

## THE DEVELOPMENT OF MOTOR QUALITY – DETENT – THROUGH ELEMENTS AND STRUCTURES SPECIFIC TO THE SPORTS GAMES

DULGHERU MIRELA<sup>1</sup>

### Abstract

**Purpose:** This experiment started from the premise that the use of sports games in physical education class is perceived by students as an attractive activity, through which we can stimulate on the background of the application of psycho-motor solicitation development of physical qualities. The present experiment has proposed to verify the hypothesis that if we introduce in each physical education class structures and elements of the game of football, basketball, volleyball and handball we will be able to improve the performances of our students at the specific tests to determine the explosive force of the inferior limbs.

**Material and methods:** This experiment was done on four groups of students from the Faculty of Economics. In support of the experiment we conducted specific research methods used in the research field, especially the method of measurement and evaluation, registration, statistics and mathematical method, graphical method, etc.

**Results:** The statistical processing of phase measurements, initial, intermediate and final results have superior values and visible progress of students undergoing the special program we proposed, compared with those who have worked only exercises specific to athleticism for the development of this quality.

**Conclusions:** Results and implicit the conclusions of the experiment confirm our hypothesis, and therefore we recommend applying the basic elements of the games in physical education class in order to improve the Sargent test results, a test of my choice in determining the explosive force of the lower limbs.

**Key words:** detent, explosive force, specific means, sport games, game elements and structures

### Introduction

The experiment started from the

force (force under speed regime) (T., Bompa, 2002).

<sup>1</sup>Petroleum and Gas University from Ploiești, ROMANIA

Email: dmirela714@yahoo.com

Received 23.05.2011 / Accepted 11.07.2011

premise that physical education activity can boost performance of physical qualities and entertaining means, through sport games, which by their nature are considered attractive activities, which stimulate the psycho-motor background for the benefit of performance increase.

The study chose detent, respectively the explosive inferior limbs' strength that I believe can be improved by means known to the athletic type, but also by means specific to sports games. Sports games are known to increase the attractiveness of physical education class, that the use of certain elements and structures of sports games increase the interest, competitiveness, the focus of students involved in the didactic process (T., Bompa, 2001).

We remember that we chose to study the development of detent that is a biometrical quality which facilitates the discontinuous movements' development and is translated into the ability to accommodate in a motor act of a high voltage, followed by sudden expansion.

Regarding the definition of detent, there is some disagreement among experts, some of whom consider detent the speed under strength regime, others assuming detent is explosive

According to V. Tudor (1999) the difference between the two forms is the predominance of one quality.

If at detent the predominant motor quality is speed (over 50% speed and below 50% strength), at the explosive force the predominant motor quality is force (over 50% force and less than 50% speed).

There were carried out researches that demonstrated the existence of close links between the maximum force and speed of the gesture. Force increase as a parameter of detent capacity depends on three factors:

- Coordination of muscle;
- Contraction speed of muscle active fibers;
- The force of contraction of muscle fibers involved, which depends on the cross section of muscle (Gh., Cârstea, 2000).

It is known that the main ingredients of detent are the explosive force and the starting force (S., Șerbănoiu, 2004).

Explosive force is translated into the ability to obtain a sudden increase of force per unit of time and depends on the speed of contraction of the phase units, the number and force of contraction of fibers employed in the effort (A., Dragnea, S., Mate - Teodorescu,

2002). I found it necessary to remind about the force that is a real parameter of detent capacity, force that we solicit in any sport game, whether discussing at the level of the inferior limbs [pace, shot], whether we refer to the upper limbs [throwing at the goal, hitting over the net, etc.](J., Weineck, 1995).

The hypothesis from which we started in our scientific approach in conducting this study was that if we turn our attention to the elements and basic structures of sports games and we will insert into the annual design as means, every physical education class, through these means specific to the sports games (handball, basketball, volleyball, soccer), we believe that we will see an increase of the combined motor qualities - detent and explosive expansion in the inferior limbs.

The specialty literature presents the main factors which determine the development of detent - explosive strength in the inferior limbs and specifies that they may be of biomechanics, biological and psychological nature (A., Dragnea, and collaborators, 2006).

