Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST,
DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengage Learning, Cabell's Directories

Science, Movement and Health, Vol. XIII, ISSUE 2, 2013
June 2013, 13 (2), 59-65

Original Article

THE INFLUENCE OF PSYCHOLOGICAL TRAINING ON THE MANIFESTATION DYNAMICS OF CONFUSION AND BEWILDERMENT GENERATED BY COMPETITION STRESS

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Abstract

The purpose of this research envisaged the dynamics of the manifestation of the confusion-bewilderment mood states in the professional middle distance and long distance runners, during stress-generating competition situations.

Methodology. Assessing the manifestation dynamics of the confusion-bewilderment psychological moods, in 3 different stages over the course of 6 months (February-August 2011), the research focused on the attitudes and the observable and measurable behavior of 12 subjects with various experience in practicing track and field and that particular event. The athletes, under their freely expressed consent, were subjected to three psychological tests, in three different stress situations: before two major competitions (national championships - selection competitions), and at the middle of the period between the two important competitions. The research instrument was the P.O.M.S. test (the Profile of Mood States, described by McNair, 1971).

Results. The application of the special psychological training program, adapted to the middle distance and long distance running competition characteristics determined, after 6 months of intervention, a statistically significant decrease in the confusion-bewilderment moods. The statistical analysis of the data allowed the observation that at the end of the psychological training program, the results for the C-B variable have significantly dropped between the first test and the third one, which indicates an increase of the regulation, therefore of the control, gained by the subjects before the actual race, of their states characterized by disorientation and confusion in thinking.

*Conclusions***.** The results of the research allow the observation that in the practice of professional track and field events, psychological trainings adapted to their specifics can diminish the psycho-affective moods characterized by bewilderment, uncertainty, disorganization, confusion. The condition that imposes itself is that these trainings must be conducted over an optimal period of time (under the coordination, or with the collaboration of a psychologist), and the periodic assessments should be always present, in order to observe the effects of these trainings, the adaptations to the determined reactions, and the changes in attitude in the subjects' behavior.

Introduction

Achieving top athletic performance (avoiding the possible failure) in various track and field events needs the approach of a complex and varied training, in which the interaction between the psychological and the motor components must be analyzed and coordinated in relation to the complexity of the reactions caused by multiple factors.

Previous studies have demonstrated that success and failure in professional sports, as well as the methods of reaching the goals and avoid failure, are directly or indirectly dependent on the athletes' interaction with manifestations of genetic, bio-psychological, or environmental factors (Martens, 1987, Epuran, 1990, Weinberg, 1995, Niculescu, 1999, etc). One of these factors is the athletes' attitude regarding the control and management of competition situations with a high level of bio-psycho-affective tension (Cashmore, 2002, Weinberg, Gould, 2007).

This bio-psycho-affective tension, generated by competition factors, usually provokes states of anxiety, disorganization, and bewilderment (confusion in thinking), nervousness, physiological reactions that have a limiting effect on the performance. From our personal experience, as well as from reading the opinions of other specialists, we noticed that this bio-psycho-affective tension provoked by competition can be also a favoring factor for the performance (Thomas, 1983, 1993), a situation that depends also on the athlete's personal, subjective experience.

The analysis of the effects provoked by the physical and psychological tension before, during, and after an event with a high affective-emotional charge, and a high biological demand, represented a starting point for several vast researches regarding the people's moods / psychological states. The result of these researches has been ulteriorly transformed in standardized research instruments, which are still used

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Received 11.01.2013 / Accepted 12.05.2012

today to study certain aspects (such is the case of the POMS test, described by McNair, in 1971, a test we used in this paper to determine the possible effects that the specially conceived psychological training could have on the dynamics of certain moods that are often present in professional athletes during competition periods - states of confusion, disorganization, bewilderment).

The opinions expressed in the professional literature in regards to the confusion and bewilderment mood states encountered in situations with a high level of psychological tension (such as professional sports competitions) tend to associate these moods with the classical emotional dimension of organized-disorganized, closely linked to anxiety states (McNair, Lorr, Droppleman, 1971).

Research Methodology

Research Hypotheses

- the stress that is specific to competition situations that are very important to the professional middle distance and long distance runners can generate increases in the psycho-affective dispositions that are characterized by confusion in thinking and slight bewilderment;
- the application of a psychological training program, adapted and related to the competition system of the middle distance and long distance track and field events, can determine, after a longer period of time, a decrease in the confusion-bewilderment moods that were generated by competition stress.

This research, part of a larger study, envisaged the analysis of the psycho-affective moods of *12 professional middle distance and long distance runners*, from 5 Romanian sports clubs, with an average age, at the beginning of the experiment, of 22 (minimum 18, maximum 28), with an experience in track and field between 5 and 14 years, and a specialization in the middle distance and long distance events of minimum 4 years. The subjects' athletic performances range from good to very good (from nationally medaled to multiple national and Balkan champions, participants and medaled in various international competitions).

The research instrument we used was an adapted form of the P.O.M.S. test (the Profile of Mood States, as described by McNair, 1971). Based on indications, the scores recorded from the applied questionnaire were transfered on a specific test profile chart, comprising T-scores for each factor. The graphical representation of the data shows "iceberg"-type diagrams, considering the visible side as being delimited by a line found at the 50 point mark. The variables subjected to the POMS test analysis are: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment.

This paper focused on the ***C-B*** variable (**confusion-bewilderment**), which expresses bewilderment and confusion in thinking. This can represent, according to psychologists, a criterion of cognitive effectiveness, possibly a product of anxiety, or of similar states.

Trying to determine the dynamics of the manifestation of the moods characterized by confusion-bewilderment in those situations in which the competition generates stress (and its varied effects), 3 tests were applied in 3 moments of major importance for the subjects' professional activity (3 major competitions in the competition season that were very important for the subjects):

- the initial testing (February 2011, National Senior Championship, indoor, goal - medal);
- the intermediary testing (June 2011, International Championship, outdoor, goal - time);
- the final testing (August 2011, National Senior Championship, outdoor, goal - medal);

The tests, applied in the presence of a psychologist (who supervised the assessment), were conducted in the first day for each of the three competitions, in the morning, after the athletes had woken up and had breakfast.

The utilized means system

The research was conducted through a specific psychological training program, over the course of 6 months. Thirty means were applied, destined for a specific psychological training, in 48 lessons, throughout 24 weeks. The specificity of the lessons was adapted, mainly to regulate the dispositions generated by the 6 variables evaluated through the POMS test.

The methods used in the subjects' psychological training, methods that the coach can use in his work to improve the regulation of mental states in athletes, involved: communication, suggestion and autosuggestion, awareness, biofeedback, development of self-esteem and coping in athletes, as well as ensuring a good neuro-psychological recovery, strategies for improving the activation, strategies for energizing the athletes, pep talks, bulletin boards, training before competition, immediate strategies for self-energizing.

We must mention that the athletes' training before the three envisaged competitions (the final 6 days before entering the competition) did not include any more high levels of intensity or volume, the runners performing standard training sessions, specific to the week before the competition. These training sessions have subjected no longer the body to new adaptations or stimuli, having as main goals: the active rest, maintaining the obtained energy to an optimal level, the psychological and tactical preparation for the competition.

Results

The data recorded after the 3 assessments regarding the confusion-bewilderment moods in all the professional athletes subjected to this analysis are shown in Table 1.

After transforming the recorded points into T scores (Table 1), according to the profile chart, and taking into account the value-imposed limit of 50 (benchmark), the analysis of the data for the initial testing (*t1*), regarding the confusion-bewilderment moods expressed by the subjects before an important competition, revealed that the ***C-B variable*** reached an average score of **53.42** (translated by a slight state of confusion before the actual beginning of the race). Out of the values presented in Table 1 - *t1* one can see that 66.67% of the subjects (8 out of 12) reach values over 50. Two subjects stood out: M.I. (a value of 61) and C.I. (a value of 64). The discussions we had with the subjects allowed us to see a possible cause for the high values for the C-B variable - the existence of a low level of communication between them and the coaches;

The analysis of the data recorded during the **intermediary testing** (**t2** transforming the obtained points in T scores, according to the chart, benchmark value - 50) before the second competition, gave the following results:

- the values of the ***C-B variable (53.25)*** still present a slight mood of confusion-bewilderment in the athletes, almost identical (slightly decreasing, but not significantly) with the one measured and assessed in the initial testing. Knowing the fact that the C-B variable can represent, according to psychologists, a possible product of the anxiety states that are specific to the situations with a high degree of psychological tension, one could conclude that the applied psychological training did not "show" its effects yet, after 3 months of applicative intervention (February-June, between *t1*and *t2*);
- the highest values for this psycho-affective mood, characterized by confusion in thinking and bewilderment before a competition, were recorded by the same two subjects, training and club colleagues: M.I. (61, the same as in the initial testing), and C.I. (66, higher than in the initial testing);
- the individual values in the first two tests present, in comparison, modifications that do not support a constant tendency (some values decrease, others increase). Still, the t2 average value is close to the t1 average value.

For a much more eloquent scientific and statistical argument, the Student's t-test was applied, to determine the significant differences between different variables, at the significance threshold of $p < 0.05$. In order to verify the existence of significant differences regarding the psychological moods of confusion-bewilderment of the subjects, determined by competition stress during the first two tests (initial and intermediary), the t-test for paired samples was applied, having as independent variable the variable *test* (t*est_1* versus *test_2*), and as dependent variable, the ***C-B*** variable, specific to the psycho-affective moods profile (POMS). Thus, in the case of the C-B variable, there are no significant differences (Table 2) between the results for test 1 and test 2 [$t(11) = 0.077$, $p = 0.940$].

The ending of the period of application of the psychological training program has imposed the last testing (***t3***), to determine the modifications in the subjects' behavior. In a synthesis, the results show that:

- the average value of the C-B variable (47.83) has dropped under the benchmark limit (50) imposed by the profile chart;
- in this last testing, the values of the ***C-B variable*** have decreased (from 53.25 to **47.83**), confirming the decreasing tendency of the other variables' values (Figure). Considering this last average value (47.83), one can say that the subjects have positively regulated their manifestations caused by stress before an important competition, and, in this case, they have started the August 2011 competition with a visibly decreased level of the psycho-affective moods characterized by confusion, bewilderment, maladaptation;

The verification of the existence of significant differences regarding the psychological moods of confusion-bewilderment of the subjects, determined by competition stress during the last two tests (intermediary and final), was done also by applying the t-test for paired samples, having as independent variable the variable *test* (t*est_2* versus *test_3*), and as dependent variable, the ***C-B*** variable, specific to the psycho-affective moods profile (POMS).

In the case of the *C-B* variable, *there are significant differences* (Table 2, Figure 2) between the results for test 2 and test 3 [$t(11) = 2.977$, $p < 0.05$]. By following the averages, one can see that the psychological training program meant to regulate the athletes' reactions to competition stress, the C-B variable results have significantly decreased between t2 and t3.

The study of significant differences regarding the psychological moods of confusion-bewilderment of the subjects, determined by competition stress between the initial test (T1) and the final test (T3), was conducted again by applying the t-test for paired samples, having as independent variable the variable *test* (t*est_1* versus *test_3*), and as dependent variable, the ***C-B*** variable.

In the case of the ***C-B*** *variable, there are significant differences* between the results for test 1 and test 3 [$t(11) = 2.944$, $p < 0.05$]. By following the calculated averages, one can see that at the end of the psychological training program, the results for the C-B variable have significantly dropped between the first test and the third one (Tables 2 and 3), which indicates an increase of the regulation, therefore of the control,

gained by the subjects before the actual race, of their states characterized by disorientation and confusion. One can estimate that by dropping the C-B average values, the subjects showed, at the end of the intervention, a possible increase of the cognitive effectiveness, a fact confirmed also by the superior results recorded in the third competition.

The average value of the difference between the initial and the final testing for C-B is the second most important, the decrease in the final value highlighting an improvement of the subjects' ability to regulate their confusion and bewilderment states generated by the competition stress;

In order to have a point of reference as objective as possible for comparing the subjects' behavior during the three moments of testing, we transformed the performances recorded during competitions into points, in compliance to the IAAF regulations, and we did an analysis of the correlations between the affective manifestations and the recorded performances.

The qualitative analysis of the statistical correlations regarding the sense of the modifications of the C-B variable values over the course of the applicative intervention highlights the fact that the **C-B variable**, even though initially did not correlate with the score recorded by the subjects (Table 3), after the intervention program it arrives at a negative correlation with the recorded score, as a result of the participation in the third and final important competition studied in this research. As the C-B variable involves states and psycho-affective moods characterized by confusion in thinking, bewilderment, and it is a negative dimension, and the correlation became negative, one could estimate that as the subjects tend to record lower T scores for this dimension, they will tend to have better performances at their middle distance and long distance running events (this happening only after going through the intervention program).

Discussions

One can observe from the analysis of the data (shown in Table 2 and Figure 1) that the applied psychological training did not show any effects yet after 3 months of applicative intervention (February-June, between *t1* and *t2*). We believe that this is possible also due to the fact that the focus in this period of time was not on approaching the confusion and bewilderment moods, the recorded values in the initial assessment being slightly over 50 (more precisely, 53.42), and did not demand an intense approach, as was applied in the case of the other variables that were studied, but are not the subject of this discussion. One can see, though, in Figure 1, that the values that imposed a more intense focus were the ones belonging to the tension-anxiety - T-A, and anger-hostility - A-H moods, which had much more pronounced initial values, and whose diminishing brought the diminishing of the confusion-bewilderment moods (which are influenced by the presence of anxiety states).

Still, one can say that the POMS profile recorded by the subjects of this study before an athletic competition is slightly different in the intermediary testing to the one in the initial testing (Figure 1), having a kurtosis with a decrease of the importance of the effects caused by the T-A (tension-anxiety) and A-H (hostility, irritation) moods, and a slight orientation toward the V-A variable (mobilization, vigor, and psychological activation). This aspect encouraged us in continuing the application of the psychological training program elaborated for this research.

After the 6 months of applicative intervention on the subjects, their results clearly expose a diminishing of the confusion-bewilderment states, the final values (47.83) being under the benchmark of the POMS test. This confirms the necessity of applying, over a longer period of time, of certain components of athletic training in the general and complex training of the track and field athletes, envisaging the diminishing of certain factors that can be perturbing for the athletic performance.

The obvious significant decrease in the C-B variable's values (Figure 3), with some exceptions, shows an improvement of the athletes' ability to regulate their states of bewilderment and confusion in thinking, generated by competition stress (one can observe the differences between the initial testing - brown, the intermediary testing - blue, and the final testing - green).

The comparative analysis of the profiles recorded by the subjects during the three assessments (Figure 1) suggests a clear modification of the psycho-affective moods, from one competition to another, with the orientation of the "iceberg" profile from the anger-hostility (A-H, brown in the figure) component toward the component of vigor and positive psychological mobilization (V-A, green). One could say that the modification of the mood orientation was due also to the diminishing values recorded by the subjects for the variable C-B (the decrease of values under 50 indicating a possible increase in the cognitive effectiveness, the confusion in thinking being diminished).

We must specify the fact that the data presented in this paper are a part of a larger study, conducted during doctoral studies (Alexe, 2012). Because of the limited space given for this paper, many details that would have clarified the central idea that was analyzed here, were not mentioned. We tried to highlight only certain details that we thought would be relevant for the discussed theme, and to accentuate certain aspects (by putting them under an original light). We also believe and support the idea that a deeper understanding of certain possible relationships between the specific psychological training and the dynamics of the confusion and bewilderment moods can be achieved only by studying the relationships between these moods and other essential factors (other moods, biological factors, ambiance, human relationships, etc.).

Conclusions

The statistical analysis of the data recorded during the first two tests allowed the observation that the stress that is specific to competition situations that are very important to the professional middle distance and long distance runners can generate increases in the psycho-affective dispositions that are characterized by confusion in thinking and slight bewilderment. This conclusion confirms the first hypothesis.

The application of a psychological training program, adapted and related to the competition system of the middle distance and long distance track and field events, can determine, after a longer period of time, a decrease in the confusion-bewilderment moods that were generated by competition stress. This conclusion, defended by the previously presented statistical data, confirms the second hypothesis of the research, and accentuates the importance of selecting original methods, created to develop the athletes' abilities to control their psycho-affective moods that appear in crisis situations, as well as the importance of applying them over time, adapting them for the training.

The effectiveness of a psychological training program applied to professional middle distance and long distance runners can be confirmed by the athletes adopting fighting attitudes, of psychological mobilization, before a competition.

