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ORIGINAL RESEARCH

THE OPTIMIZATION OF THE TRAINING STRATEGIES IN WHAT CONCERNS OBTAINING A BIGGER TRANSFER OF THE TRAINING EFFECT FOR THE COMPETITION

DULGHERU MIRELA[1], VAIDA MARIUS[1]
[1]*Petroleum and Gas University from Ploiesti, Bucharest Bvd, no. 39*

Correspondings authors: **Dulgheru Mirela,** dmirela714@yahoo.com, **Vaida Marius,** vaidamarius@yahoo.com

Abstract

The personal experiences in the position of performance athletes, put us in the situation to do observations about the differences between the segmentary muscular contraction regime during training and the one of the solicitations in the competition effort. In the present paper we want to acknowledge and demonstrate the existence of a competition specific bio-motor (un-metabolic) of which if we do not take it into account we risk to have low transfer premises of the training effect towards the competition. In the present paper we used classic materials and methods and modern ones of research (the bibliographic study method, the observation method, the logical method, the measurements and recordings method, the graphic method and the experimental one). In our paper we will present the video recorded data of the executions during the competitions and the training of an athlete that was part of the investigated subjects' batch. I put experimentally in evidence the differences in the speed and positions distribution and also in the strengths and speeds distribution during training and competition reaching the conclusion that these differences are obvious and generate changes in the commands succession. The conclusion that we reached refers to the fact that the administration and regulation process of the physical effort in concordance with the competition effort's specificity must be revised, known being the fact that because of ignoring the differential nature of the effort's specificity mistakes are made in choosing the means and dosages, means are chosen without taking into account the existent differences between the segmentary contraction regime during practice and the one of the solicitations during the competition effort.
Key words: strategy, transfer, training, competition

Introduction

The sport practice through all its components (training strategies, means etc.) is an actual and higly debated problem by the specialists, the specialty literature starting to give sufficient attention to this rather delicate matter, its solution being appreciated as an important factor in the view of top results a a worldwide level. The paper that we realized started from the premise that the sport training is liable of being perfected, the study itself checking different theories about what aspects must guide us in choosing the most efficient means and to give answers to certain questions that have their roots in the practical activity and that were born after the researched phenomenon also from the discussions with their coaches and athletes.

The exceptional obtained results along the time in the Romanian athleticism lead us to the conclusion that we have so many human "resources", talents, also coaches with a high training, but also specialists in the sport research that had signaled and proved scientifically the weak points of the elite athletes' training also the increasing ways of the performances that through their high value, at a given moment, they tend to stop progressing. They are considered specific the means that are adequate to the basic indicators of the technique and of the functional particularities from the competition imposed at the athletic task. The specificity is given both by the external characteristics of the movement (amplitude, trajectory etc.) and by its coordinative structure, the functional particularities of the muscle, the vegetative reactions, the performance criteria.

We consider that a personal record of an athlete, in our paper a jumper in length, is susceptible to have perfecting by the continuous analysis of the training results' transfer towards other types of efforts, and that is the one characteristic to the execution during competitions and the permanent attempt of improvement of the

training strategies that represent choosing the most efficient exercises that would have as result a higher transfer of the training effects towards the competition.

The working hypotheses from which we started in this paper were:

1.Between the speed-position relation during the competition and the speed-position relation during practice there are huge differences that are not taken into account by the specialists in the training of the one that jumps in this moment. The relation between the strength – speed – position depends fundamentally by the neuromuscular control of the contraction;

2.By putting into evidence the existence of a certain bio-motor specificity (non-metabolic) of the competitions we try to put in evidence the differences between training and competition that are not generators of working volumes, of training, with transfer premises very reduces in the movement specific to the competition;

3.The planned results' dynamic and the competition effort's specificity are the ones that dictate to make more efficient the training means and of the entire training process.

Approaching the problematic of the chosen theme the paper had as purpose realizing a contribution in solving certain major problems that condition the choosing of the most efficient means during practice.

