The running shoot (lay-up) preceded by pass* has the same modde of technical execution like the shoot describe on the top, with exceptions of the moment of catchingu the ball. Here this is made in the moment of the first step (the flight phase) and is amortisations by easy flexions of arms and bringing the ball in the shoot positions.

**On the executions mistakes** which could been, we can add the receiving poorly a pass (inccorect catching, low pass or high pass).

**From biomechanical describe** we can tell that the muscular chains which realise the mouvement are the same like in the lay-up preceeded by dribblin, with exception that in the first part of the movement the muscular chains of the arms made an dynamic of transfer activity (for catching the pass), in conditions at static effort at balancing.

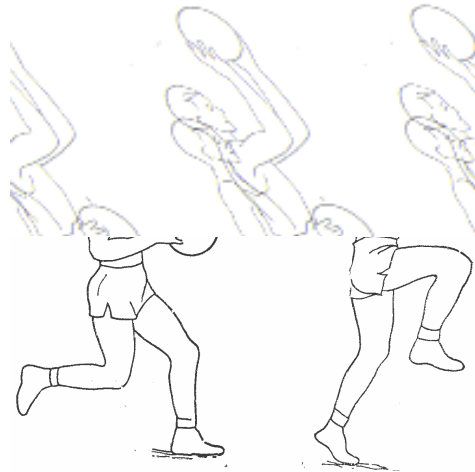


Fig. 3 – lay-up

**Mechanical describe of tehcnical execution:** In order to better understanding the phenomenon we used mathematical processing of related data a shoot, by using MathCAD.

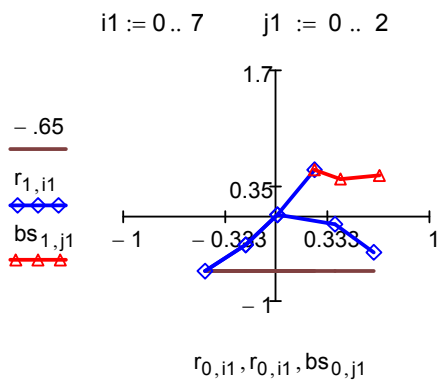


Fig. 4 – first step - on the right foot

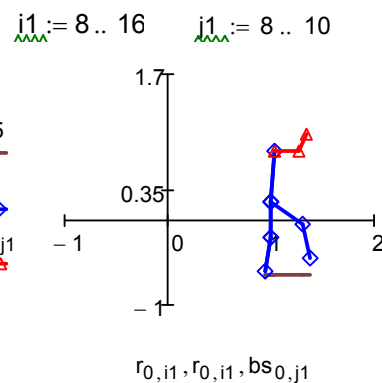


Fig. 5 – second step – the step which prepare the shoot

$j1 := 17..23$       $j1 := 11..13$

$j1 := 24..30$       $j1 := 14..17$

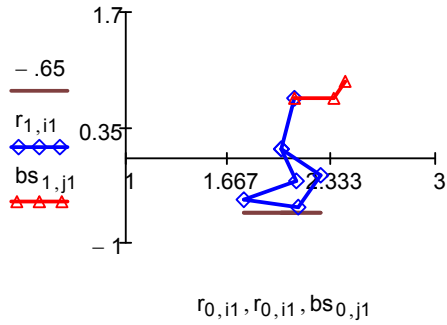


Fig. 6 – preparing for the last part of shoot (triple flexion)

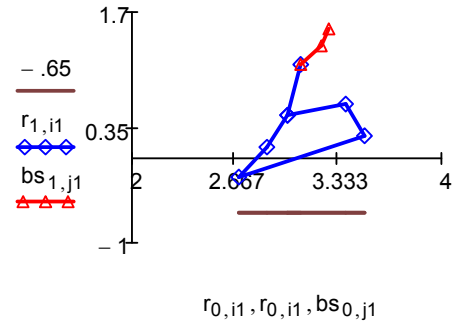
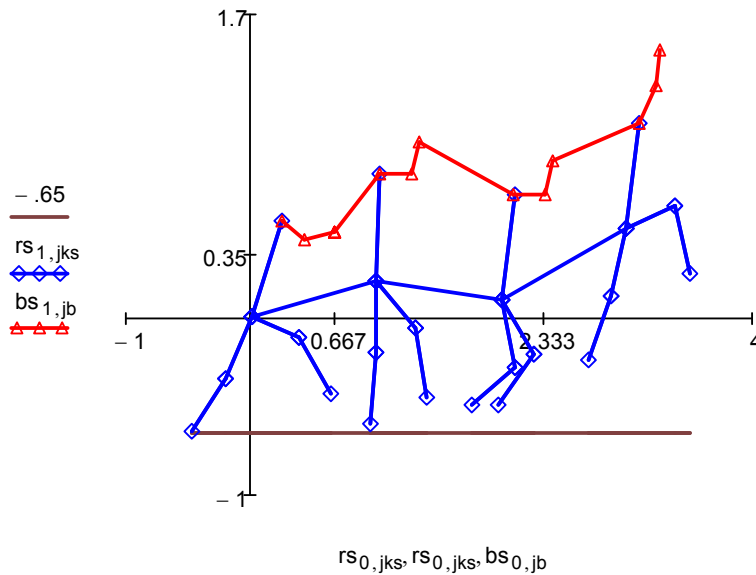


Fig. 7 – bound step on the basket (the shoot)



$$(ks_{3,10} \quad kb_{3,7}) = (43 \quad 31) \quad ((jks \quad j_b) := (0.. ks_{3,10} \quad 0.. kb_{3,7}))$$

Fig. 8 – lay-up – full graphical representation

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