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Table 1 - Data recorded by the subjects during the POMS test, variable C-B

No.	Initials	gender	age	*t1*	*t2*	*t3*	average
3.	G.I.	M	23	50	52	46	49.33
2.	S.A.	M	20	55	44	57	52.00
3.	I.C.	M	26	44	44	41	43.00
4.	C.V.	M	20	39	53	44	45.33
5.	P.G.	M	21	55	59	48	54.00
6.	G.A.	M	23	59	48	43	50.00
7.	Z.I.	M	28	59	57	50	55.33
8.	M.I.	M	19	61	61	55	59.00
9.	F.C.	F	23	52	55	44	50.33
10.	B.C.	F	19	50	57	52	53.00
11.	B.A.	F	24	53	43	37	44.33
12.	C.I.	F	18	64	66	57	62.33
		Average	22.00	53.42	53.25	47.83	51.50
		Max	28	64	66	57	
		Min	18	39	43	37	
		ampl	10	25	23	20	
		S	3.05	7.13	7.34	6.48	
		Vc	13.84	13.34	13.78	13.54	

Table 2 - The t test for comparing the average values between the situations *test_1, test_2, and test_3*

Variable	Test	Average	Standard deviation	t Test results

C-B	Test_1	53.41	7.13	t (11) = 0.077, p = 0.940
	Test_2	53.25	7.34	
Variable	Test	Average	Standard deviation	t Test results
C-B	Test_2	53.25	7.34	t (11) = 2.977, **p = 0.013**
	Test_3	47.83	6.48	
Variable	Test	Average	Standard deviation	t Test results
C-B	Test_1	53.41	7.12	t (11) = 2.944, **p = 0.013**
	Test_3	47.83	6.48	

Table 3 - The Pearson r correlation coefficients between the values of the C-B variable and the values from the students' scores recorded during the analyzed track and field competitions

Variable	**Score 1 (N = 12)**	**Score 2 (N = 12)**	**Score 3 (N = 12)**
C_B1	r = – 0.071 p = 0.826		
C_B2		r = 0.082 p = 0.799	
C_B3			r = – 0.288 p = 0.363

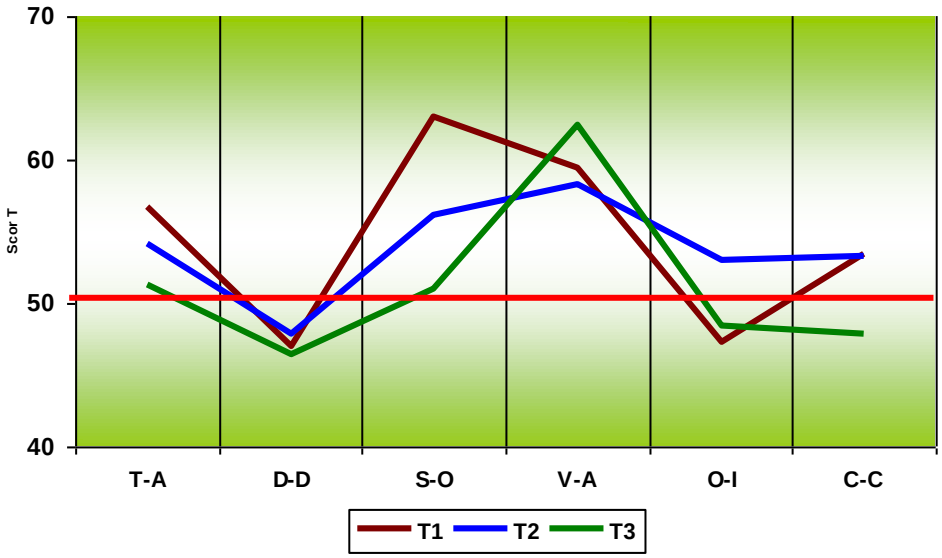


Figure 1
Comparative analysis regarding the profile of the psycho-affective moods in all three tests

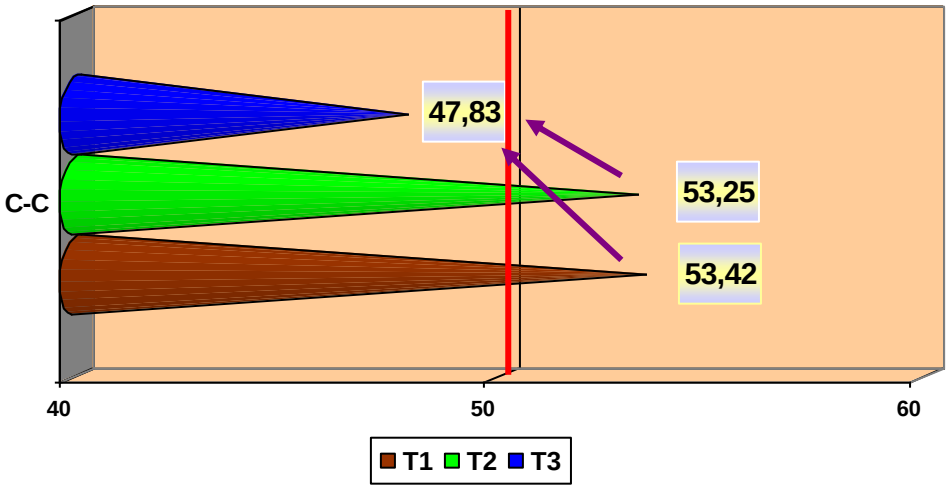
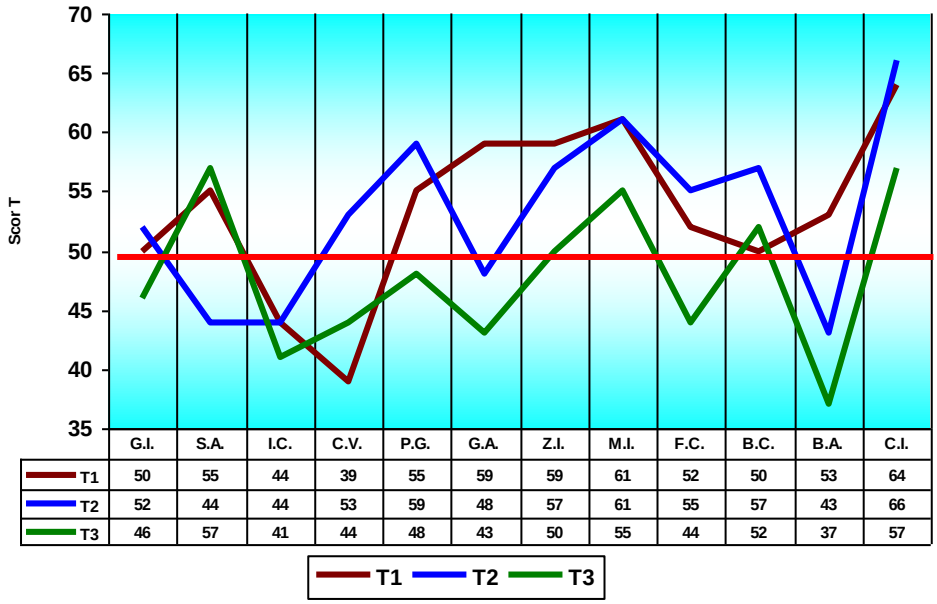


Figure 2
Comparison of the average values recorded during the 3 tests for the C-B variable between the *intermediary testing (T2)* and the *final testing (T3)*



	G.I.	S.A.	I.C.	C.V.	P.G.	G.A.	Z.I.	M.I.	F.C.	B.C.	B.A.	C.I.
T1	50	55	44	39	55	59	59	61	52	50	53	64
T2	52	44	44	53	59	48	57	61	55	57	43	66
T3	46	57	41	44	48	43	50	55	44	52	37	57

Figure 3
Development of individual values for the ***C-B variable*** in the three moments of the testing (initial test – T1, intermediary test -T2, final test -T3)

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

Science, Movement and Health, Vol. XIII, ISSUE 2, 2013
June 2013, 13 (2), 66-72

Original Article

EFFECT OF SPATIAL ORIENTATION AND MOTOR RHYTHM TRAININGS ON MOTOR SPEED AND SKILL PERFORMANCE LEVEL OF SOCCER JUNIORS

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Abstract

Through this research we tried to recognize the effect of spatial orientation and motor rhythm trainings on motor speed and skill performance level for soccer juniors under 17-18 years old. A research sample of 26 juniors was divided into two groups, experimental and control. The training program was 8 weeks long, 3 training units per week where the spatial orientation and motor rhythm trainings time lasts form 30:40 minutes.

The research outcome illustrated the appearance of motor speed and skill performance level improvement through the spatial orientation and motor rhythm abilities trainings. Thus the researchers recommended that coaches should give a great deal of importance to developing the coordinative abilities through making it an essential part of soccer juniors training program.

Key words: spatial orientation, motor rhythm, motor speed, skill performance level.

1. Introduction

The rhythm is one of the effective means to help in the processes of education and training being linked to motor sense and a mean to clarify and be aware of the movement. That was referred to by (Gouda**,** 1990) study, quoted from Kurt Munnell, clarifying that while acquisition of a new motor performance its rhythm realization has a major role in its acquisition and mastery.

That was also emphasizes by (Southard,1996) clarifying the importance of rhythm in skill performance, as well as (Southard, et. al, 1993) did referring to the rhythm great impact during the motor performance.

According to both (Mainl & Schnabel, 2006) and (Mainl & Schnabel, 2007) ,motor rhythm is one of coordinative conditions of performance, which had a great importance in all kinds of sports, not only in sports or disciplines, its performance is determined by musical companion, but also to learn motor skills, requiring a high level of this capability during motor learning process.

Auditory support makes it easy for learners to understand the chronology of muscular effort required for performance, which is considered more effective through increasing athlete ability on handling this information, by the possibility of receiving and performing the rhythm.

(Smolensky, 1996) indicates that the correct timing and rhythm sequence in performing the skill has a major role in motor performance accuracy and control, and helps the player to perform and sense each move.

Both (Hirtz,1985) and (Prätorius,2008) agreed on the motor rhythm application importance, comes first in skills acquisition and mastery in different activities and on its performance specifying nature in several sports. (Hotz, 2002) also pointed to its aesthetic, economical and harmonic importance during motor execution.

Both (Meinel & Schnabel ,2006) mentioned that the first principle of motor rhythm relies primarily on auditory (often musical) or (eg: when giving an ideal model of movement) realization of the rhythm given in advance, which was implemented in motor handling. While the second principle refers to the fact that in many of the sport movements an external rhythm is associated with motor implementation given in advance, as well as an internal rhythm does (self regulatory rhythm).

This means that providing a model of performance is of great importance in the ideal implementation of the motor track in its appropriate dynamic chronological sequence. Here, the motor-sense information occupies a special importance in percepting performance model rhythm.

(Neumaier, 2009) added that there are two major factors we must distinguish between, in rhythmic ability:

-Perception which refer to receiving one of the external rhythms given in advance, for example through music, and implementing it in chronological rhythm pattern identified movements. As well as the dynamic design .of time among pulses of rhythm with the movements

-Creating a matching dynamic chronological order, which, contributes to reach a motor path featured by flow and motor beauty in sports, depending on motor track evaluation

The player mastery degree of the rhythmic ability could be known by his ability to adapt to the motor rhythm of another player, and then the conscious breakthrough of the opponent player rhythm is founded in the team sports.

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Received 21.01.2013 / Accepted 09.05.2012

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST,
DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

(Kirchner & Pöhlmann, 2005) see the motor rhythm definition as "the player ability to recognize chronological and dynamic order of motor performance he does, to save this plentiful information as a rhythmic guideline simplified pattern, and then to use this pattern to guide motor dealings through the motor control (Settings) process " .

Here the strong correlation between each of the ability to perceive motor rhythm and the ability of spatial orientation appears. The ability of spatial orientation is the ability of meaningful and appropriate change of the body position and movement in time and space for a specific area of the playground or a moving target (the ball, opponent, and colleague).

The basis here is built on the reception and processing of information, as well as the motor-sense information, here appears the integration between each of these two abilities in realizing the situation and the opponent's motor rhythm.

The ability to control and direct the movement and realize its arrangement chronologically and spatially, the change in the position and the movement of parts of the body as a whole in the space does not depend only on the spatial change of parts of the body, as the specified requirements of this capability, which have been developed for each sportive activity is on a enormous degree of difference.

In team sports, including soccer, player must realize his body position as well as position changes inside the available space for motor handling (playground area, whether large or small) with partial cognitive of many other moving targets (colleagues, opponents, ball),thus taking into account the change in the body position, depending on the ongoing changes in the game situation.

The relationship between the so-called Timing, which is the regular and accurate motor handle, performed in correct timing, as an expression for the optical motor accounts of the movement performances (eg meeting the ball at the highest point when you hit ball by head, as well as the appropriate time to start a wall pass (1-2) in soccer).

(Neumaier,2009) clarified that each motor track - includes a transition move - requires the highest degree of realizing the precise location around the movement linked to body position and movement. These requirements increase with situations changes in the surrounding environment (the playing environment).

(Prätorius,2008) and (Hirtz,1985) emphasize that the great importance of the spatial orientation ability emanates primarily from the executive role of the optical information during motor handles, and thus it is a comprehensive basis for the development of compatibility.

The researchers believe that the play nature of soccer imposed on the players to keep on with the permanent changing game actions including the variables contained in the game situation (ball - colleagues – opponent - the player position towards the goal ....), which may negatively affect the motor speed and motor performance selection proper to the situation. This gives a great importance to the spatial orientation as one of the variables that may affect the selection and execution of the right skill performance and its proper speed.

Spatial rhythm has a great importance for team sports because of the specialty of its exercises and movements variety. As all the movements of motor rhythm require balance, body position is changed between flexion, extension and straightening...., it is also used in most types of team sports warming-up.

The researchers noticed, through their work as juniors sector coaches, Insufficiency in motor speed level of juniors through motor performances, as the slowness through performing trap movements with and without the ball, dribbling and changing direction, passing and receiving, which could be due to players inability on realizing self-motor rhythm for those skills and therefore inability to perceive time and dynamic sequence, which helps increasing the rate of speed at performance.

As the soccer juniors in late ages 17-18 generally may not be sufficiently subjected to coordinative abilities training , or especially to spatial orientation and rhythmic ability train during growth spurt of these abilities, the researchers believe that applying this research on that age stage will identify the rate of compensating losses in those two abilities level and its impact on the motor speed level and skill performance for soccer junior.

2. Aim of Research

This research aims to identifying "Effect of Spatial Orientation and Motor Rhythm Trainings on Motor Speed and Skill Performance Level of Soccer Juniors" Through:

-Effect of spatial orientation and motor rhythm trainings on motor speed level for soccer juniors.

-Effect of spatial orientation and motor rhythm trainings on skill performance level for soccer juniors.

-The rate of improvement in spatial orientation level - motor rhythm and motor speed - skill performance level for soccer juniors.

3. Hypotheses

-There are statistically significant differences in the variables under consideration between pre-test and post-test measurements of the experimental group for the post-test.

-There are statistically significant differences in the variables under consideration between pre-test and post-test measurements of the control group for the post-test.

-There are statistically significant differences in the variables under consideration between post-test measurements of experimental group and control group for the post-test measurement of the experimental group.

Methods

Research Methodology

The researchers used the experimental approach by using experimental design of two groups, experimental group and control group, owing to its suitability of this study.

Research Sample

Twenty six soccer juniors under (18) years registered at the Egyptian Soccer Federation season 2012/2013 were selected randomly.

Research Sample Modesty and Equivalence

Sample modesty and equivalence in main variables (age – height -weight - training age) and under consideration variables were emphasized as described in tables (1) & (2).

Table (1): Research sample homogeneity in experimental group and control group pre-test measurements n=26

variables		Measuring unit	Average	median	deviation	Skewness Coefficient
Age		Age	17.83	17.9	0.41	-0.52
Height		Height	167.6	167	2.56	0.70
Weight		Weight	65.64	65	2.87	0.67
Training Age		Years	6.35	6	0.88	1.20
Spatial Orientation Ability		S	1.39	1.3	0.12	2.54
Motor Rhythm Ability		S	1.98	1.55	0.48	2.66
Motor Speed	dribbling & shooting	S	45.79	4.6	0.92	-0.69
	dribbling	S	41.23	42	1.38	-1.68
Skill performance level	passing	Number	2.92	3	0.81	-0.29
	shooting	Points	5.16	5	1.40	0.34
	dribbling	S	28.03	29	1.42	-2.05

T-Test (0.05) = 2.064

Table (1): clarifies that the skewness coefficient values of the research sample in sample tuning variables lies between ± 3 which indicates the modesty of the data distribution.

Table (2): Research sample equivalence in experimental group and control group pre-test measurements n=26

Variables		Measuring unit	Experimental Group		Control Group		T- Test
			Average	Deviation	Average	Deviation	
Spatial Orientation Ability		S	1.37	0.11	1.45	0.12	1.55
Motor Rhythm Ability		S	1.89	0.38	2.11	0.56	1.16
Motor Speed	dribbling & shooting	S	45.78	0.99	45.95	1.01	0.44
	dribbling	S	40.48	1.63	40.71	1.02	0.44
Skill performance level	passing	Number	3	0.91	2.92	0.76	0.23
	shooting	Points	5.15	1.34	5	1.58	0.27
	dribbling	S	27.17	1.32	28.46	1.56	1.33

T-Test (0.05) = 2.064

Table (2): clarifies that there are no statistically significant differences in the under consideration variables between the pre-tests of the experimental group and control group as all the T-Test values are less than their tabulated value at (0.05) significance level which indicates the sample equivalence .

Research Variables 4.4

The research variables were measured through:

- Spatial orientation ability test (Abdelsattar, 2012).
- Motor rhythm ability test (Drobe, 1999).
- Motor speed (dribbling test- dribbling and shooting test) (Weinek, 2004).
- Skill performance level (passing using appropriate strength test) (Drobe, 1999), (shooting accuracy test) (Baatjes, 2006) and (dribbling test) (Southard and Mircale,1993).