The main objective that was at the base of realizing this study had materialized in the process of making efficient the actions of choosing the training means.

Material and method

In the realized study the following methods have been used: the bibliographic study method, the observation method, the logical method, the measurement and recording method, the graphic method, the experimental method.

The experiment has been realized on a jump in length athlete, participant in the National Athleticism Championships of Romania, with notable results, that has been recorded, measures and analyzed in the competition, also during the development training of the muscular strength in which the subject used the means used currently by the athletes of high performance.

There have been made video recordings during the competition but also during the practice for the jumpers in length. For the images processing we used the Dart Trainer program, using the Analyzer module, the video image has been made at a 50 frames per seconds, meaning 1000 milliseconds, (50 = 20 mls, representing the time from the 2 images, the time base being from 20 to 20 milliseconds). On the processed image we measured the angle between the trunk and thigh for the beating foot, from the moment in which the foot sole has taken contact for the beating execution until the moment in which the pushing has been considered finished, so in the moment in which there was no more contact with the ground. For the athlete in cause there have been measured the angles depending on time, the data being afterwards introduced in Excel where the calculus has been made in order to obtain the value of the angular speed. We mention the fact that we took a reference point (0) that was obtained by the difference of the measured angle from which we subtracted a 180 degrees angle.

In parallel there have been also made video recordings of the executions during the strength trainings where we made genuflections with the bar-bell of different weights (40 kg, 60 kg, 80 kg, 100 kg) 4 repetitions at each weight, for measuring the angular speeds between thigh and trunk in the respective execution.

The development place of the initial study was the Athleticism Gym from Bucharest where the athletes that jumped in length did their training, athletes that were participants at the National Championships of Romania, but also athletes that are part of the national senior lot. We used as working instruments: the video camera with tripod, fluorescent markers that we applied at the level of the inferior limbs, respective on the lateral side of the knee articulation and of the coxo - femoral articulation, the bar from the bar-bell with disks of different weights, the space delimitation pins, computer with the Dart Trainer program and the Analyzer module in order to decompose and analyze the movement.

The experiment has been realized on a jumper in length, participant at the National Championship of Romania of athleticism, with notable results, that had been recorded, measured and analyzed during competition, and also during the muscular strength development training in which athletes used means currently used by them.

During the experiment there had been made video recordings during the athleticism competition with a national character, Grand Prix Bucharest, at the jump in length and during the strength trainings of the same subjects where they had made genuflections with the bell – bar. We mention the fact that the same instruments had been used, the same jump sector and we tries as much as possible to realize them in the same moments of the day, but in different days. The image analysis and the data processing has been made with the help of the Dart Trainer program, respective with the Analyzer module. On the images the angle between tights and trunks was measured for the beating foot from the moment in which the foot sole took contact with the ground in order to execute the beat and until the moment in which the beating has been considered finished.

The angle between the thigh and trunk has been measured, its evolution, having as aim the angular speed's value in the different phases of the taking off, depending on time, then the data have been introduced in Excel where the calculus have been made in order to obtain the angular speeds. We mention that we took a reference point -0- that was obtained from the difference of the measured angle from which we subtracted 180 degrees. We noticed that the values are negative when the angle between the trunk and the thigh does not pass 180 degrees and become positive if this angle passes 180 degrees. The athlete was filmed in order to analyze and process cinematically the movement from the training with the bar-bell where he made genuflections with the bar-bell, making a number of 4 repetitions at the following weights: 40 kg, 50 kg, 60 kg, 70 kg, 80 kg, 90 kg, 100 kg. Also in this case we were concerned about finding out the angular speed's value, the evolution of the angle between thigh and trunk. In processing the images in order to calculate the angular speed we chose to measure from 40 to 40 milliseconds because there were parts in which we had not what to measure and we risked to introduce errors.