Analyzing the information about these factors I tried to remember the most important of them:

- age, sex, diurnal rhythms (it was demonstrated that the daily fluctuations of force are approximately 5%);
- ratio of synchronization of motor units;
- means and methods used;
- ability to focus the fundamental nervous processes (excitation and inhibition);
- frequency of lessons;
- intensity of muscle contraction;
- the angle value of the segments involved in this type of action;
- muscle fiber thickness and the number of muscle fibers employed in the contraction;
- a wide range of psychological factors (motivation, attention, emotional states);
- Quality of energy substances in muscle and metabolic processes, etc (R., Manno, 1996).

#### **Material and methods**

The present experiment was conducted on first year students from the Faculty of Petroleum Engineering, we chose four groups, which totaled 100 boys. Students were divided equally into two working groups, an experimental form of 50 students, chosen randomly, and a control that had also a number of 50 members elected by the same criteria as those in the experimental group.

The experimental group had followed a certain training plan, sport game being always present at the lesson of physical education, they were introduced specific ways of sport games

in each lesson, game elements and structures, and control group students have developed their sport activity during the physical education classes respecting existing curriculum in the minutest details.

The experiment was conducted over an academic year, the activity took place according to the weather conditions, in the gym or on the outdoor ground and expended over the period October 2009 to May 2010.

They were established two control samples: detent on a vertical plan, for which the evaluation took place using the well-known Sargent test, and the long jump without take-off which we tried to determine the explosive force of the lower limbs.

Returning to the Sargent test I would like to remind you that it bears the name of the one who analyzed it from a biomechanical point of view, being considered one of the most striking evidence for determining the detent at the level of the lower limbs, in the vertical plane.

At the Sargent test were performed only two vertical jumps, without rapid flexion, both at the beginning and end of the university year, for a more reliable determination because it is possible when there are several consecutive repetitions the acquisition of the technique to influence the jump's height.

As a description of this evidence we can point out that it contains simple elements and is made of standing to one side of a wooden ruler graduated, the ruler having a length of 4 m, the doer extends up the arm near his ear with his fingertips leaving a sign, a trace, usually wet or dust chalk on the ruler attached to the wall, then he executes a slight flexion, after which he jumps vertically and marks a new sign on the ruler. It is calculated the distance between the two marks, expressed in centimeters.

In the present experiment I appealed to the known methods and research techniques: bibliographic study method, method of measurements and recordings, experimental method, statistical method and mathematical and graphical method.

Processing of statistical and mathematical calculation took into account the following statistical indicators: average, median, upper limit ( $X_{max}$ ), the lower limit ( $X_{min}$ ), amplitude ( $W$ ), quadric standard deviation ( $S$ ) and coefficient of variation ( $CV$ ).

Looking at our schedule in achieving our purpose, we briefly present some elements and structures, specific exercises to sports games that I used during both semesters of the academic year 2009-2010:

From the handball area we used the following elements and structures:

▪ With the handball ball in his hands, successive jumps in the spot or with shifting, on one or both legs, hop step with leading the handball ball forward – up, jump step ball carrying the ball at the chest.

▪ Throwing at the goal from jumping (or jump over the bench, an obstacle), with and without changes in direction.

▪ With the handball ball held between the ankles successive jumping on the spot or moving forward with both feet.

▪ Throwing at the goal from jumping while making a double jump on the left or right foot, etc.

From the basketball area we used the following elements and structures:

- Structures of exercises that contain changes in direction, pass, dribble, jumping on one leg or two legs, throwing the basket, etc.

- Stand with the ball held between the ankles: Jumping like the ball on the distance of 10-25 m. jumping with knees to chest, etc.

- free throws followed by vertical jump with touching the ring with your hand or reaching an object suspended.

- themed game (the ball does not falls to the ground).

From the volley area we used the following elements:

- Passing the ball from jumping over the net.

- From huddled in pairs, disrupting the partner by jumping from the squat in squat and pushing in his hands, [fighting cocks].

- Jumping on one leg, two legs, squatting with the trunk extension.

- Advanced exercises to attack and block, etc.