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST,
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4.5 Exploratory Study

The exploratory study was performed on a sample of 10 juniors out of the original sample. It aims to indicating the scientific factors of spatial orientation and motor rhythm abilities, motor speed and skill performance under consideration.

4.5.1 Study Procedures

The researchers calculated the scientific factors (Validity – Reliability) for the tests applied in this study using validity differentiation , test and re-test applying for calculating reliability as shown in tables (3) and (4).

Table (3): Validity factor for the applied tests in study

$n_1+n_2= 20$

Variables		Measuring unit	Featured Group		Non-Featured Group		T- Test
			Average	Deviation	Average	Deviation	
Spatial Orientation Ability		s	1.2	0.083	1.45	0.124	*5.361
Motor Rhythm Ability		s	1.52	0.414	2.04	0.62	*2.199
Motor Speed	dribbling & shooting	s	42.25	0.824	45.84	1.09	*8.309
	dribbling	s	37.61	1.14	42.68	1.16	*9.864
Skill performance level	passing	number	4.5	0.707	2.80	0.632	*5.667
	shooting	points	7.70	0.823	5.0	1.56	*4.832
	dribbling	s	24.66	0.837	27.65	1.58	*5.276

T-Test (0.05) = 2.101

Table (3): indicates the existence of significant differences between the featured and non-featured groups in the applied tests of the study at (0.05) significance level indicating the validity of applied tests.

Table (4): Reliability factor for the applied tests in study

n_1 =10

Variables		Measuring unit	First Application		Second Application		Correlation coefficient
			Average	Deviation	Average	Deviation	
Spatial Orientation Ability		S	1.5	0.12	1.44	0.1	0.92
Motor Rhythm Ability		S	2.36	0.42	2.09	0.31	0.97
Motor Speed	dribbling & shooting	S	46.18	0.72	46.34	0.72	0.96
	Dribbling	S	43.11	0.74	39.68	0.90	0.97
Skill performance level	Passing	Number	3.1	0.57	3.8	0.63	0.68
	Shooting	Points	5.2	1.39	6.7	1.06	0.87
	Dribbling	S	28.26	1.17	27.36	0.88	0.96

Correlation coefficient (0.05) = 0.602

Table (4): indicates the existence of covariant correlation at (0.05) significance level between the first and the second applications of the tests on the exploratory study sample. The correlation coefficients values confined to 0.68 : 0.97 indicating the reliability of applied tests.

4.6 The Training Program Applied Procedures

The researchers specified some points through which the training program could be developed:

The training program period is 8-weeks.
.Training units per week are (3) units
.The training unit period ranges from 100 to 130 minutes
Spatial orientation and motor rhythm trainings period .through the training unit ranges between (30:45) minutes

The used spatial orientation and motor rhythm trainings load intensity (less than the maximum intensity - maximum intensity).
.The used training method - interval high intensity
Spatial orientation and motor rhythm trainings to be .immediately placed after the warming-up
.The performance time should not exceed 20-30 seconds
The repetitions number (6 - 8).
.The groups number (3: 4) groups
.The between groups rest period (2 - 3) minutes

In juniors training, it is important to strengthen the coordinative elements individually through training, while for the higher level players, it is important during training to apply complex methods, under time, spatial, and opponent pressure.

5. Results

Table (5): Difference between pre-test and post-test variables averages in experimental group. n=13

Variables		Measuring unit	Pre-test		Post-test		T-test	Improvement percentage %
			Average	Deviation	Average	Deviation		
Spatial Orientation Ability		s	1.37	0.11	1.24	0.09	*7.22	9.85
Motor Rhythm Ability		s	1.89	0.38	1.50	0.38	*6.12	20.42
Motor Speed	dribbling & shooting	s	45.78	0.99	42.33	0.88	*28.59	7.54
	Dribbling	s	40.48	1.63	37.63	1.02	*11.82	7.04
Skill performance level	Passing	number	3	0.91	4.54	0.66	*5.28	51.28
	Shooting	points	5.15	1.34	7.54	1.13	*6.82	46.27
	Dribbling	s	27.70	1.32	24.99	1.03	*18.62	9.82

T-Test (0.05) = 2.179

Table (5): indicates the existence of significant differences between the pre-test and post-test of the experimental group for the post test.

Table (6): Difference between pre-test and post-test variables averages in control group. n=13

Variables		Measuring unit	Pre-test		Post-test		T-test	Improvement percentage %
			Average	Deviation	Average	Deviation		
Spatial Orientation Ability		s	1.45	0.12	1.41	0.09	*3.57	2.77
Motor Rhythm Ability		s	2.11	0.56	1.91	0.45	*3.61	9.35
Motor Speed	dribbling & shooting	s	45.95	1.01	44.08	1.03	*10.51	4.07
	Dribbling	s	40.71	1.02	39.33	1.03	*8.36	3.39
Skill performance level	Passing	number	2.92	0.76	3.62	0.65	*5.20	23.68
	Shooting	points	5	1.58	6.23	1.30	*4.79	24.62
	Dribbling	s	28.46	1.56	26.88	1.22	*11.50	5.54

T-Test (0.05) = 2.179

Table (6) indicates the existence of significant differences between the pre-test and post-test of the control group in the under consideration variables for the post-test.

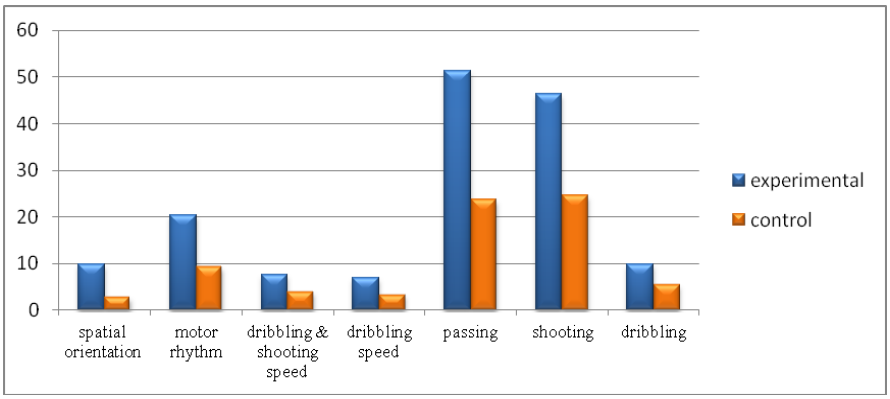

Figure 1: Under consideration variables improvement percentage

Table (7): Difference between experimental group and control group post-test measurements averages n=26

Variables		Measuring unit	Experimental Group		Control Group		T- Test
			Average	Deviation	Average	Deviation	
Spatial Orientation Ability		S	1.24	0.09	1.41	0.09	*4.69
Motor Rhythm Ability		S	1.50	0.38	1.91	0.45	*2.487
Motor Speed	dribbling & shooting	S	42.33	0.88	44.08	1.03	*4.678
	dribbling	S	37.63	1.02	39.33	1.03	*4.244
Skill performance	passing	Number	4.54	0.66	3.62	0.65	*3.591

level	shooting	Points	7.54	1.13	6.23	1.30	*2.740
	dribbling	S	24.99	1.03	26.88	1.22	*4.290

T-Test (0.05) = 2.064

Table (7): indicates the existence of significant differences between the experimental group and control group in the post-test measurements for the post-test.

Discussion

It is clear from Table (5) and graph (1) the existence of significant differences between the pre-test and post-test measurements of the experimental group in the spatial orientation ability , motor rhythm ability and motor speed variables (dribbling and shooting - dribbling) also the skill performance level (passing-shooting- dribbling) for the post-test measurement with obvious significant degree as the calculated T-Test value confined between (5.28, 28.59), while the tabulated T-Test value at (0.05) level is (2.179). Also the improvement percentage confined between (7.04%, 51.28%), where the highest improvement percentage was in (passing as a skill variable) test, while the lowest improvement percentage was in (dribbling as a motor speed variable) test.

The obvious improvement in motor speed level, either in dribbling and shooting or only in dribbling is due to spatial orientation and motor rhythm abilities trainings that improved the ability of performing motor repetitions with high degree of speed, which may be referenced to the dynamic and chronological sequence , which helps to increase the rate of speed during performance and thus the optimal use of the needed energy.

These results agree with the results of (Zak & Duda,2003), (Witkowski, et. al, 2006) , (Taha, 2007) and (Mounir,2010) on the soccer players performance level in terms of skill and tactics depend on the coordinative skills level.

It is clear from Table (6) and the existence of significant differences between the pre-test and post-test of the experimental group in the spatial orientation and motor rhythm abilities and Motor speed (dribbling & shooting - dribbling) and the skill performance level (passing –shooting – dribbling) for the post-test measurement with clear significant degree where calculated T-Test value confined between (2.77, 24.62), while the tabulated T-Test value at (0.05) level is (2.179). As well as the improvement percentage confined between (2.77, 24.62), where the highest percentage of improvement in (shooting as a skill variable) test, while the lowest percentage of improvement (spatial orientation ability) test.

Table (7) initiated the existence of significant differences in the post-test between the experimental and control groups for the post-test of the experimental group in the variables under consideration (spatial orientation ability, Motor rhythm ability, Motor speed, skill performance level) where calculated is confined between (2.487, 23.74), while the tabulated T-Test value at (0.05) level is(2.179).

As the calculated T-Test value for the spatial orientation ability is 23.74 representing the highest value while the calculated T-Test value for the Motor rhythm ability is 2.487 representing the least value.

The researchers referenced their findings for these measurements to the training program, where spatial orientation and motor rhythm abilities applied to the experimental group leads to the acquisition of new motor models for the motor handlings as well as the diversity and control in motor handlings performance gained before, and to the use of the special coordinative training methods and techniques. These results agree with (Witkowski, et. al, 2006) (Cicirko &Buraczeeski, 2007) and (Liakh & Witkowski ,2010) results.

Conclusions

Through the study results the researchers found that the trainings of the spatial orientation and motor rhythm abilities have improved the motor speed level and further more improved the skill performance level of soccer juniors. From here we can emphasize that coaches should give a great interest to coordinative abilities development as well as the coordinative abilities should be an essential part of the training program for soccer juniors to raise a generation of talented soccer professional. Finally the researchers recommend the necessity of performing further similar studies on different samples in terms of age, sex and physical activity.

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Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST,
DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengage Learning, Cabell's Directories

Science, Movement and Health, Vol. XIII, ISSUE 2, 2013
June 2013, 13 (2), 73-77

Original Article

IMPROVE MAXIMAL AEROBIC SPEED IN HANDBALL SENIORS THROUGH INTERMITTENT EFFORT

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Abstract

Purpose: Working at high intensity intervals, the maximum aerobic speed aims central and peripheral qualities of maximum oxygen consumption. Through this experiment we want to improve its ability to repeat short explosive efforts and also to allow athlets more time to be quickly and strong more often.

Material and methods: Experimental strategy implementation period was 8 weeks during July and August 2010. The research was conducted on HCM Constanta senior team participating in the National Handball League 2010-2011 edition. The team is a group composed of 18 players, with a mean age of 26,94±3,78 years.

Study took place in Sports Hall of Constanta, the team conducted its official matches, with a field approved by the Romanian Handball Federation and the track Farul Stadium in Constanta.

We will include specific physical training program with a training schedule intermittent effort. We use such intermittent longer races more or less long, long intervals since the sequence of effort / rest 3-3 minutes, 2-2 minutes, then intermittent sprint 30 meters and passing through the more classical intermitent: 30"-30", 20"-20". These flights will be carried out at speeds close to maximum aerobic speed (VMA) using the 30-15 IFT (intermittent effort test) on intensity between 80 and 110% of flights will also be performed in line or commuting, or made way through periods of game activity effectively reduced for periods of 3 to 4 minutes. At the beginning and end of the training program, athletes were tested to determine VMA by 30-15 IFT.

Results: After applying the new program designed by intermittent effort, we managed to improve maximal aerobic speed, men handball team HCM Constanta from17.21 to 18.83 km / h.

Conclusions: After applying the training program with intermittent effort we managed to improve its ability to repeat short explosive efforts and also to allow athletes more time to be fast and powerful often.

Keywords: maximal aerobic speed, intermittent effort, handball, improve.

Introduction

Maximal aerobic speed (also called maximal oxygen consumption, maximal oxygen uptake, aerobic capacity, functional aerobic capacity, or simply VO2 max) is regarded as the criterion measure of cardiorespiratory fitness. Maximal aerobic speed is a useful physiological measurement, utilized by trainers to track progress with their athlets. It is the highest rate at which oxygen can be distributed, consumed during exercise or the maximal rate at which oxygen can be taken in, and used by the body during physical activity. VO2 max is usually expressed in relative (uptake relative to body weight) terms as milliliters of oxygen consumed per kilogram of body weight per minute (ml O2 /kg/min or ml/kg/min). The "V" in VO2 max represents the volume used per minute (in scientific notation, a dot (sometimes) appears over the V to indicate "per unit of time"). Significant factors that influence maximal oxygen consumption in healthy adults are gender, heredity, body composition, age, state of training and mode of exercise (http://www.ideafit.com/fitness-library/maximal-aerobic-power-and-functional-independence-in-older-adults).

For an athlete to compete successfully in an endurance event, a VO2max of at least 70 ml.kg-1.min-1 is a minimum requirement (Hawley et al., 1997 cited by Finn). While athletes employ a variety of training strategies to increase VO2max, recent research suggests that a form of interval training known as high-intensity intermittent training leads to rapid improvements in VO2max and endurance performance (Finn 2001). To attain an optimal stimulus (and forthcoming adaptations), athletes are generally required to spend a couple of minutes in their 'red zone,' which generally means hitting >90 – 95% of either VO2 max or maximal heart rate (HR) (Laursen and Jenkins, 2002).

Despite the growing interest in game- or skill-based conditioning (Buchheit et.al. 2011, Impellizzeri et.al. 2006, Sheppard and Borgeaud, 2009), running-based high-intensity interval training (HIIT) is still one of the most popular forms of exercise to improve cardiorespiratory fitness in athletes (Billat, 2001a, 2001b).

Material and methods

Experimental strategy implementation period was 8 weeks during July and August 2010. The research was conducted on HCM Constanta senior

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Received 15.01.2013 / Accepted 19.05.2012

team participating in the National Handball League 2010-2011 edition. The team is a group composed of 18 players, with a mean age of 26, 94±3,78 years. At the beginning and end of the training program, athletes were tested to determine VMA by 30-15 IFT.

Study took place in Sports Hall of Constanta, the team conducted its official matches, with a field approved by the Romanian Handball Federation and the track Farul Stadium in Constanta.

We included a training program with intermittent effort schedule. We use such intermittent longer races more or less long, long intervals since the sequence of effort / rest 3-3 minutes, 2-2 minutes, then intermittent sprint 30 meters and passing through the more classical intermitent: 30"-30", 20"-20" as you can see in Tabel 1. These flights will be carried out at speeds close to maximum aerobic speed (VMA) using the 30-15 IFT (intermittent effort test) on intensity between 80 and 110% of flights will also be performed in line or commuting, or made way through periods of game activity effectively reduced for periods of 3 to 4 minutes (Cazan, 2010).

Tabel 1. Training program with intermittent effort schedule

Week	Day	Running time	Running intensity	Recovery duration	Recovery intensity	Series duration	Number of series	Recovery time between series
Week 1	Monday	5 min.	80-85%	-	-	-	5	3 min.
	Wednesday	4 min.	80-85%	-	-	-	5	3 min.
	Friday	3 min.	85-88%	-	-	-	5	3 min.
Week 2	Monday	3 min.	85-88%	-	-	-	6	3 min.
	Wednesday	2 min.	85-88%	-	-	-	6	3 min.
	Friday	2 min.	85-88%	-	-	-	6	3 min.
Week 3	Monday	1 min.	90%	30 sec.	Passive	12 min.	2	3 min.
	Wednesday	45 sec.	90%	15 sec.	Passive	7 min.	3	3 min.
	Friday	45 sec.	90%	15 sec.	Passive	8 min.	3	3 min.
Week 4	Monday	30 sec.	90%	15 sec.	Passive	7 min.	3	3 min.
	Wednesday	30 sec.	90%	30 sec.	40%	12 min.	2	3 min.
	Friday	30 sec.	93%	30 sec.	Passive	10 min.	3	3 min.
Week 5	Tuesday	20 sec.	95%	20 sec.	Passive	8 min.	2	6-7 min. active
	Thursday	20 sec.	90%	20 sec.	45%	8 min.	2	6-7 min. active
Week 6	Tuesday	15 sec.	100%	15 sec.	Passive	10 min	3	3 min.
	Thursday	15 sec.	95%	15 sec.	25%	7 min.	2	6-7 min. active
Week 7	Tuesday	15 sec.	95%	10 sec.	passive	7 min.	2	6-7 min. active
	Thursday	10 sec.	90%	10 sec.	passive	7 min	2	6-7 min. active
Week 8	Tuesday	10 sec.	100%	10 sec.	passive	6 min.	2	6-7 min. active

Thursday	10 sec.	110%	10 sec.	passive	6 min.	2	6-7 min. active

To overcome the inherent limitations of VO2 max for training prescription based on changes of direction, and intermittent supramaximal was developed 30-15 IFT (Buchheit, 2008, 2010). IFT 30-15 was designed to determine the maximum VO2 and HR, and anaerobic capacity, capacity inter-effort recovery, acceleration, deceleration, and abilities COD (Buchheit 2008a, 2008b). Final speed reached to test VIFT is therefore a compound velocity, which takes into account all physiological variables created when doing HIIT including COD. In other words, the IFT 30-15 is very specific, not for sport specific, but common training sessions conducted in intermittent sports. While other protocols such as Yo-Yo tests have somewhat similar physiological requirements, VIFT is only speed that can be used for exercise prescription (eg final performance measured at Yo-Yo, or the total distance covered, can not be directly used for training prescription because her relationship with VO2 max is based on speed) (Dupont et al. 2010) to demonstrate the validity of the test logic, VIFT proved to be better than VO2 max HIIT, COD to individualize the players inteam sports (Buchheit 2008). This was exemplified by a low heterogeneity between players cardiopulmonary system responses (Buchheit 2008). Finally, IFT 30 to 15 is also attractive because it was perceived to be less painful than continue running tests (Leger and Boucher, 1980 (Leger and Lambert, 1982) by 70% of players tested (Buchheit, 2005).