During our paper we will present the data from the video recordings of the executions during competitions and training of an athlete that was part of the investigated subjects' pattern.

In order to film at the jump in length, the video camera was placed on a tripod, following an optimum angle of visibility. The video image was taken at the first attempt from the experiment at 30 frames per second. We measure on the processed image the angle from the trunk and thigh for the beating foot from the moment in which the foot sole has taken contact with the ground and until the moment in which this leaves the ground. Also we video recorded the athletes in their execution of the genuflections with the bar-bell, the images have been taken in a sagittal plan.

Results

The angles have been measured depending on time, the data have been introduced in Excel for making the calculus that will lead us at finding out the angular speed, parameter that interests us. In the followings we present the processed data and introduced in tables, where we can see the values of the angular velocity in different moments of the jump. In the first column we have the times from the 2 images, in the second one the measured angle from 0 degrees to 360 degrees, in the fourth column, the equivalent in radians of the measured angle and in the fifth column the values of the angular velocity resulted after using the following formulae: Speed (rad/sec) = = Δ angle (rad) /Δ time (s).

The angles measurement has been realized with the help of the video processing application Dart Trainer, obtaining in this way the angles values expressed in degrees. In the following step these values have been processed with the help of an application realized in C#, calculating the value of the angles in radians and the angular speed. After the data processing by the application, these have generated graphics, on the basis of which we made the interpretations, the discussions and the necessary corrections.

The resulted data after processing the video material at the made jumps during the competition

Table 1. Jump no.1/competition – athlete P.M.

Time	Angle	-180	Rad	V
0	147.7	-32.3	-0.56372	
0.02	148.5	-31.5	-0.54976	0.698111
0.04	150.4	-29.6	-0.5166	1.658014
0.06	150.7	-29.3	-0.51137	0.261792
0.08	158.5	-21.5	-0.37523	6.806583
0.1	162.7	-17.3	-0.30193	3.665083
0.12	174.4	-5.6	-0.09774	10.20988
0.14	189.9	9.9	0.172783	13.5259

The results after processing the video material made during the strength training (genuflections with the bar-bell)

Table 2. Repetition no.1/training - athlete P.M.

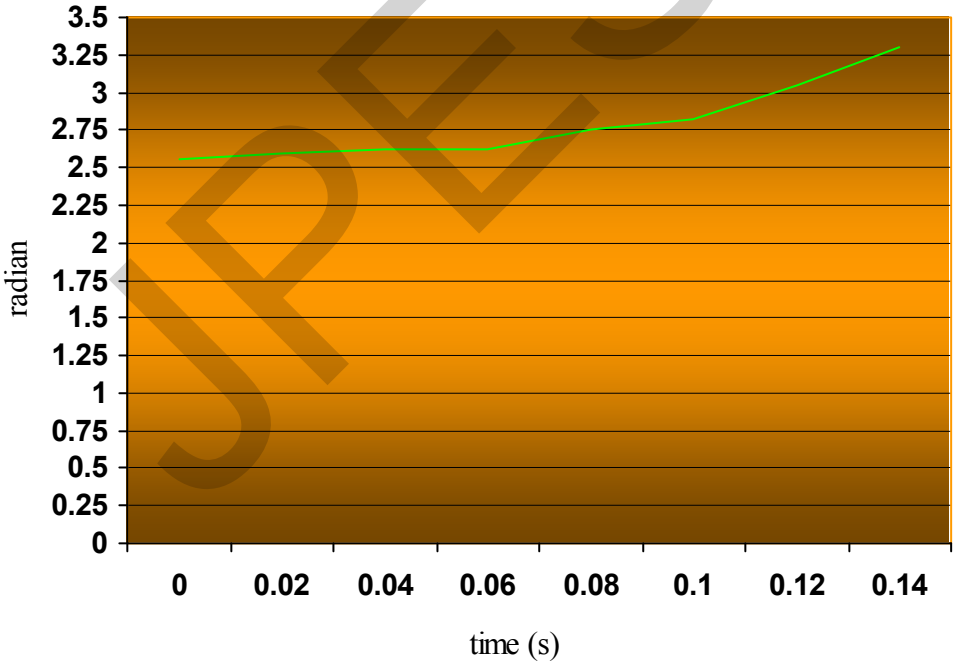
Time	Angle	Rad	V
0	59.9	1.045421	
0.04	62	1.082072	0.916271
0.08	64	1.116978	0.872639
0.12	69.7	1.216459	2.487021
0.16	75.2	1.312449	2.399757
0.2	82.1	1.432873	3.010604
0.24	88.1	1.53759	2.617917
0.28	98.1	1.712118	4.363194
0.32	106.2	1.853485	3.534188
0.36	114.9	2.005324	3.795979
0.4	121.5	2.120513	2.879708
0.44	129	2.251408	3.272396
0.48	137.8	2.404993	3.839611
0.52	153.4	2.677256	6.806583
0.56	165.4	2.886689	5.235833