- Successive attacks from passes "rising" with withdrawal.

- Reproduction in the absence of the ball of the attack hit along the whole length of the field, respecting all phases (taking off, jumping, striking, landing).

From the football area we used the following exercises:

- Reproduction of hitting the ball with the head from jumping

- Jumping to the ball in order to hit it with the head

- Jumping vertically with a theme of overcoming of the horizontal plane of the goal

- Successive jumping on both feet over 10-15m on each leg with return dribbling through poles.

- Bilateral game with a theme (the validity of the goal is given only by hitting the ball with the head).

- Passing the ball between two players by hitting the ball with the head, etc.

#### Obtained results

After the made experiment numerical data resulted, data that were statistically processed and subsequently put in tables, in Tables 1 and 2 in which I present the statistical calculations of the initial and final values for the Sargent test and long jump without taking off in the 2 pre-established groups as being known as the experimental group and control group.

**Table 1.** Detent. Sargent Test. Statistic values.

	<i>Experiment group</i>		<i>Control group</i>	
	Initial T	Final T	Initial T	Final T
Arithmetic mean	45,022	51,795	43,568	46,863
Minim	29,5	37,5	30	34,5
Maxim	55	61	54	58
Amplitude	-	5,772	-	2,295
Median	46,5	53	44	47
Standard deviation	5,45	6,86	4,54	6,39

Coefficient of variation	13,03	12,53	11,43	12,76
--------------------------	-------	-------	-------	-------

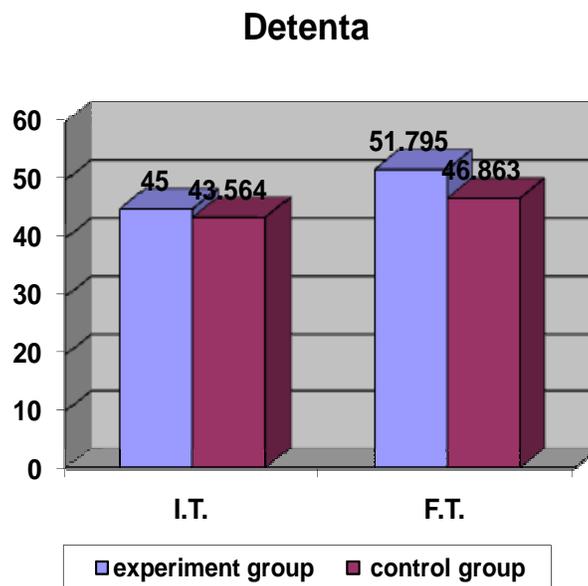
**Table 2.** Jump in length from standing position. Statistical values.

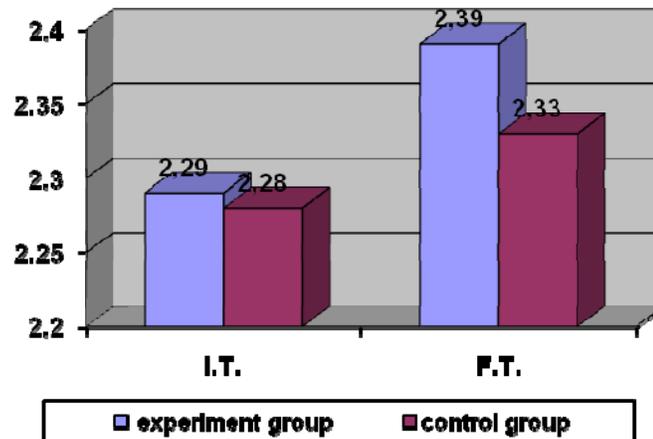
	<i>Experiment group</i>		<i>Control group</i>	
	Initial T	Final T	Initial T	Final T
Arithmetic mean	2,298	2,393	2,283	2,339
Minim	2,2	2,34	2,2	2,28
Maxim	2,90	2,98	2,90	2,94
Amplitude	-	9,75	-	5,84
Median	2,43	2,53	2,4	2,53
Standard deviation	0,38	0,37	0,40	0,39
Coefficient of variation	8,44	7,62	8,92	8,68

I represented graphically in Figure 1 the evolution of the average means at detent.