To ensure that athletes reach the intensity required, there are several ways to control and individualize running speeds. While the simplest method involves the athlete's perception of effort (eg. I run as hard as I can, knowing that x reps be done (Celine et al. 2011), or HR retrospective analysis (Helgerud et al 2007), where once the session is over, players help dictate a reaction changes in future sessions running distances) using ground running tests is a method more objective (Bill and Koralsztein 1996), accurate and practical (it is not necessary to monitor HR), and rather effective. For a long time, velocity associated with VO2 max (vVO2 max) was the speed. Reference favorite running HIIT program (Bill, 2001a, 2001b). However, since the speed of VO2 max is determined only by the athlete and the energy cost of jogging (Di Prampero et.al. 1986) its use is limited to single supramaximal intermittent jogging (ie,> vVO2 max) including changes in direction (COD) as predominantly implemented in team (Dupont et al, 2004) or tennis (Fernandez-Fernandez et al, 2011). For example, athletes with similar max vVO2 can present different profiles anaerobic recovery or COD. Programming based on vVO2 max for HIIT these athletes can lead to different levels of encouragement aerobic and anaerobic (Bill, 2008). this prevents standardization of training, and limited ability to target specific physiological adaptations.

Protocol of IFT 30-15

The 30-15 IFT consists of 30 s shuttle runs interspersed with 15 s passive recovery periods (Buchheit 2008). Velocity is set at 8 km.h-1 for the first 30 s run, and speed is increased by 0.5 km/h every 30 s stage thereafter (well-trained players can start the test at 10 or even 12 km/h to save time). Players are required to run back and forth between two lines set 40 m apart (Fig. 1) at a pace governed by a prerecorded beep. This prerecorded beep allows the players to adjust their running speed when they enter a 3 m zone placed in the middle and at each end of the field. During the 15 s recovery period, players walk in a forward direction toward the closest line at either the middle or end of the running area, depending on where their previous run stopped. This line is where they will start the next run stage from. Players are instructed to complete as many stages as possible and the test ends when they can no longer maintain the required running speed or when they are unable to reach a 3-m zone in time with the audio signal for three consecutive times. The velocity attained during the last completed stage is noted as the player's VIFT (Buchheit 2008).

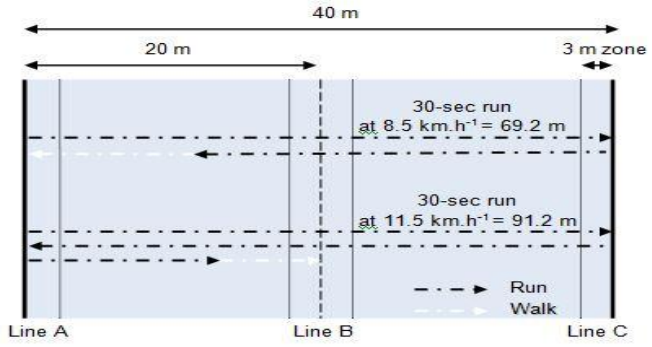

Fig. 1. Area prepared for the 30-15 IFT and example of two intermittent runs. For the run at 8.5 km.h-1 (about 69.2 m in 30 s), subjects start at line A, run to line C crossing line B, and then return. After crossing line B again, they stop after 8.5 m and walk to line A during the 15s recovery to be ready for the next stage. For the run at 11.5 km.h-1 (about 91.2 m in 30 s), subjects start at line A, make one complete round trip and stop after 9.5 m when going towards line B, then walk to line B during the 15 s of recovery for the next start. Note that calculation of targeted distances take into account the time needed for direction changes (Buchheit 2008).

Results

Table 2. 30-15 IFT test results obtained from initial testing and final testing

	INITIAL TEST		FINAL TEST	
	n=18		n=18	
Variables	M±DS	CV (%)	M±DS	CV (%)
VMA km/h	17.21 ± 0.81	4.59	18.83 ± 0.38	2.04

Established significance level at p<0.05.
M, average; DS, standard deviation; CV, variability coefficient; n, number of subjects.

Discussion

Applying the training program designed by us for senior handball team HCM Constanta, we managed an improvement of VMA, from 17.21 to 18.83, a significant improvement at p <0.05. We had an increase in VMA by 9.5%.

Researchers at McMaster University in Canada have investigated the effects exerted training VO2 max (MacDougall et al, 1998). Training was carried out on a stationary bike ERGOMETAL 3 days a week. The program began with four intervals of 30 seconds separated by a rest period of 4 minutes. In spatamani 7 Number ranges increased to 10, while rest intervals were gradually reduced 2.5 minutes. VO2 max increased by 9%, demonstrating that significant gains can be obtained in VO2 max of relatively short duration exercises. In the first week of the program, each workout session it took 14 minutes. In Week 7, the duration of each session increased to 30 minutes.

Besides its effect on VO2 max, high-intensity intermittent training may improve athletic performance.

Lindsay et al. (1996) reported that 4 weeks of interval training can improve 40-km time trial performance of competitive cyclists. The cyclists replaced approximately 15% of moderate intensity endurance training with high-intensity intermittent training, completing six interval sessions during the course of the study. Each interval session consisted of six to eight 5-min work bouts at 80% of peak power, separated by 60 s of recovery. The authors found significant improvements in 40-km time trial performance (54.4 ± 3.2 vs 56.4 ± 3.6 min) and time to fatigue at 150% of peak power (72.5 ± 7.6 vs 60.5 ± 9.3 s) (Finn 2001).

Studies considered in these articles have used high-intensity intermittent efforts as a form of intervention on exercise capacity. However the application forms were widely different. Some working range takes between 15 to 30 seconds while resting periods covering 10 seconds to 4.5 minutes. Conclusion would be that are needed more research to determine the most effective form of training, interval and effort needed break to improve endurance performance.

Conclusion

After applying the new program designed by intermittent effort, we managed to improve maximal aerobic speed, men handball team HCM Constanta from17.21 to 18.83 km / h. After 8 weeks training program with intermittent effort we managed to improve its ability to repeat short explosive efforts and also to allow athletes more time to be fast and powerful often.

In conclusion, choosing training program for 8 weeks with intermittent exercise, the programming intervals intermittent exercise room is important to ask certain physiological systems, and instead to take into account certain adaptations. Speed reached at the end of the IFT 30-15 (VIFT) is a complex structure that takes into account all physiological variables obtained when performing intermittent intervals including changes steering effort (eg, anaerobic capacity, capacity inter-effort recovery, acceleration, deceleration and change of direction skills). VIFT speed is therefore of major importance and precision speed to bring players with different levels of physiological profiles to similar metabolic requirements, thus standardizing training content.

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Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST,
DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

Science, Movement and Health, Vol. XIII, ISSUE 2, 2013
June 2013, 13 (2), 78-84

Original Article

INVESTIGATION ON THE PEOPLE'S EXPECTATIONS FROM UNICIPALITIES IN THE AREA OF SPORT AND RECREATIONAL SERVICES IN IRAN

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Abstract

Municipalities are as one of the most important people cooperation organizations in communities' bureau system. In this direction, the role of municipality management with a range view of various duties is very important including development activities, service, cultural and sports in developing of towns, healthy care and providing of facilities for citizen leisure times. The aim of this study is investigation and describing people's expectations from municipalities in the area of sport and recreational services. In the other words, it can help to clarify both sport significance as an effective relational way between citizen and municipalities and people expectations in relationship with this subject and the role of municipality that can be an effective in the promoting present situation. The method of present study has been as describing and measuring method and it has been has been data collection tool of questionnaire. The investigation statistical society of resident citizen is in the city area limits of Ardebil city- as province central of Ardebil in northwest of Iran with 420260 population- that 4700 people (%1/1 rate) selected as statistical sample. There have been used from SPSS software for statistical evaluate and clarification of relationship between study variant and various statistical methods, frequency, frequency percent, weighted and arithmetic mean and Chi-square (X^2).

The results showed that municipalities has a great responsibility in providing sport and recreational facilities in the point of view of people and performing of these duties can has an important influence in promoting municipality situation from the people view and also expansion of relationship between citizen and municipality. Also, according to other section from results, a great part of participations in this study didn't have favorite situation and they evaluated own profit rate from present facilities in this field in order to various difficulty in the low limit.

Key words: sport, municipality, people.

Introduction

The aim of every government system is necessities production or required public services (B.Çoban , 2006).

In this direction, local managed systems are the main units of public joint necessity supplier that they form by legal duties and perform their duties. In the present age, using new appliances like as elevator, escalator, technology field and changing life style and the way of people employment and the expansion of apartment living in cities are caused to decrease the activities of people that in fact immobility of people is the reason of increasing mortality rate, diseases and disabilities (Etgiya, 2007). Meanwhile, in order to citizen job, the lack of enough chance for taking sport, permanent citizens are exposed to various diseases resulted of immobility. On the other hand, the discussion of leisure times and the necessity of having healthy recreational is accepted as a main require of citizens. In this direction, the role of municipalities' management is very important in developing sport places and building sport facilities for citizen majority.

Today, in developing countries, crowded, immobility, air pollution and the lack of park and sport and recreational facilities change the body activity into the difficult choice. In many of these countries, expansions of sport centers have many obstacles that may be in order to life difficult requirement and life low level of people. At this time, what is less noted is planning for leisure times and recreational by developing sport places. On the basis of this, expansion of sport centers for leisure times among citizens is as an important require for healthy life of people (The law of municipilities, 1965).

In Iran, although the main founder of establishment and protection of sport places is a duty of sport ministry, but according to act 21, 55article of municipality law, the establishment of sport places is one of the main duties of municipality (Sport and kultur department, 2006) .According to laws, municipality is a legal, local and independent organization that is constituted for removing public welfare and recreational needs and municipality try to solve these affairs.

Since 2007, positive evolution and approach carried out in planning of sport development from on behalf of municipality in Iran. Assignment of a specific part as cultural organization, municipality sport for planning towards to increasing rate of municipality sport places is one of the steps. But with regard to

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Received 13.01.2013 / Accepted 07.05.2012

youth population and the lack of facilities in this area, still there are a lot of distances in developing sport and recreational facilities by municipality.

Other performed investigations indicate that attendance of municipalities in the area of sport and recreational services, citizen hasn't necessary favorableness. In the investigation that performed by Mohammad Taghi Rahnamayi and Leila Aghayi in the relate of municipalities role in developing sport spaces for Tehran citizen leisure times, the results showed that citizen complain from problems such as being inadequate and non-standard of sport spaces, inappropriate servicing of sport spaces from the viewpoint of schedule, non-specialty of coaches on that centrals, limitations of sport fields for women and handicapped (M.RAHNEMAEI, 2009). In other investigation that performed by Dr. Bilal Choban in relation with people expectations from municipalities in the area of sport facilities, the results showed that sport facilities to the citizen have very important influences from the viewpoint of people in promoting municipalities situation and also promoting the relationship between citizen and municipalities.(B.Çoban , 2002)

Also, from the viewpoint of participants, municipalities must consider necessities and demands of citizen in expansion and making sport spaces in city various areas.

In the other research, Tarik Kurtoglu showed that sport activity is a necessary for overcome the city life inadequacy and from the viewpoint of citizen, municipalities play an important role in providing these demands. Also, from the viewpoint of statistical society, municipalities must act to making and developing sport spaces in various area of city with considering of demands and necessities in citizen various classes.(Tarik Kurtoglu, 2006)

The aim of this research is investigation into the people expectations in Iran from municipalities in the area of sport and recreational servicing and representation of required suggestions for promoting the present situation so that, sport is as a relation bridge between citizen and municipalities and hereby towards clarification of demands and viewpoint of citizen in relation of sport facilities and role and influences that municipalities can have in this part characterize.

Method

The present research is from measuring and its statistical society is from resident people in municipality limits of Ardebil city in northwest of Iran. Survey is used to collect the data of this study. The research statistical society comprises 420260 people i.e all resident in Ardebil city that 4700 people selected as statistical samples and participated in research (%1/1). For estimating research data, there has been used from a questionnaire including 29 questions, 3 questions from demographic qualities and 26 questions with regard to the main aims of research and in 5 degrees of Likert scale.

This questionnaire after confirmation and counseling with teachers, its reliability had been tested by Cronbach's alpha test that it was 82%. The resulted data from the research had been considered by statistical package SPSS (v 17) For obtained describes from descriptive statistical methods and for estimating the relationship and differences between variations and participants various classes in this research had been used from frequency, measuring average and Chi-square test (X^2) respectively.

The questionnaires distributed between research samples with directing control of researches and collected after completion.

The number of them eliminated in order to being defective from statistical analysis cycle and as a result, 4625 of them had been studied.

Results

In this research, 4625 people of Ardebil citizens answered to the questionnaire. Demographic qualities of participations in research are in 1 tables: Table 1:

job	N	%
officer	1128	24.4
worker	333	7.2
student	1697	36.7
housewife	389	8.4
unemployed	338	7.3
Trades mans	356	7.7
farmer	97	2.1
Private sector	287	6.2
Total	4625	100

According to the results shows, the most percent participations in research are in the range between 21-30 years (%34/94) and less than 20 years (%27/56).
1677 (36/2 percent) was women and 2948 (63/74 percent) was men.
From the viewpoint of job, the most people were students (1697 people with 36/7 percent) and the least people were agricultural classes (97people, 2/1 percent).
Table 2: investigation into the citizen viewpoint in relate of responsibility rate and the share of municipalities in filling leisure times by sport activities:

Table 2

job	Very much	very	medium	les	slightly	Total
officer	342 %30.43	476 %42.29	174 %15.02	93 %8.42	43 %3.81	1128
worker	98 %29.42	132 %39.63	53 %15.91	29 %8.70	21 %6.30	333
student	518 %30.54	702 %42.11	262 %15.04	144 %8.47	81 %4.77	1697
housewife	123 %31.61	151 %38.81	58 %14.91	33 %8.48	24 %6.16	389
unemployed	100 %29.58	130 %38.46	51 %15.08	29 %8.57	28 %8.28	338
Trades mans	105 %29.49	144 %40.44	53 %14.88	31 %8.70	23 %6.40	356
farmer	26 %26.80	13 %13.40	33 %34.02	8 %8.24	17 %17.52	97
Private sector	82 %28.57	110 %38.32	42 %14.63	23 %8.01	30 %10.45	287
Total	1396	1855	704	392	278	4625

Both women and men considered these responsibilities in very high rate. In considering to the various ages classes was observable with similar rates. But between jobs various ages, this difference is observable in this viewpoint. For example: agricultural classes, considered this responsibility in high and average rate, while other job groups considered this responsibility with high and very high rate.
Table 3: The viewpoint of citizen in relate of influence sport facilities in promoting municipalities situation with people and promotion of citizen relationship level with municipality:

Table 3:

job	Very much	very	medium	les	slightly	Total
officer	482 %42.33	371 %32.89	170 %15.07	62 %5.49	43 %3.81	1128
worker	130 %38.92	120 %35.92	51 %15.26	19 %5.68	14 %4.09	334
student	628 %37.01	668 %39.36	245 %14.43	90 %5.30	66 %3.89	1697
housewife	151 %38.81	137 %35.21	64 %16.54	21 %5.39	16 %4.11	389
unemployed	135 %39.94	118 %34.91	50 %14.79	21 %6.21	14 %4.13	338
Trades mans	142 %39.88	124 %34.81	55 %15.44	20 %5.61	15 %4.21	356
farmer	42	32	15	5	3	97

	%43.29	%32.98	%15.46	%5.49	%3.09	
Private sector	116 %40.41	92 %32.01	54 %18.61	15 %5.22	10 %3.48	287
Total	1826	1661	704	253	181	4625

The major of participated women and men in research evaluated this influence in high and very high rate. With considering various job classes had not been observed semantically differences and only in student groups, the most percent allocated into the high and then very high option, but between other groups, the most percent allocated into the very high and then high.
Table 4: The viewpoint of citizen in relate of municipalities attention necessity to require of citizen in developing city sport facilities:

Table 4:

Age groups	Totally agree	agree	Un decided	against	Much against	Total
Less 20 years	522 %40.94	502 %39.37	189 %14.82	51 %4	9 %0.70	1275
The ages of 21-30	664 %41.08	637 %39.41	240 %14.85	63 %3.89	11 %0.65	1616
The ages of 31-40	345 %42.02	331 %39.35	125 %14.86	33 %3.92	6 %0.71	841
The ages of 41-50	277 %41.03	266 %39.40	100 %14.81	26 %3.85	4 %0.60	675
above 50 years	94 %40.11	88 %40.32	32 %14.67	9 %4.04	1 %0.49	218
Total	1902	1824	686	182	31	4625

All ages group both major women and men believed that municipalities must be considering demands and viewpoint of citizen in developing sport facilities in city.