The resulted graphics after the application

Graphic 1.- jump competition no.1_angle_time

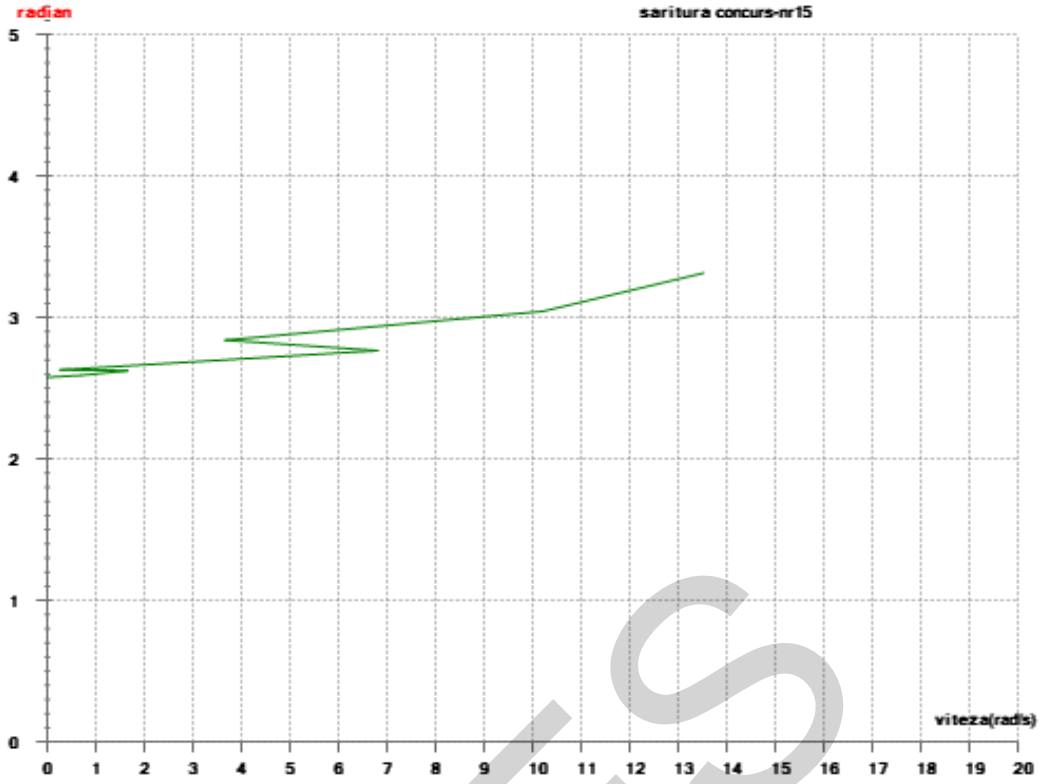
Graphic 2.- jump competition no. 1_angle_angular velocity