I also tried by a graphical representation in Figure 2 to show the evolution of average means in the long jump on the spot.

**Figure 1:** The medium evolution of detent



**Figure 2:** The medium evolution of the jump in length without taking off**The Jump in length without taking off****Obtained results and their interpretation**

Analysis and interpretation of statistical parameters calculated and put into tables indicate a higher evolution of the amplitude at the experimental group compared with the control group, for example the amplitude of the detent is with 3.5 cm higher in the experimental group compared to the control group recorded amplitude.

It was also found that at the detent, in the case of the experiment group was made a jump of the mean in the case of the Sargent test with approximately 6 cm, and at the control group, the mean progressed with 3 cm. The coefficient of variability indicates that the degree of homogeneity of values is medium. In the same context, at the long jump from standing position we notice, at the experiment group a progress of the average of performance with 10 cm, and at the control group only with 5 cm, we find that in both groups also can be observed a small scattering of the data (clustering the values around the average), the degree of homogeneity of the values being high.

**Conclusions**

Following the conducted experiment we can conclude that, according to the hypothesis claiming that if we turn our attention to the elements and basic structures of sports games and we will insert into the annual program as means, at every physical education class, through these means specific to sports games (handball, basketball, volleyball, soccer), we believe that we will see an increase of the combined motor qualities - detent and explosive

strength in the inferior limbs, hypothesis that is otherwise confirmed.

From the data shown in the above tables and figures presented show that the experimental group had higher increases in both samples, compared with the control group, the group that did not work using the means specific to sports games at every class of physical education.

As a corollary of those currently referred to the fact that detent, the explosive strength of the inferior limbs can be improved at this level of study, taking into account that the investigated subjects are not engaged in sport performance, demonstrating that by preparing students through sports games represents an effective form, pleasing and touches a very important goal in the current context, of the necessity to attract the school population and not only towards moving, sport.

We can say that in the specific training process, the introduction of these means specific to the sport games, has as result the increase of attractiveness of physical training classes simultaneously with the improve (get better) the two motor qualities (motor skills) combined, leading ultimately to higher levels of general physical training. Thus, versatile approach of the game structures, in the case of physical education classes and sports and of the study subjects, resulted in a significant increase in their efficiency.

The same idea was found that after the very good results obtained from tests, the experimental

group subjects approached in a very special manner the physical education lessons, with positive results.

It is important to note the total change of attitude to the studied students regarding the game structures, sports game in general, meaning that at the beginning of the research, their attention regarding some games was low, then after the rise in density of the lesson using play structures, the attention and participation in the lesson was more efficient, noticing even an active and enjoyable participation and, as seen, beneficial for their own performances.

#### References

- BOMPA, T., (2001)** – *Development of bio-motor qualities*, Ex Ponto Publishing House, Bucharest.
- BOMPA, T., 2002**– *Training theory and methodology –Placing in periods*, Ex Ponto Publishing House, Bucharest,
- CÂRSTEA, Gh., (2000)** - *Physical education and sport theory and methodology*, AN-DA Publishing House, Bucharest.
- DRAGNEA, A., MATE - TEODORESCU, S. (2002)** – *Sport's theory*, Fest Publishing House, Bucharest.
- DRAGNEA, A., and collaborators (2006)** – *Physical education and sport – Theory and didactic*, Fest Publishing House, Bucharest.
- MANNO, R., (1996)** - *The theoretical basis of sport training*, Revue E.P.S. Publishing House, 1992, translated by C.C.P.S., S.D.P. 371-374, Bucharest.
- ȘERBĂNOIU, S., (2004)** - *The physical education and sport methodology*, University Book Publishing House, Bucharest.
- TUDOR, V., (1999)** - *Conditional, coordinative and intermediate capacities - components of motor capacities*, Rai Publishing House, Bucharest.
- WEINECK, J., (1995)** – *Sport's biology*. Vol. 1, in: SDP. Bucharest, CCPS, S.D.P. 365 – 366.
- WEINECK, J., (1995)** - *Sport's biology*. Vol. 2., in SDP. Bucharest, CCPS, 369.