Table 5: The viewpoint of citizen in relate of the main problem of sport places belong to municipalities and the rate of clients effective profiting from them:

Table 5:

General problems	N	%
Have been established on not suitable land	1365	29,51
Problem of personnel	1442	31,18
Problem of access to	876	18,94
Problem of management	1976	42,72
Problem of parking	644	13,92
Problem of air pollution	234	5,05
Problem of lighting	468	10,12
Problem of cleaning	788	17,04
Problem of not always publicly available.	1366	29,54
Problem of grand stand.	298	6,44
other	162	3,50
Total	9619	------

The main problem in sport places belong to municipalities, such as problems relates to protection and optimization, lack of expert forces, establishment in an inappropriate area and lack of time regular servicing that in general, it causes lack of enough using citizen of these places.

Table 6: investigation on the tendency of citizen to cash and non-cash participate in establishing sport places by municipalities:

Table 6:

job	yes	no	Total
officer	300 %26.59	828 %73.41	1128
worker	82 %24.62	251 %75.38	333
student	418 %24.63	1279 %75.37	1697
housewife	111 %28.53	278 %71.47	389
unemployed	83 %24.55	255 %75.45	338
Trades mans	142 %39.88	214 %60.12	356
farmer	24 %24.74	73 %75.26	97
Private sector	118 %41.11	169 %58.89	287
Total	1278	3347	4625

The major of participants in research didn't have any attendance to the participating in this field that this rate with similar percents was observable between gender variations, age and job, and from this viewpoint between variations, there aren't semantically difference.

Table 7: The viewpoint of citizen in relate of municipality assignment resource cost way in sport area in city:

Table 7:

job	Municipal sports club	Sport for all	Total
officer	101 %8.98	1027 %91.01	1128
worker	32 %9.60	301 %91.30	333
student	213 %12.55	1484 %87.34	1697
housewife	42 %10.89	347 %89.10	389
unemployed	32 %9.46	306 %91.44	338
Trades mans	40 %11.23	316 %88.76	356
farmer	8 %8.29	89 %91.61	97
Private sector	35 %12.19	252 %87.71	287
Total	503	4122	4625

The major of participants in this research claimed that a great part of resource (89/1 percent) must be spending in sport section and also in place. This rate is observable with similar percents between gender variations, age job groups.

Discussion

The findings showed that the role and situation of municipalities in developing citizen sport, filling citizen leisure times and establishing sport places are very important from the viewpoint of citizen and doing

the best duties can have special influence in promoting municipality situation and promoting the relationship between municipality and citizen. The results showed that responsibility rate and municipality share in filling citizen leisure times by sport activities are in very high rate that these results agree with Bilal ÇOBAN (2002) and Tarik KURTOGLU (2008) findings.

Also, with regard to other section of results, providing favorable sport facilities can has a positive influence on promoting people viewpoint towards municipalities and developing the relationship between citizen and municipality that this results agree with Bilal Çoban (2002) and Tarik Kurtoglu (2006). With regard to other section of results in this research, the major of participated citizen believed that municipality must be considered necessity and demands in establishing and developing sport places in city that these findings agree with findings of Bilal Çoban (2002) and Tarik Kurtoglu (2006).

Also obtained results show that the main problems in using present sport places in city cause the lack of protection, the lack of skillful forces, being in an inappropriate places and the lack of time regulation servicing that these results agree with research results of Mohammad Taghi Rahnamayi and Leila Aghayi (2009), Bilal Çoban (2002) and Tarik Kurtoglu (2006). According to other research findings, citizen didn't show any attendance in relation with participation in establishing sport projects by municipality that of course this case can be the result of low income level and participants' economical problems in research and mistrust to municipality and the lack of legal ways. These results were in contrast with Bilal Çoban (2006) and Tarik Kurtoglu (2006) findings, but they agree with the research of Mohammad Taghi Rahnamayi and Leila Aghayi (2009). In another findings, participated citizen in research claimed that the main selection of allocated financial resource to the sport in municipality must spend in developing related affaires to the citizen and public sport and they evaluated required validity rate for participating municipality in champion sport section in very low rate that these results agree with Bilal Çoban (2002), Tarik Kurtoglu (2006), Mohammad Taghi Rahnamayi and Leila Aghayi's (2009) findings. With regard to present research results and other performed researches, it can be stated that municipalities have a closer relationship with citizen out of consideration for legal duties thus municipality can be beneficial in providing mental and physical health with guidelines of citizen for establishing a general system of citizen sport.

Conclusions. Unfortunately, according to obtained results of research, the way of providing sport facilities to citizen and their satisfaction rate of these servicing, considering these necessities and demands of people, there are long distances in developing sport places, spending necessary cost in expansion of citizen sport based on viewpoint of participations in research.

Whereas, municipality cab provide the possibility of easy access to sport spaces in order to directional relationship with decision making elements in city planning area (Çoban, 2002). It seems that municipality must provide an effective way in citizen sport section and with providing necessity requires for participating private section and citizen in developing and promoting legal works towards establishing grounds with sport uses for building sport places, the close relationship with scientific and university centers and media towards people encouragement to active presence in citizen sport stage and also in financial support of municipality cultural sport sections can carry with relation of promoting sport and recreational servicing to citizen.

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Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengage Learning, Cabell's Directories

Science, Movement and Health, Vol. XIII, ISSUE 2, 2013
June 2013, 13 (2), 84-89

Original Article

A NEW APPROACH FOR STIMULATING LEARNING IN THE FIELD OF PHYSICAL EDUCATION AND SPORTS

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Abstract

The aim of this research is to highlight the efficiency of a new approach for stimulating learning for Physical Education and Sports specialties.

*Material and methods***.**This paper is a study ascertained and performed on 30 students of the Faculty of Sports Movement and Health Sciences during the seminar hours. This study was carried out from February to April 2013 and was based on an item-based protocol regarding the application practices of the theoretical knowledge. The intervention protocol involved during the 14 seminar hours, which are divided into a 30-minute theoretical part and a 60-minute practical part, regarded aspects related to an initial and final evaluation of 8 items. Among the 8 items to be followed during lessons it was aimed to form the students' competences regarding the analysis and argumentation capacity for using methods and means at a certain moment during the educational teaching process. The protocol for monitoring the teaching capacity of the seminar activity for the university discipline Specialty Didactics – Physical Education and Sports comprises 8 items with 2-3 answers each. The protocol, as an assessment instrument, was applied at the beginning of the activity during the 2nd seminar and at the end of the 13th seminar, and as a work instrument, it was used during all the seminars. Every item was granted 3 points for a correct answer, 2 points for a partially correct answer and 0 points for an incorrect answer, the student being allowed to choose only one variant.

*Results.*The results, gathered according to the application of the protocol both during the initial and final evaluation, were analyzed and processed. The indicators are represented by: arithmetic mean, maximum and minimum value, standard deviation and progression. The arithmetic progression was between 2.40 points and 0.30 points for each item and 7 points in general.

*Conclusions***.**The conclusions highlighted the fact that the means of the score recorded in the final evaluation of the 8 items are higher than the initial means, that the score of the maximum values in the final evaluations are equal to or higher than those in the initial evaluation, and that the score of the minimum values in the final evaluation are equal to or higher than those in the initial evalua, but also the fact that the value of the progression for the 8 items is between 2.40 and 0.30 points. It was confirmed the hypothesis, according to which if, on a sample of 20 students, we intervene with an approach for stimulating the participation in the formation of professional competences, they will manage to better learn the technique to use methods, means and action strategies. It also underlines the efficiency of the protocol-based intervention. The recorded progress also emphasize the formation of a critical process of reflection in the activity of students' formation.

Key words: approach, stimulation, learning, physical education, sport .

Introduction

The purpose of this paper is to highlight some simple and efficient possibilities to shape personalities in the teaching process and to emphasize on the importance of thought and imagination in order to develop a creative teaching educational process. "The imagination capacity can be educated" (Becea, 2003, p. 72), but the development of thought and creation of a future teacher depends on the number of strategies and work manners employed and acquired during studies.

Starting from the idea suggested in the paper entitled "Innovative Methods in Adult Education" (Ezechil coord. and Coman, Langa, Soare, Neacşu; Petruţa,), we developed a protocol by means of which to "determine a critical reflection process" in students regarding the use of methods and means specific to the teaching-learning-assessment process in Physical Education. This demarche takes into account the fact that, in the process of professional development, a teacher intends to make his/her students acquire solid knowledge, multiple skills, correct attitudes and competences to use information, personal or group skills and abilities. Since the chosen method or strategy "belongs to the executive side of the action, to the pedagogical praxis, an essential aspect of the educational system, praxiology comes to enlighten many aspects of the theory of the pedagogical act" (Cerghit, 1980), completes and establishes the habit to work, create and adapt the means and methodological procedures to the particularities of the persons involved in the educational system.

The argumentation of our demarche to realise a formative, thorough, applicative and efficient process is based on inserting some paradigms of pedagogy performed in terms of interrelationing, namely

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Received 16.01.2013 / Accepted 17.05.2012

stimulating teacher's cognition to perform an attractive teaching act and also an accumulative, stable, thorough and creative act. Confidence and conscience of the possibilities of which every student is becoming aware little by little have a beneficial effect on the character's development, on the cultivation and education of attention in professional training. "Nowadays, all the explanatory approaches ... include arguments represented by contemporary sciences such as biophysics, biochemistry, physics, biology" (Neacşu, C-tin., Mamulaş, I., 2012), but also those represented and stipulated by psychology, pedagogy, physiology and methodology. Or forming professional competences, as prioritary objective of the university system "means the constitutive substratum of a capacity, preexisting this which will depend on the natural development of an ability, on the educational orientation, possibly on the practices" (Tudor, 2001) used in the teaching process within the respective subject areas. The process of professional training is a complex proces which is based on "constructing and fundamenting a theory and human development in a relatively-determined scientific, historical, socio-cultural, psychological and pedagogical context" (Neacşu, 2010), but influenced by the evolution of the educational system and society and even by people's education. Humans are characterized by their capacity to be educated, and "they exist within the world's general movement" (Vinţanu, 2008), so they are subjected to a continuous training and transformation process. The professional training process as a complex and continuous one is based on the immediate and long-term reaction of the person who is subjected to a directed training and education. "A reaction is that response action when the performer knows the movement or action to be done" (Epuran, Stănescu, 2010) and shapes it according to the situations occured, given requirements and reponse capacity.

Students' professional training mostly depends on the manner in which they are stimulated during the face-to-face encounters according to the requirements stipulated and the assessment for meeting the requirements.

Material And Methods

During this research we used the following methods: documentation, observation, ascertained experiment, testing, statistical-mathematical processing (Excel 2003), graphical method, data analysis and interpretation.

This paper aims to perform an ascertained experiment by means of which we will underline the possibility to develop an approach for stimulating learning in the field of Physical Education and Sports, based on choosing answer choices and argumenting them during the seminar activities and practical courses.

The research tried to verify a hypothesis on a 20-student sample. Our hypothesis was to check *ifwe intervene in the students' professional training process with an approach for stimulating learning and participation in forming competences by asking to choose and elaborate their answers, according to concrete situations, students manage to improve the technique to choose methods, means and action strategies.*

In order to demonstrate the hypothesis, we developed an intervention protocol used during the 14 seminar hours, which are divided into a 30-minute theoretical part and a 60-minute practical part, regarding aspects related to an initial and final evaluation of 8 items. The protocol was employed as a work instrument during the 12 seminars, but also as an assessment instrument in the initial and final evaluation. It comprised 8 items by means of which we followed the formation of students'competences related to their analysis and argumentation capacities to use certain methods and means at different times of the performed activity during the educational teaching process.

The 8 items of the protocol for monitoring the teaching capacity of the seminar activity for the university discipline Specialty Didactics – Physical Education and Sports had a question format with 2-3 answer choices. Choosing one of the answers, choice which was given a certain score required from the students both knowledge and thought. The protocol was completed at the beginning of the 2nd seminar and at the end of the 14th seminar. Every item was granted 3 points for a correct answer, 2 points for a partially correct answer and 0 points for an incorrect answer, the student being allowed to choose only one variant and received the corresponding score.

The 8 items and the score values of their answers were the following:

1. *Would it be possible to choose a teaching method and adapt it to students of different ages?*(Answer: yes = 3 points / no = 0 points for the 1st part of the question and no = 0 points /yes = 3 points, for the second part of the question);

2. *What method is the most efficient in forming perception and understanding of a movement performance?*(Answer: demonstration = 3 points /description = 2 points /explanation = 2points);

3. *Whatmethod can you use more efficiently for understanding information?* (Answer: yes – explanation = 3 points /narration = 2 points/ lecture = 0 points);

4. *What method has a higher accumulative value?* (Answer: demonstration = 2points /practice = 3 points /observation = 0 points);

5. *Do teachers use familiar methods or would you prefer new ones?* (Answer: yes = 2 points /no, we prefer new methods too= 3 points);

6. *How can you choose the best exercise for learning a skill*? (Answer: according to what we learnt during sports disciplines = 2 points / analyzing the group's possibilities = 3 points);

7. *How can you choose the most effective exercise for acquiring a motor skill?* (Answer:

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

following the methodological sequence = 2 points / by analyzing efficiency = 3 points);

8. *Can you use a random exercise in the initiation stage for a motor skill?* (Answer: yes = 2 points /no = 3 points).

Results

The results recorded according to the protocol both in the initial and final evaluation are gathered and processed in table no. 1. Moreover, over the 12 lessons, different protocols were used on different topics, so that students could get accustomed to the exciting way of using the information received. The indicators which were calculated and analyzed are represented by: the arithmetic mean, maximum value, minimum value, standard deviation and progression.

The result analysis was made according to the score recorded by the group for every item and its general score and also by every participant individually for the general score. We mainly focused on changing and developing students' conception of a process as a way of action in their professional training.

Group result analysis

For the item *Would it be possible to choose a teaching method and adapt it to students of different ages?* the answers highlighted that the mean recorded in the initial evaluation 2.55 points and in the final evaluation, 4.95 points. The maximum value recorded 6 points in the initial and final evaluation, and the minimum value recorded 0 points in the initial evaluation and 3 points in the final evaluation. The progress between the two evaluations, the initial and the final was 2.40 points, a progress which is close to the score recorded in the initial stage.

Table no. 1 – Results of the Protocol for stimulating teaching capacity

Crt. no.	**I.**	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		Total points	
		I	**F**	**I**	**F**	**I**	**F**	**I**	**F**	**I**	**F**	**I**	**F**	**I**	**F**	**I**	**F**	I	F
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
6	B. S	3	3	0	2	3	3	0	3	2	3	2	2	3	3	3	3	16	22
9	P. M	3	3	0	2	0	2	2	3	2	3	2	3	2	3	2	3	13	22
12	V. A	3	3	0	2	3	3	3	3	2	3	2	2	3	3	3	3	19	22
17	S.E	3	3	2	3	0	2	2	2	3	3	2	3	2	3	2	3	16	22
3	N. J	0	3	0	2	2	3	0	3	2	3	2	3	2	3	2	3	10	23
14	B.A	0	3	2	3	3	3	0	3	3	3	3	3	2	2	2	3	14	23
20	D.O	3	3	3	3	2	3	2	3	2	2	3	3	2	3	3	3	20	23
2	P.E	0	6	2	3	3	3	3	3	2	3	2	2	2	2	2	2	16	24
8	L. A	0	6	2	3	0	3	3	3	2	2	3	3	2	2	2	2	14	24
19	P.D	0	6	2	3	0	2	3	3	2	2	2	3	2	2	3	3	14	24
16	Z.I	6	6	3	3	0	3	3	3	3	3	2	2	3	3	2	2	22	25
4	L. G	3	6	0	3	3	3	3	3	2	3	3	3	3	3	3	3	21	26
5	Z. G	6	6	2	3	0	3	3	3	2	2	3	3	2	3	2	3	20	26
7	C. T	3	6	3	3	3	3	0	2	3	3	2	3	3	3	3	3	20	26
13	A.E	0	6	0	3	0	3	3	3	2	3	2	3	3	3	2	2	12	26
15	M.A	3	6	3	3	3	3	0	2	2	3	3	3	2	3	3	3	19	26
18	R.A	3	6	0	2	3	3	3	3	3	3	3	3	3	3	3	3	21	26
1	P. B	3	6	3	3	3	3	2	3	3	3	3	3	3	3	3	3	23	27
10	M. V	3	6	2	3	3	3	3	3	3	3	3	3	3	3	3	3	21	27
11	J. DI	6	6	2	3	2	3	0	3	3	3	3	3	2	3	2	3	20	27
X		2.55	4.95	1.55	2.75	1.8	2.85	1.90	2.85	2.4	2.8	2.5	2.90	2.45	2.80	2.50	2.80	17.55	24.55
Progression		2.40		1.20		1.05		0.95		0.40		0.30		0.35		0.30		7.00	
S		2.01	1.47	1.23	0.44	1.40	0.37	1.40	0.37	0.50	0.41	0.51	0.41	0.51	0.41	0.51	0.41	3.75	1.85
V. max		6	6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	23	27
V. min		0	3	0	2	0	2	0	2	2	2	2	2	2	2	2	2	10	22

*****Legend: I= Subjects' Initials 1. *Would it be possible to choose a teaching method and adapt it to students of different ages?;* 2. *What method is the most efficient in forming perception and understanding of a movement performance?;*3. *Whatmethod can you use more efficiently for understanding information?*; 4. *What method has a higher accumulative value?*; 5. *Do teachers use familiar methods or would you prefer new ones?*; 6. *How can you choose the best exercise for learning a skill*?; 7. *How can you choose the most effective exercise for acquiring a motor skill?*; 8. *Can you use a random exercise in the initiation stage for a motor skill?*

For the item *What method is the most efficient in forming perception and understanding of a movement performance?* the average mean of the answers was 1.55 points in the initial evaluation and 2.75 points in the final evaluation. The maximum value recorded 3 points in the initial and final evaluation, but the minimum value recorded 0 points in the initial evaluation and 2 points in the final evaluation. The progression between the initial and final evaluation was 1.20 points, therefore a good and obvious progress.