Graphic 3. - jump competition no.1_ angular velocity_time



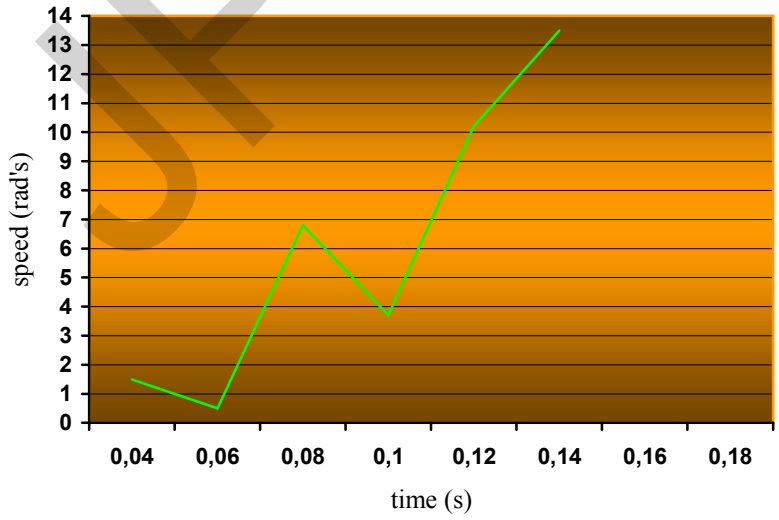
Graphic 1. Jump competition no.1_angle_time (rad/s)

The measured parameters' values:
Angle (rad) – 2,6 rad. – 3,25 rad.
Time (s) – 0,12 s



Graphic 2. Jump competition no. 1_angle_angular velocity (rad/sec)

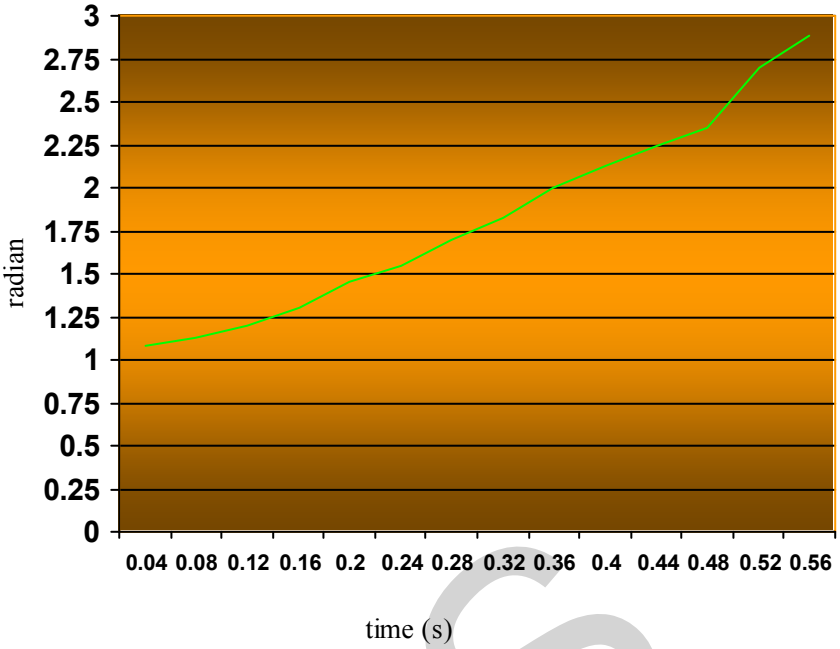
The measured parameters' values:
Angle (rad) – 2,6 rad. – 3,25 rad.
Angular speed – 13 rad/s



