THE COMPOSITION OF RELATIONSHIP BETWEEN APPROACH SPEED AND CENTRE GRAVITY (CG) IN THE FLOP STYLE

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INTRODUCTION

The sport from of back is a little complex. One of the most important points is beating the board. The result of beating the board depends on the approachang hight of the body's centre gravity. By examing two excellent men high jumpers, aiming at explaining relationship between approach speed and the height of the body's centre of gravity, so as to afford theoritical basis for coaches and athletes to grasp reasonable sport skills.

METHOD

The High-speed cameras (Model: LBS-16A, speed: 100 framers per second), Pulling-force sersor (Model:HYL-1) and Remoto EMG meter (Model: Multi Telemeter 551, Japan made) were simultaniously operated by means of Synchronous Signal Generator.

RESULT

During body's extension and foot's falling to the ground from the last third step to beating the board, two athletes not only change their horizontal and vertical velocity but also change their hight of CG (see Table 1, 2, 3, 4, 5).

The compositions of relations between approach speed and centre of gravity (CG) in the flop style when taking off are as following.

1 Speed relatively low, CG relatively high

Most of the athletes prefer this approach method because it is easy controlled.

2 Both speed and CG are relatively lower.

The athletes reduce his approach speed in order to lower his CG.

Table 1:Horizontal velocity of body's CG during extension(m/s)

Athlete	Result	The last third step	The last second step	Final step	Take-off
A	2.26	7.60	8.90	8.51	3.65
B	2.19	7.48	8.19	8.11	4.15

Table 2: Vertical velocity of body's CG during extension(m/s)

Athlete	The last third step	The last second step	Final step	Take-Off
A	0.28	0.32	0.20	4.69
B	0.30	0.25	0.22	4.21

Table 3: Vertical velocity of body's CG when falling to ground(m/s)

Athlete	The last second step	Final step	Take-off
A	-0.95	-0.66	-0.79
B	-0.80	-0.45	-0.37

Table 4: Hight of the body's CG when falling to the ground(m)

Athtele	The last third step	The last second step	Final step
A	0.92	0.84	0.77
B	0.93	0.90	0.81

Table 5: Hight of the body's CG during exetension(m)

Athtele	The last third step	The last second step	Final step	Take-off
A	0.95	0.93	0.89	1.38
B	0.86	0.84	0.82	1.27

3 Both speed and CG are higher.

Increasing approach speed causes CG unnecessarilly higher, while B adoptes it. B has a higher CG and a faster speed during the two steps before taking off, which makes him more comfortable than A. But his hight of CG need to be much lowered during taking off. In order to reach the aim, B should lower his CG during the final step when falling to the ground, as a result, he couldn't stop his downward movement of CG when driving phase ends, and get a negative vertical velocity -0.45m/s. Because of this negative vertical velocity B should gain more momentum than A to jump the same hight like A.

4 Speed much higher, CG relatively lower.

A adopts it. A very effective take off can be made by this approach method. However, a deep flexing of knee, wich, if is overdone, might effect an exposive extension, is needed. The biomechanics base is that not only CG should be lowered, but also approach speed in the final two steps should be increased. This approach method is necessary for gain high scores, but it is too difficult to perform. So it is an important problem as to how to make a faster horizontal velocity and a lower CG in several final steps of approach.

CONCLUSION

As to the relationships between approach'method and CG, there are two elections. One of them is keeping a relatively lower CG, wich inevitably causes an negative vertical velocity when taking off. The other is slightly highening CG to reduce this negative vertical velocity. To solve the above problem, one should organise approach method and CG height the most excellently as is difference according to different person.

REFERENCE

Chen wancai (1992). Biomechanics of taking off in the flop style.