For the item *Whatmethod can you use more efficiently for understanding information?* the average mean of the answers was 1.80 points in the initial evaluation and 2.85 points in the final evaluation. The maximum value recorded 3 points in the initial and final evaluation, and the minimum value recorded 0 points in the initial evaluation and 2 points in the final evaluation. The progression between the initial and final evaluation was 1.05 points, a good progress as well.

For the item *What method has a higher accumulative value?*, the average mean of the answers was 1.90 points in the initial evaluation and 2.85 points in the final evaluation. The maximum value recorded 3 points in the initial and final evaluation, and the minimum value recorded 0 points in the initial evaluation and 2 points in the final evaluation. The progression between the initial and final evaluation was 0.95 points.

For the item *Do teachers use familiar methods or would you prefer new ones?*, the average mean of the answers was 2.40 points in the initial evaluation and 2.80 points in the final evaluation. The maximum value recorded 3 points in the initial and final evaluation, and the minimum value recorded 2 points in the initial and final evaluation. The progression between the initial and final evaluation was 0.40 points.

For the item *How can you choose the best exercise for learning a skill*?, the average mean of the answers was 2.50 points in the initial evaluation and 2.80 points in the final evaluation. The maximum value recorded 3 points in the initial and final evaluation, but the minimum value recorded 2 points in the initial and final evaluation. The progression between the initial and final evaluation was 0.30 points, a small increase as well.

For the item *How can you choose the most effective exercise for acquiring a motor skill*, the average mean of the answers was 2.45 points in the initial evaluation and 2.80 points in the final evaluation. The maximum value recorded 3 points in the initial and final evaluation, but the minimum value recorded 2 points in the initial and final evaluation. The progression between the initial and final evaluation was 0.35 points.

For the item *Can you use a random exercise in the initiation stage for a motor skill?* the average mean of the answers was 2.50 points in the initial evaluation and 2.80 points in the final evaluation. The maximum value recorded 3 points in the initial and final evaluation, but the minimum value recorded 2 points in the initial and final evaluation. The progression between the initial and final evaluation was 0.30 points.

Individual result analysis

In table no. 1, in columns 19 and 20, we present the total scores recorded by the students in the two evaluations (initial and final).

The data analysis represented in graphic no. 1, highlights the following aspects:

- In the initial evaluation, the general scores accumulated by every student have values between 10 and 23 de points. Four students are in the first half of the general score with values between 10 and 14 points, and 16 students are the superior half with scores between 16 and 23 points;
- In the final evaluation the general scores accumulated by every student have values between 22 and 23 points. All 20 students are in the superior half, which underlines the changes in their initial concepts as a result of the teaching educational act.;
- In the final evaluation 6 students recorded 26 points each and 3 of them, 27 points;
- 15 students had a progress from the initial evaluation to the final evaluation with scores between 3 and 9 points;
- 5 students progressed from the initial to the evaluation, with scores between 10 and 14 points;
- The group's average value was 17.55 points in the initial evaluation, a little over the half of the possible minimum value, and in the the final evaluation, 24.55 points a little under the possible maximum mean.

Discussions

Regarding the teaching and instructional process, Gréhaigne, Godbout, Bouthier 2001) emphasize that "the elements on which perception is based are discussed in the interpretation, anticipation and decision making". The authors, in an analysis of the educational and instructive process for a team present a pedagogical approach called the "dynamic pattern" comprising, (a) "setting action, (b) observing settings and debating them", (c) in order to achieve „the ultimate aim of acquiring strategic and tactical knowledge", necesary in any teaching apptoach in team sports.

After an intervention structured for a determined period, following the strategy described, the progress (as it is also observed in the graphic no.2) is not great, between 2.40 and 0.30 points, but demonstrates the efficiency of the activity of the professional training process by observing how to stimulate the learning process.

The total score mean of the 20 students had a value of 17.55 points in the initial evaluation and 24.55 points in the final evaluation. The maximum value recorded 23 points in the initial evaluation and 27 points in the final evaluation, and the minimum value recorded 10 points in the initial evaluation and 22 points in the final evaluation, and it shows a real progress imposed and influenced by directing and formulating teaching-educational tasks.

As Kokaj, Hein, (2003), stress, teachers need, in order to create a learning environment, several stimulating strategies, which could lead students to perception and comprehension. "They should seek to provide a positive general feedback feedback "which is directed towards the acquisition of skills, in order to create a learning environment". In our case, the progress mean, recorded at the group level was 7 points, which underlines the efficiency of the question-

based strategy for stimulating thought at the moment of choosing the work method or the action plan.

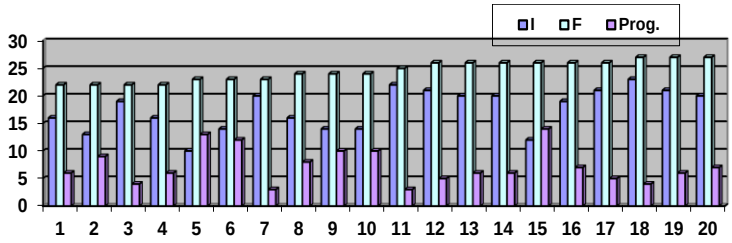
The permanent analysis of students' activity regarding their professional development as well as the stimulation of their curiosity and reactivity by different means constitute the main and necessary directions in the evolutionary teaching act, an aspect which is also underlined by Hassandra and Goudas (2003,) who state that "a wide variety of social factors influence the students' intrinsic motivation in physical education. These must also be taken into account when planning the physical education lessons".

Conclusions

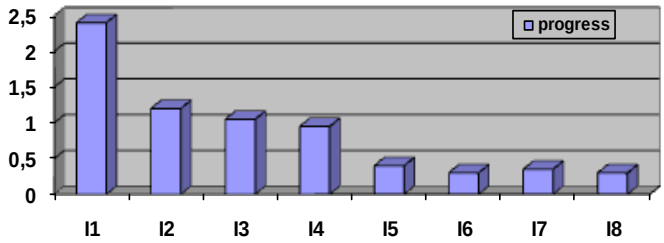
This study allowed us to present a series of aspects regarding the results of the students studying at Physical Education and Sports Specialty and attending the courses from the Teacher Training Department. The results analysis and discussion enable us to draw the following conclusions:

- The means of the scores recorded at the final evaluation, for the 8 items are higher than the initial means;
- The maximum values in the final evaluation are equal to or higher than those in the initial evaluation;
- The scores of the minimum values are equal to or higher than those in the initial evaluation
- For the 8 items the values of the standard deviation are between 2.01 and 0.51 in the initial evaluation and between 1.47 and 0.30 in the final evaluation;
- The progression value is 2.40 points according to the choice of the teaching method and its adaptation to students' age;
- Students progressed by 1.20 points according to the most efficient methodn in forming the perception and understanding of a movement;
- a progression of 1.05 points was recorded for using a method to understand information;
- students progressed by 0.95 points according to the higher accumulative value of a method;
- we recorded a progression of 0.40 points for the tendency to use a softer method;
- the progression value of 0.30 points was recorded for choosing an exercise to learn a new skill according to the group possibilities;
- students progressed by 0.35 points at choosing an exercise according to its efficiency;
- the progression value is 0.30 points for not using a random exercise in the initiation stage;
- the hypothesis according to which if, on a sample of 20 students, we intervene with an approach for stimulating learning and stimulating participation in the formation of professional competences, they will manage to better learn the technique to use methods, means and action strategies, was confirmed;
- the new approach for stimulating learning in the field of Physical Education and Sports, based on the 8-item protocol constitutes a highly efficient work instrument.

Graphic no. 1 – Representation of the points accumulated in the initial and final evaluation and the recorded progression



Graphic no. 2- Representation of the progression recorded from the initial evaluation to the final evaluation



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Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

Science, Movement and Health, Vol. XIII, ISSUE 2, 2013
June 2013, 13 (2), 90-95

Original Article

A CASE STUDY REGARDING THE EFFICIENCY OF INTERVENTION THROUGH KINESIOTHERAPY IN PREMATURE INFANTS

RAŢĂ MARINELA[1]

Abstract

Purpose. The recorded experiment based on a case study was performed at Bacău Maternity County Hospital, on the second floor in the last two weeks until his being discharged, in the "Sensorial Room" at the Kinesiotherapy Base of "Vasile Alecsandri" University of Bacău and at the patient's house for six and a half months.This paper is a case study performed on a 6-week premature infant, over a 7-month period of time.

As research methods. We used the bibliographic method, observation, testing, data interpretation method and graphical method. As applicative intervention, we used kinesiotherapeutical programs in order to improve the infant's functionality and facilitating the acquisition of motricity specific to the chronological age.

*Results.*The results were recorded both according to the ontogenetic development and to the maturity of the reflex, orofacial and respiratory function, which underline the efficiency of the kinesiotherapeutical intervention.

*Conclusion.***D**ue to the fact that the assessment and exploration methods were objective, the results gathered are concrete, demonstrating the efficiency and importance of kinesiotherapy in a premature newborn.

Key words: kinesiotherapy; premature;newborn.

Introduction

A newborn weighing 1.520 kg, delivered before 37 weeks is considered a premature baby. According to the pregnancy age at birth, premature newborn babies can have a weight corresponding to the pregnancy age, lower or higher than the normal one. A normal threshold for weight is considered 2.500 kg. For premature and overweight children there is a risk for inadaptation to the extrauterine life, for which they need qualified help to adapt to the new mode of existence. "A premature infant needs special care because its vital organs are not ready for life.
It needs an incubator in order to maintain its heat, it needs mechanical ventilation in order to be able to breathe, and above all, medical treatment should not be missing" (Adrian Crăciun, head of the Neonatology Department, Cantacuzino Maternity Hospital, http://www.romanialibera.ro/stil-de-viata/sanatate/cum-prevenim-nasterile-premature, 30.03.2013, at 13.05).

The child's development is "a qualitative process of cellular differentiation which is expressed by functional modifications" **(**Cordun, M., 2009, p. 50). Reaching development to ensure movement independence is a parent's main objective in his/her child's development. However, there are still some development and manifestation differences betwenn children even from their birth, differences which can negatively influence the infant's further evolution. Kinesiotherapy, as practical form of intervention, "provides the recovery of the deficient functions and the acquisition of functional independence, by placing the subject to exercise an active role in its own shaping and development" (Teodorescu, S., Bota, A., Stănescu, M., 2007, p. 2).

A term baby born with a low birth weight in relation to gestational age (delay of intrauterine growth) presents changes in growth or neurological manifestations different from a newborn whose weight and development correspond to the gestational age. That is why an estimate of the gestational age is essential for interpreting the observations made during the neurological examinations, but also for establishing the child's evolution procedure. A lack of a profilactic and kinesiotherapeutical intervention, as well as delays in following the developmental stages up to 6-7 months, facilitate the occurence of psycho-motor deficiencies and sechelae.

"The evolution of specific disorders depends on the patient's age" (Marcu V, Dan M., 2010, p.139), but the interventions as closely as possible to the date of birth of a premature infant require good knowledge of the characteristics of development, but also a great responsibility. The stimulation of the functional development as a way to improve the neurological manifestation determines "neuronal adaptation which is very important in the initial stage of a profilactic recovery program" (Sbenghe, T., 1999, p. 387).

A kinesiotherapeutical intervention determines improvements in functionality, but in a scientific presentation "the greater the strength developed is, the greater the intensity of the effort increases, and the higher the capacity is, the lower the intensity of the effort decreases within the programmed limits and therefore it can be longer maintained" (Cordun, M., 2011, p. 164).

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Received 11.01.2013 / Accepted 15.05.2012

An intervention as fast as possible, having well-structured objectives, can reduce the level of deficiencies present in a premature birth and can stimulate the infant's normal functional development. "When establishing the treatment's objectives, we should always start from an assessment as objective as possible, regardless of the manner of intervention and field of activity" (Raţă M, 2011, p. 49), and these shall be distributed in time according to the possibility of achievement and importance at the corresponding moment. Approaching this topic is motivated, on the one hand, by the fact that the related topics are very restricted and on the other hand, by the necessity to underline the importance and efficiency of a kinesiotherapeutical intervention as closely as possible to the date of birth.

A fast and accurate assessment of a premature infant allows good knowledge of the level of the developmental stage, which allows establishing the objectives and elaborating the intervention program through kinesiotherapy as objectively as possible.

Research Hypotheses

In this research we started from the following hypotheses:

1. if we perform an early kinesiotherapeutical intervention in a premature infant we can recover the motor delay (the chronological age coincides with the biological age);
2. if we perform an early kinesiotherapeutical intervention in a premature infant we can avoid the risks of installing psycho-motor sechelae.

Material And Method

Our research was performed for 7 months (September 2012- March 2013), period which included the theoretical research and the subject's therapeutical activity. The patient born prematurely (at 31 weeks and 1.400 kg) was intubated and administered surfactant, and then sent to intensive therapy where he was given oxygen for 24 hours. At the moment of birth, he suffered from a hypoxia and a reduced haemorrhage. Having this patient registered in medical records, 6 weeks after his birth and knowing all the signalled aspects, we designed a kinesiotherapy program into two stages. The program had as objective the recovery of the motor delay in the first stage and the observation and therapy continuation in the second stage. The purpose of the kinsiotherapeutical intervention is to eliminate and decrease the risk of a pathological record with negative effects in time. The frequency of appointments was three times a week, and his parents continued the recommended therapy for the rest of time. The recorded experiment based on a case study was performed at Bacău Maternity County Hospital, on the second floor in the last two weeks until his being discharged, in the "Sensorial Room" at the Kinesiotherapy Base of "Vasile Alecsandri" University of Bacău and at the patient's house for six and a half months.

As research methods, we used the following: theoretical documentation, observation, case study, testing, data analysis and interpretation.

Assessment and estimation were performed by using Dubowitz Method (1970). This method highlights both the external and the neurological features and calculates the gestational age of the premature infant, by estimating 21 well-defined physical and neurological signs.

The minimum score can be 0, and the maximum score 72 (35 neurological signs; 37 external signs). Formula: estimated age = (0.2642 * (total score)) + 24.595. The estimation method of the gestational age of the fetus was based on the 21 well-defined physical and neurological signs. This method enables the estimation of the gestimation age ± 2 weekes, in 95% of infants.

The neurological signs which were estimated in the initial and final testing were represented by: posture, hand flexion on the forearm, leg dorsiflexion, arm retraction, leg retarction, popliteal angle, heel to ear, scarf sign, head suspension, ventral suspension and out of the external features, the following were estimated: tegument texture, edema, skin colour, skin opacity, lanugo, plantar ridge, nipple formation, breast size, ear consistency, feminine genital organs (with hips in semiabduction).

The second assessment method was performed by using Kuban KCK Method (1986), which estimated the tendon reflexes (mandibular, large pectoral, biceps, brachioradial, triceps, finger flexor, patellar, hip adductors and crossed adductors, achilian muscles). To these, we added the assessment of ontogenesis according to Vojta, which helped establishing the developmental age.

Therapeutical Intervention

Kinesiotherapeutical intervention, as a manner of stimulating functionality, is not easily accepted by an infant, regardless of the manner in which it is performed, because it constitutes, at first, a stressful external factor. A stimulus introduced by a kinesiotherapist in an infant's treatment leads to a reaction. The infant's reaction is of low intensity at the beginning of the intervention, but it increases over the next appointments. In very small infants, the intervention is performed so that the infant could send the expected response.