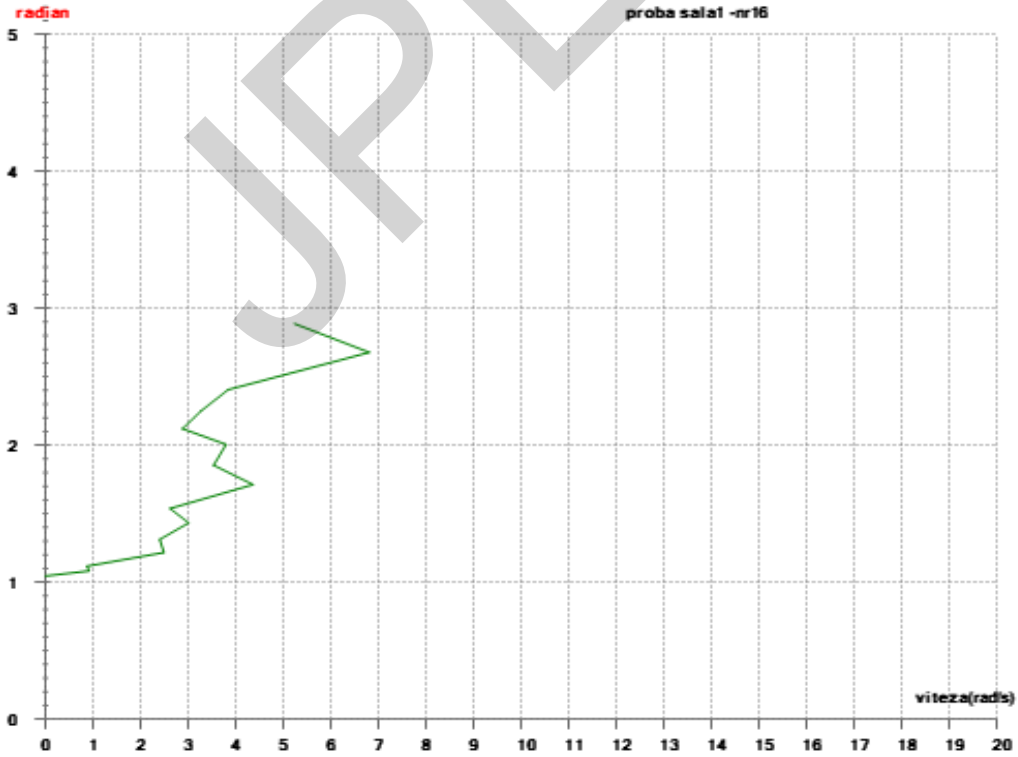
Graphic 3. Jump competition no.1_ angular velocity_time

The measured parameters' values:
Angular velocity -13, 5 rad/s
Time- 0,12 s

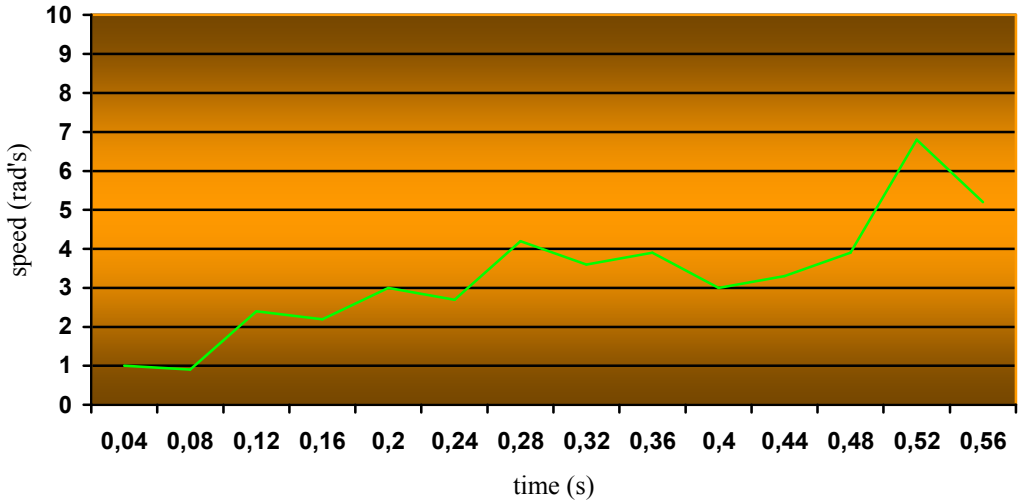
Graphic 4 - repetition 1/training-bar-bell_angle_time
Graphic 5 - repetition 1/ training-bar-bell_angle _angular velocity
Graphic 6 - repetition1/ training-bar-bell _ angular velocity _time