It cannot be sent, as in adults, by minute descriptions, by formulating requests or by indications, but by stimulating and encouraging behaviour means. It was conceived to fulfill the following objectives: performing/ promoting normal forms of movement in order to prevent from installing the pathological ones and to fight postures which lead to pathological ones;

stimulating /facilitating the respiratory function to prevent respiratory disorders; decreasing/ shortening the period of artificial feeding and educating coordination of breast suction, swallowing and breathing; improving/increasing and balancing muscle tone in order to reach developmental stage according to the chronological age; balancing sleep-wake cycle mechanism; stimulating/facilitating and strengthening parent-child interaction.

The recovery program was performed in two distinct stages, under different conditions and with different objectives. In the first stage, our work with the infant took place in hospital carefully monitoring heart beating, oxygen intake, heart rate, respiratory rate and facies colour. A very slow general massage was performed, and also Vojta stimulation from the 1st stage of rolling over for only 5 seconds, slow passive mobilizations and stimulations of the primitive reflexes.

In the second stage, we added the oro-facial stimulation, passive-active and tactile general motor stimulation, manual chest compression and postures. These manners of stimulations were performed for 10-15 minutes and they had an effect especially on the spontaneous motricity, oro-facial function and breathing. The oro-facial stimulation was used to bring to normal the muscle tone and also to educate *sucking* and *swallowing*. The vestibular, propriocieptive motor, tactile, visual and auditory sensory stimulation was intended for *tone regulation* and *neurosensory stimulation.* In order to improve the respiratory function, we used soft maneuvres of manual chest compression. These were performed during exhaling and inhaling movements. We alternated free exhalation and inhalation with a soft compression at the end of inhalation.

We also performed a soft abdominal pressure to stimulate the diaphragm's activity. In order to strengthen muscle tone we used postures. During these procedures, muscles need to fight gravitational force which imposes an expanded position, an opposite position to the physiological one, by placing the body in certain positions. These were used to promote flexion and extension of the segments, but also to orient towards the medial line of limbs and postural symmetry. These activities during the intervention were performed in the presence of a family member. By using *massage*, we noticed an exercise of different sensory stimuli.

At the first contact, we seized an increase of the heartbeat, but it got back to the initial value once he got accustomed to it and relaxation occured. A soft smoothing and friction massage was performed for tactile stimulations and also pressures on the articulations for proprioceptive stimulation. First, passive *immobilizations* of the body segments were performed and together with the increase of muscle tone, we worked on the limb movements under the gravitational force, facilitating posture reactions.

This *intervention plan* included also a part of the program which was continued by parents at home. They performed visual and auditory stimulation with a toy, sensory stimulation by massage and vestibular and proprioceptive stimulation with a gymball. After the child reached the necessary acquisition equivalent to 2 months of age, the work against gravitation was more challenging, therefore exercises focused on the stimulation of an antigravitational motricity and met the ontogenetic requirements.

The duration of the kinesiotherapeutical intervention under direct supervision of the kinesiotherapist was 6.5 months, but the infant was monitored until he turned one year of age and started to walk independently.

Results Of The Research

All the observations taken from the initial and final assessment were recorded and are found in the observation sheets, and in this paper, they can be found summarized in table no.1 and no. 2 and are represented in graphic no. 1. Data interpretation included the results both of the initial and final assessment.

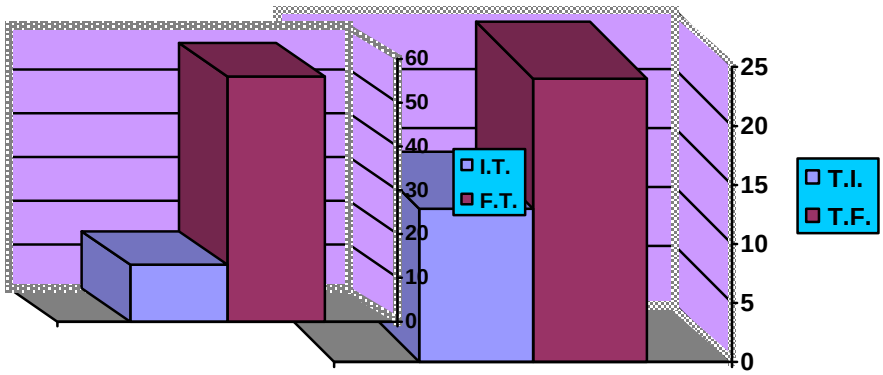
The scoring by Dubowitz Method which followed the progress during hospitalization for neurological signs (tab. no. 1) was 13 points at the initial testing and 24 points at the final testing, therefore an increase by 11 points. The neurological signs were estimated in the initial testing with values between 0 and 2 points, and in the final testing between 2 and 3 points. The highest progress by 2 points was recorded at hand flexion on the forearm, leg retraction and head suspension, and the lowest by 1 point was recorded at the others (posture, leg dorsiflexion, arm retraction, popliteal angle, heel to ear, scarf sign, ventral suspension).

For external features (tab. no. 1) the initial score was 25 points and the final score was 51 points, so we recorded an improvement of 26 points. The external features were estimated at the initial testing with points between 0 and 2, and at the final testing between 2 and 4. Progress by 3 points was recorded for tegument texture, edema, skin colour and plantar ridges, by 2 points at skin opacity, nipple formation, ear consistency and feminine genital organs (with hips in semiabduction), and by 1 point at lanugo, breast size and ear shape.

Table. No.1 Dubowitz Scoring for external and neurological criteria

Neurological signs	**I. T.**	**F. T.**	***External features***	**I. T.**	**F. T.**
Posture	2	3	Tegument texture	1	4
Hand flexion on the forearm	0	2	Edema	1	4
Leg dorsiflexion	1	2	Skin colour	0	3
Arm retraction	1	2	Skin opacity	1	3
Leg retraction	1	3	Lanugo	2	3
Popliteal angle	1	2	Plantar ridges	0	3
Heel to ear	2	3	Nipple formation	0	2
Scarf sign	2	3	Breast size	2	3
Head suspension	1	3	Ear shape	2	3
Ventral suspension	2	3	Ear consistency	1	3
			Feminine genital organs (with hips in semiabduction)	1	3
Total points	13	24		25	58

After calculating the points accumulated during assessment by using the formula for estimating the gestational age, we found the following estimation = (0.2642 * (total score)) + 24.595. Therefore, in the initial assessment, his age was 31 weeks, after the final testing, his age was 40 weeks. We can say that this newborn was discharged from the hospital with a developmental age of 40 weeks and a chronological age of 2 months, which means a difference of 8 weeks between the chronological age and the developmental age.



Graphic no. 1 **Testing Dubowitz scoring**

Graphic no. 2 **Testing tendon reflexes**

***Legend: I. T.-Initial testing, F. T. –Final testing of Dubowitz scoring**

Assessment by Kuban KCK Method (1986) (table no. 2) underlines the fact that tendon reflexes were present at the initial testing (hospital discharge), at only 3 levels out of 9, with a normal intensity in the large pectoral muscle and with a low intensity in the mandibular and finger flexor.

At the final testing (7 months) the reflexes of 8 levels were present with a normal intensity in the mandibular, large pectoral, biceps, triceps, finger

flexor, patellar, hip adductors and crossed adductors, achilian muscles.

Table.no.2 Results of Kuban K.C.K. Method 1986

Tendon reflexes	***I.T.***	***F.T.***
Mandibular	Present (but with low intensity)	Present
Large pectoral	Present	Present
Biceps	-	Present
Brachioradial	-	Present
Triceps	-	Present
Finger flexor	Present (but with low intensity)	Present
Patellar	-	Present
Hip adductors' and crossed adductors' muscles	-	Present
Achilian	-	Present

Discussions

According to Broderick, E., (2011) "premature new-borns receiving massage therapy have a more rapid growth in weight than the ones who do not", which is an aspect underlined and highlighted in our study, demonstrating that there is a possibility that after the kinesiotherapeutical intervention the delays are recovered. The normal manifestation, after 6.5 months of tendon reflexes, as well as the improvement of the neurological aspects and external characteristics underlines the efficiency of the kinesiotherapeutical intervention at an early age, as closer as possible to the date of birth. The local effects recorded which led, first of all, to a general balance of the organism, and secondly, to the improvement of the child's health state, without a helplessness state, prove that "the neuromotor development is the result of the combined influence of the genetic and environmental factors, which complete the most efficient movement patterns. An "early stimulation of the child, meant to reduce the possible handicap, together with the parents' training for positioning and mobilization of the new-born" (Robănescu,L., Bojan, C., Coltoş, M., Cosac, E., 2006) is important in the child's future evolution. We can also mention the fact that the 8-week difference between the developmental and chronological age was recovered over the 6.5 months of kinesiotherapy. The child was monitored for a year in order to seize the verticality process until acquiring walking. In addition, "introducing music therapy together with kinesiotherapy for the motor and psychological rehabilitation of patients makes the process more efficient and favours a faster recovery (Ogłodek, E., Araszkiewicz, A., 2010, s. p. 171-172), an aspect taken into consideration and which must be taken into account in the future.

Conclusions

Following this research and the results gathered, we can say that the hypotheses initially established were confirmed, the kinesiotherapeutical program which was thouroughly designed and introduced at an early stage had an indubitable role in improving the deficiencies of the premature infant.

The normal manifestation of the tendon reflexes, as well as the improvement of the neurological aspects and external features underline the efficiency of the kinesiotherapeutical intervention at an early age.

The analysis of the patient's evolution, following the kinesiotherapeutical program emphasized the recording of local effects which led firstly, to a general balance of the organism and secondly, to an improvement of the infant's health condition, without the installation of helplessness condition.

We can also mention the fact that the 8-week difference between the chronological and the developmental age was recovered over the following 6,5 months of kinesiotherapy. The infant was monitored until he turned one year of age in order to seize the verticality process up to the acquision of walking.

Due to the fact that the assessment and exploration methods were objective, the results gathered are concrete, demonstrating the efficiency and importance of kinesiotherapy in a premature newborn.

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Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST,
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Science, Movement and Health, Vol. XIII, ISSUE 2, 2013
June 2013, 13 (2), 96-102

Original Article

AQUATIC INTERVENTION PLAN FOR PEOPLE WITH NEUROMUSCULAR DISORDERS

STAN AMELIA ELENA[1]

Abstract

Objective. The people with multiple sclerosis could benefit from competent aquatic therapy to improving range of motion and strength of the arms and legs and reducing spasticity, besides socializing.

Methods. Use of aquatic therapy for people with multiple sclerosis through Watsu sessions, Bad Ragaz Method, Halliwick Concept, Task-Type Training Approach and by patient education.

Results.

Although multiple sclerosis is a degenerative and progressive disease, the role of therapeutic aquatic program is reached by maintaining a level of continuous independent life, with patient more confident in hers abilities.

Returning to prior level of function and independence.

Aquatic program can support fuul range of motion, offers buoyancy supported environment.

Through this study we observed a significant improvement in the level of fatigue with a potential positive effect on functional abilities.

Conclusions.

Aquatic rehabilitation effectively improves impairment and disability oriented problems for people with limitations from neuromuscular occurence.

Aquatic exercise programs for people with neuromuscular disorders should be designed and supervised by therapists with expertise in recognizing the lack of control of functional movement commonly encountered by patients with those clinical conditions and identifying strategies to overcome them.

Key words: aquatic rehabilitation, multiple sclerosis.

Introduction

The inactivity and obesity at pacients with neuromuscular disease presents a high risk for developing or worsening comorbid conditions such as high blood pressure, high blood cholesterol, diabetes, heart disease, strokes and other conditions. „Impaired aerobic capacity, also resulting from inactivity, negatively affects a person's ability to carry out functional activities" (Brody L. T., Geigle P. R., 2009, p. 239). „In recent years, rehabilitation professionals have grown to appreciate their role in secondary prevention, designing and providing wellness opportunities that include community-based exercise programs for people with neuromuscular dysfunction" (Rimmer J. H., cited in Brody L. T., Geigle P. R., 2009 p. 239). Many people with neuromuscular dysfunction are interested in exercise, but multiple obstacles causes their capability to achieve the advised level of exercise, besides the absence of places where to practice. Land-based exercise is difficult for patients with neuromuscular dysfunction because of the effort needed to move against gravity and the higher risk of falls and other injuries. The aquatic environment offers for all people, even those with mobility limitations, with a safe and effective alternative for exercise. Because of the buoyant support of the water is reduced the risk of falls and allows persons with mobility impairments to exercise at higher intensity. The turbulence and drag properties of the water are ideal for strengthening exercises. The patients can easily achieve aerobic fitness levels in water.

„Treating a neurogical patient in water offers a wide variety of options in a higly dynamic environment" (Campion M. R., 2001)

Aquatic wellness programs is very important for the healty people but is the most importance for people with impairments.

The limitation in performing of any activities is any difficulty that it may have in executing activities. Typical activity limitations resulting from neuromuscular dysfunction include walking and performing transfers. A participation restriction is a problem that a person may experience in involvement in life situations. Typical participation restrictions following neuromuscular dysfunction relate to physical barriers, attitudinal barriers, lowered expectations and feas. The application of aquatic rehabilitation approaches can influence people with neuromuscular disorders at any or all of these levels.

The central nervous system plays a vital role in control of functional movement. Injury or disease affecting this system can result in a variety of primary movement problems involving motor, sensory, perceptual, cognitive, and behavioral systems. Additionally, primary body structure impairments (e.g., paralysis, spasticity, rigidity, tremor, dysmetria,

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Received 05.01.2013 / Accepted 22.05.2012

hyperkinetic) can lead to secondary movement problems that do not result directly from the nervous system lesion. These are rather developed in time, for example, paralysis resulting directly from spinal cord injury can lead to joint tightness and limited range of motion over time, or hypokinesia can lead to illusion of motion or athetosis can have as dysfunction inability to perform a movement or sequence of movements despite intact sensation.

Aquatic rehabilitation programs, from skilled therapy to wellness services, offers a unique, versatile approach to interventions for these body structure impairments and the activity limitations that they create. Improved technology and medical management allow more people with the need of neuromuscular rehabilitation to survive head injuries, brain tumors, strokes, birth injuries. Longer and healthier life hopes may account for an increased predominance of specific neuromuscular disorders. The unique properties of water, particularly buoyancy, turbulence and drag, enable the design of effective and versatile treatment programs. Specific benefits of the aquatic environment include weight release and easely in movements. These characteristics allow safe movement exploration, strengthening, and functional activity training, often before patients can perform the same activities on land. In addition, the supportive properties of water allow easier handling of patients by therapists.

Objective. The people with multiple sclerosis could benefit from competent aquatic therapy to improving range of motion and strength of the arms and legs and reducing spasticity.

The important aims for the first stage of the aquatic treatment, in wchich we particpated were primary: accomodation with water, improved breath control, appreciation of longitudinal roll and stability, normalization of tone and we tried some intermediate.

Methodology

Motor Control Models

Three motor control models are studied:

- the reflex model,
- the hierarchical model,
- the systems model.

The reflex model assumes that human movement occurs in response to sensory input to the central nervous system but a reflex model does not fully explain the production of skilled movement.

„The hierarchical model views the central nervous system as a top-down control pattern in which the higher centers of the cerebral cortex control the lower centers of the brain stem and spinal cord. The lower centers are in charge of more primitive, reflexive movement; the higher centers control the more complex, voluntary movement. Reflexive movements may appropriately override voluntary movements for functional purposes in normal humans" (Brody L. T., Geigle P. R., 2009).

The systems model does not regard the central nervous system as being only liable for motor control, movement results from interaction among many different kinds of systems, includ-ing environmental, musculoskeletal, sensorimotor, and cognitive.

Resulting movements occur secondary to interactions between the systems.

The intervention approaches used by rehabilitation therapists are many and varied. In the beginning of neurorehabilitation, the prevalent rehabilitation model was a muscle reeducation model wherein therapists strengthened weak musculature and provided orthopedic support or bracing for body segments to which strength would not return. Patients with neuromuscular disorders were treated in a similar manner. In recent years „research of contemporary movement science indicates that functionally oriented neurotreatment, in which patients are more active problem solvers, may be more effective than treatments based on earlier models" (Gordon J., 2000). This rehabilitation approach to neurorehabilitation would mean specific functional tasks: patients must develop effective compensatory strategies to carry out their skills, to learn adaptability to performing the tasks under a variety of musculoskeletal and environmental constraints (e.g., on different surfaces, with different obstacles to avoid). At patients with neurological impairments displays limited ability to participate as active problem solvers because of major physical or mental impairments.

Methods

The poeple would benefit form skilled aquatic therapy directed at improving the range of motion at the arms and legs and strenghtening the musculature and gait and balance retraining.

The buoyant support during gait and balance activities, reducing fear of falling. Some people with multiple sclerosis are heat intolerant; a warmer therapeutic pool may further induce fatigue. This response to heat is variable from one person to another.

Watsu, are suitable at the begining of the recovery sessions, that emphasizes the basic moves and a far or near leg-over sequence can be used. The main purpose for those activities would be to reduce spasticity and allow increased freedom of movement during gait and balance activities.