Graphic 4. Indoor task no. 1_angle – time (rad/sec.)
The measured parameters' values:
Angle (rad)- 1,15 rad.-2,75 rad.
Time (s) - 0,56 s



Graphic 5. Indoor task no. 1- Angle/angular velocity (rad/sec)
The measured parameters' values:
Angle (rad)- 1,10 rad.- 2, 90 rad.
Angular velocity (rad/s) - 7 rad/



Graphic 6. Indoor task no. 1 angular velocity/time (rad/sec/sec)
The measured parameters' values:
Angular velocity (rad/s)- 6 rad/s
Time(s) - 0,56 s

Discussion

Carefully studying the parameters' values that interest us in an evident way, we notice that during the training of genuflections with the bar-bell we have a higher movement time that is situated somewhere around the 0, 56 seconds in comparison with the execution movement time of the specific motor act from the competition that is situated between the values 0,12s – 0, 16 s. Also we observe a rate of the angular velocity during practice situated somewhere between 6 – 7 rad/s much lower than the angular velocity obtained during the competition, of which value is up to 13 – 13,5 rad/s.

We must not neglect it and that is why we underline the existence of an amplitude levels difference between the executions from the competitions confronted by the ones during training.

Observing how the angle evolves depending on the angular time and speed in the two studied situations, we notice the differences through the showing up of a curve on the graphic at the genuflections that are not similar at all with the ones from jumping.

We remind the fact that the strength was chosen among the reference motor qualities, and as a development mean, genuflections with the bar-bell, exercise used by all the jumpers in length.

Zatiorski sustained the fact that in the execution of the same movement we have different strength-speed relations, that generate differences in the reality projection; we checked in our experiment and we noticed that the projection of the points that represent the strength depending on the angle and the strength depending on the speed is one during practice and another during the competition.

Analyzing the resulted graphics after the data processing we observe major differences in the speed, positions distribution and also in the strength and speed distribution in the two situations chosen by us: the jump in length in competition conditions and the genuflections with the bar-bell during the strength development practice.

Conclusions

From the ones presented above we can draw the following conclusions:

- In a competition situation there is a special relation between the motor qualities for every movement, this being different from the relation between the motor qualities used in the training process.
- During the jump in length, at the stamping on the threshold, we notice a value of the angular speed higher in comparison with the one recorded in the execution with the bar-bell.
- We consider that between the speed-position relation during the competition and the speed-position relation during practice there are high differences, fact proved after the made experiment.
- We confirmed the fact that the strength-speed-position relation depends fundamentally of the neuromuscular control of the contraction, this relation being validated by the obtained results by us after the tests, the data gathering and their processing on the basis of which the graphics that prove these differences were made.

- During practice the jumpers do not develop the same speed-position relation and do not train the same specific strength, of course we are not referring to the general strength that has as purpose the general toning up.
- In the strength-speed-position relation if the projection of the speed-position relation is different, the strength availability is null.
- We proved that there are differences in the speed and positions distribution also in the strengths and speeds distribution during practice and competition, reaching the conclusion that these differences are obvious and generate changes in the commands sequence.
- We consider that the administration and adjustment process of the physical effort in concordance with the competition effort's specificity must be revised, known being the fact that from the reason of ignoring the differentiate nature of the effort's specificity mistakes are made in choosing the means and dosage, the means are chosen without taking into account the existent differences between the segmentary contraction regime during practice and the one of the solicitation during the competition effort.

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