Bad Ragaz Method, is suitable for those persons who, besides multiple sclerosis have other medical diagnosis and has to prevent excessive fatigue. For the application of these method the appropriate pattern are:

- shoulder flexion and abduction, external rotation, wrist and finger extension moving to shoulder extension and adduction, internal rotation, and wrist and finger extension moving to shoulder extension and adduction, internal rotation, and wrist and finger flexion,

- leg patterns to increase strenght and coordinated, reciprocal movements of the legs, unilateral and bilateral movements.

Halliwick Concept, in which are used activities to facilitate patterns of movement with attentive account of the level of difficulty of the activity and the quantity of manual guidance, like:

- changing the basic body position: sit to stand exercises, rolling,
- maintaining the body position: stand, sit, floating up, gliding supine gliding prone,
- moving around.

Task-Type Training Approach, can be useful for increasing isotonic strenght of the moving leg while simultaneously challenging the ability to stabilize with the stance leg and trunk. Emphasis is put on disability by working in functional positions like water walking (will also improve gait and balance skills) and can be progressed with more advance skills like quick turns or stopping and starting on demand.

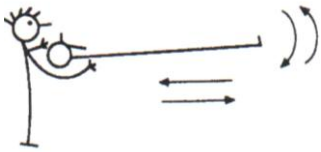
Patient education, presume that patients to return to aquatic exercise program because is important for a lifelong physical physical fitness activity and work to improve social wellness.

The subjects was a older woman of 75 years old, who participated in aquatic activities at the swimming pool into the Faculty of Medicine and Pharmacy Carol Davila from Bucharest. This project.

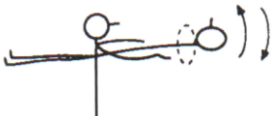
The study held place on the october - november 2012 (on a period of 7 weeks, once a week, with 30 minutes per session).

I prepared programs for learning her own limitations and accepting that she needs to rest, to enjoy it and feel that is beneficial. A program adapted to cope with abnormal increases and decreases in muscle tone.

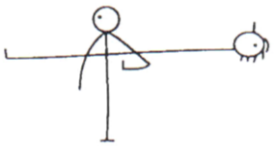
Practical techniques



1. The body is moving forward or backward with or without floats, feet up, with minimal support of the head

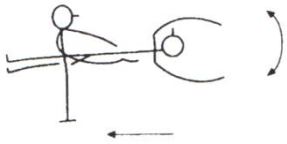


2. Movement of rotation, side-to-side, with or without flotation devices.



3. For roll, find balance point, the therapist use edge of palm to correct

4. The therapist alter balance from the feet at roll

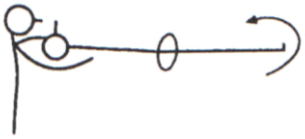


5. Stretches with prolonged circles, moving forward and backward to mobilize shoulders

6. Trunk rotation, in flexion

7. Therapist helds the knees of the patient

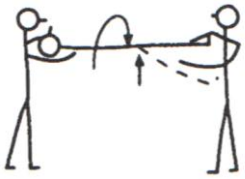
8. Small stretches



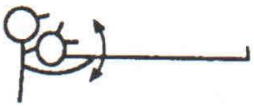
9. Stretching by swinging the body from the head

10. Prolonged stretches of the muscles of the foot

11. Prolonged stretches aiding selective flexion or extension

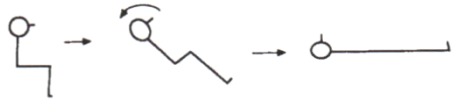


12. Prolonged stretch of the body with extension and rotation

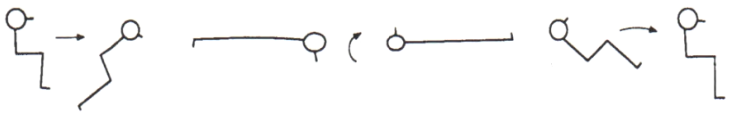


13. Movements of rotation

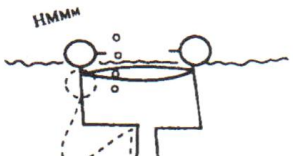
14. Longitudinal rotation in both directions, initially controled by therapist



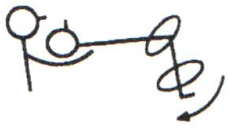
15. Vertical rotation, patient must learn to blow the air.



16. Combination of rotations

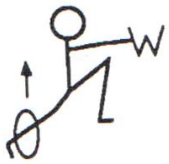


17. Exercise of breath control with selective flexion and extension



18. Buoyancy with trunk rotation

19. Buoyancy with lateral flexion

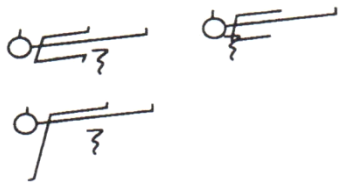


20. Buoyancy with hip extension

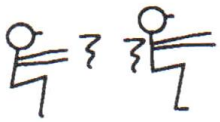
21. Buoyancy with extension

22. Buoyancy with thoracic rotation

23. Flotation, lifting raising individual limbs

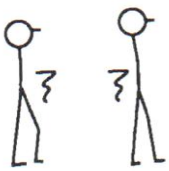


24. Flotation aided by isometric holding, using turbulence

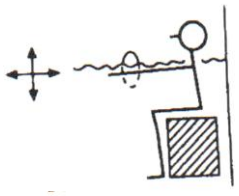


25. Flotation, using turbulence, with extension of the shoulders

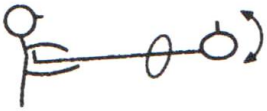
26. Flotation with elbow extension



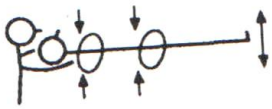
27. Flotation with assistance and resistance from turbulence. Movements of extension at hips



28. Flotation of movements of superior members

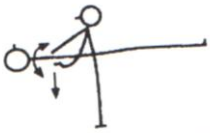


29. Rhytmic stabilization with rotation exercises, with flexion and extension

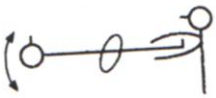


30. Rhytmic stabilization with patient maintaining position while therapist applies pressure around the trunk

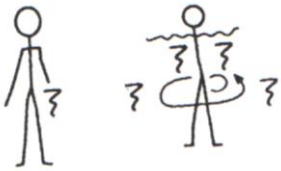
31. Movements for awareness executing longitudinal rocking



32. Maintaining balance



33. Patient triesto resist at rotation



34. Turbulence is used for perturb balance

35. Maintaining balance chainging the depth of water and increasing turbulence

(Figures are from Campion. M.R., 2001)

In the therapeutic sessions (tabel below) we used the techniques above.

Days	***Practical techniques***	**Aims**
1.	1 – 4	Floating reducing head support, with selective release using a short lever and appreciation of roll
	17	Breath control exercise
	18 – 22	Buoyancy exercises
2.	1 – 4	Floating reducing head support, with selective release using a short lever and appreciation of roll
	17	Breath control exercise
	18 – 22	Buoyancy exercises
3.	5 – 9	Stretching exercises

	18 – 22	Buoyancy exercises
4.	17 3 – 4 5 – 9	Breath control exercise Appreciation of roll Stretching exercises
5	10 – 12 13 – 14 29 – 30	Prolonged stretches Rotations Rhytmic stabilizations
6.	13 – 16 18 – 22 31 – 35	Rotation and longitudinal rotations Buoyancy exercises Balance and saving reactions
7.	23 – 28 29 – 30 31 – 35	Facilitation of movement using turbulence and buoyancy Rhytmic stabilizations Balance and saving reactions

Conclusions

Rehabilitation through hydrotherapy after neurological and physical injury requires competent and different approaches, to recreate and strengthen the pacient.

The treatment lessons must be done slowly and wait for reactions before changing to a new activity.

The skill in treatment is to challange the patient to her limits, not beyond central nervous system. In water is very easy to overchallange the damaged central nervous system beyond its capacity to execute natural.

Water can be used as facilitator, is a dynamic environment that can recreate for the person the feeling of freedom of movement, it allows a subtle and intuitive approach to treatment.

Aquatic intervention has a important role in the rehabilitation of the neurologically damaged person.

Although multiple sclerosis is a degenerative and progressive disease, the role of therapeutic aquatic program is reached by maintaining a level of continuous independent life, with patient more confident in hers abilities.

Aquatic program can support full range of motion, offers buoyancy supported environment.

Through this study we observed a significant improvement in the level of fatigue with a potential positive effect on functional abilities.

Discussion

Geigle and Brody (2009) found that „Challanges to the delivery of care to pacients with neuromuscular disorders encourage rehabilitation professionals to explore many approaches to neurorehabilitation".

Campion (2001) revealed that through practical techniques applied in water therapy in the later stages „not too much harm can be done and the patient enjoys doing something a bit different".

„The effect of immersion on the sympathetic nervous system due to the depression of noradrenaline production (O'Hare, 1985) may partially account for the feeling of well-being that patient often report after hydrotherapy treatment" (Campion M. R., 2001).

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Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

Science, Movement and Health, Vol. XIII, ISSUE 2, 2013
June 2013, 13 (2), 103-110

Original Article

MOTOR ABILITIES IN HUMANS FROM BERNSTEIN'S AND FLEISHMAN'S PERSPECTIVE

WACŁAW PETRYŃSKI[1] , MIROSŁAW SZYNDERA[2]

Motto

A theory is a kind of code that transforms complicated „messages" from nature into much simpler ones.
J. Cohen, I. Stewart

Abstract

The basic goal of science is to produce the predictability that enables intentional shaping of environment and efficacious influence the future events. To achieve this goal, three methods of information processing may be adopted: induction, abduction and deduction. The former bases on observation of simple cause-effect chains and the premise that the same causes will evoke the same results. It enables production of predictability "rooted" in reality. Abduction includes abstract processing of the observed reality and creation of generalized theories. Theory enables production of predictability "rooted" in formal representations of reality (and not in sensory experiences) by means of deduction. In motor science, being probably the greatest challenge to the whole contemporary science, production of predictability is especially difficult. The elementary conditions for performing any motor act make the motor abilities. They may be identified either experimentally, or theoretically. The former way, basing on superficial parameters of motor performances, is being initiated by E.A. Fleishman. The latter, founded on neurophysiological and physiological rationale, has been developed by N.A. Bernstein. In the paper both these approaches of identifying and defining particular motor abilities have been presented with special emphasis on the latter.
Key words: motor ability, motor performance, motor science.

Introduction

The basic task of science is to create the predictability. This was aptly expressed by founder of positivism, A. Comte, who stated "*savoir pour prévoir afin de pouvoir"* (Comte, 1852, p. 91). In this adage "*to know*" means the abstract representation in human mind of the world image, i.e. objects, phenomena and processes. "*To anticipate*" needs perception of time as a factor determining sequence of events in the temporal scale that reaches beyond direct availability by sense organs; thus, it has to be abstract.

The future events are burdened with much uncertainty, so the anticipation is nearly always of probabilistic nature [Feigenberg, 2008]. Accordingly, the process of developing the predictability has to go far beyond the bases determined by positivist or behaviourist paradigms. The main task of science is to build predictability, and this is why – as it aptly stated M. Heller – "*the science sees the world through theories*" [Heller, 2011, p. 44]. So, to achieve a scientific predictability it is necessary to create its basis, i.e. abstract theory.

The positivist and behaviourist paradigms were based on so called "real facts". However, A. Einstein remarked that already at the level of sensory experiences an image of reality becomes somehow distorted because of specificity of human sense organs [Einstein, 1936]. So, the bases of perception are not the facts, but their sensory representations that may be termed "afferentations". Moreover, it is worth noticing that the afferentations always include a share of subjective interpretation; hence, there is no something like "objective fact" or "bare fact". Nevertheless, just the afferentations make a basis for creation of more and more abstract representations of reality in individual's mind, finally leading to creation of a hypothesis, from which may originate the highest advanced product of science i.e. theory. Such a series of representations of increasing "abstractness" might be termed "Einstein's spiral" (figure 1). Figure 1. Reality and abstraction in information processing in humans – the Einstein's spiral.It is to be emphasized that "*the development of science is a creative process, so the complete elimination of subjective elements from it is not possible*" (Heller, 2011, p. 82). Accordingly, the abstract representation of reality, being the fundamentals of theory creation, may take various shapes and it results – all the more – with different theories basing on the same facts. This was expressed by R. Schmidt as follows:

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Received 15.01.2013 / Accepted 20.05.2012

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengage Learning, Cabell's Directories

> *Since laws are the product of human creativity, different laws can be formulated by two different individuals who are examining the same observations. Laws do not automatically spring forth from the facts (...)* (Schmidt, 1988, p. 29).

More general is the statement by P. Lenartowicz:

> *The "science" is a historically variable, rough vision of reality, connected not only with observation and researching the Nature itself, but also with some historical philosophical tendencies* (Lenartowicz, 2010, p. 39).

Consequently, according to nonlinear theory of science evolution (Heller, 2011, p. 68), the process of development consists of stationary phases and bifurcation phases. In stationary phase the current paradigm enables achieving valuable results, so the scientists are glad to follow it. However, when such a paradigm becomes infertile, a new way of researches and reasoning has to be developed and this makes the essence of bifurcation phase. Such a bifurcation results with creation of two streams and usually, in a long temporal perspective, only the more effective one survives.

1. Predictability creation methods

Already Aristotle defined two ways of reasoning: inductive and deductive one (Reale, 1990, p. 361). In short, the former bases on facts, and the latter on ideas.

However, one may ask, where the ideas, necessary for deduction, come from? It is to be noted that – roughly – the facts are rooted in reality, whereas the ideas are fully abstract. So, to create the ideas, the observations have to be transformed, expressed in abstract form and generalized, i.e. the theory has to be developed. To achieve this, it is necessary to "ascend" into higher levels of abstraction. According to C.S. Peirce, such a transformation is termed "abduction" [Harris, Hoover, 1980; Sowa, 1990; Sowa, Majumdar, 2003]. The relations between induction, abduction and deduction are presented in figure. 2. Induction, abduction and deduction

Accordingly, the following definitions may be formulated:

Induction *– «Information processing consisting in joining the observations into cause-effect chains at the same level of abstraction».*

Deduction *– «Information processing consisting in transformation of abstract, generalized knowledge, translating it into code understandable at "working" level of given task solution and producing a pattern of such a solution realizable in practice».*

Abduction *– «The process of reasoning including transformation of perceived reality into more abstract form and generalizing the idea obtained in such a way».*

Accordingly, the **induction** may be regarded as intellectual operation at low levels of Einstein's spiral, where only simple cause-effect connections may be discovered; the **abduction** – as risky climbing up it, towards the elusive and unambiguous regions where the scientific conclusions and hypotheses may be invented; and the **deduction** – as descending down the Einstein's spiral, from the regions of theories, to the sphere of reality, where the (possible) usefulness of abstract theories – measure of which is the highly practical predictability – is being observed (or not). It is worth noticing that the bottom of Einstein's spiral is intellectually "safe" – so, just this region is beloved by so called "empirical sciences" – but enable only extensive development of science. On the other hand, the peak of the spiral is intellectually quite risky, but only here the real progress may arise. Paradoxically enough, only creation of formal representations and then processing them at a level of higher abstraction enables unveiling such phenomena and processes which are not detectable at the level of direct observation. A. Einstein wrote:

I have learned something else from the theory of gravitation: no collection of empirical facts however comprehensive can ever lead to the setting up of such complicated equations. A theory can be tested (not proved! – WP) *by experience, but there is no way from experience to the construction of a theory. Equations of such complexity as are the equations of the gravitational field can be found only through the discovery of a logically simple mathematical condition that determines the equations completely or almost completely*. (Einstein, 1996, p. 85).

Similar idea expressed R. Dawkins, who wrote:

Careful inference can be more reliable than "actual observation", however strongly our intuition protests at admitting it [Dawkins, 2009, p. 15].

Accordingly, in motor science, dealing with probably most challenging issues in whole contemporary science, the "new, original experimental data" cannot any longer result with valuable discoveries "by themselves".

2. Inductive paradigm in motor abilities identification in humans; The Fleishman's legacy

At first let us define the term "motor ability" as follows:

> ***Motor ability – «****the specific current primeval potentiality of using the biological energetic and informational resources by a living being in order to bring about desirable physical phenomena and/or processes in the environment».*

Here it is to be emphasized that the term "motor ability" is somewhat misleading, because even in the most primitive of them, i.e. the strength, also the informational components make its inseparable parts.

The empirical method enables adoption of induction only. Consequently, it may give rise to a THEORY THAT (it has been observed **that**...). It bases on observations and determines the superficial associations of causes and effects (at the bottom of

Einstein's spiral), but it lacks in deep theoretical reflection (at the peak of Einstein's spiral). Such a "theory" – termed by R. Dawkins "theorum" – enables prediction only in the field of knowledge acquired empirically; it might be compared to mathematical interpolation. The theory THAT might be identified with what G. Gigerenzer termed "surrogate for theory" [Gigerenzer, 2009].

The inductive method of motor abilities identification might be associated with works by E.A. Fleishman [Schmidt, Wrisberg, 2008; Schmidt, Lee, 2011]. He adopted statistical factor analysis in the study of perceptual-motor abilities. R.A. Schmidt and C.A. Wrisberg wrote:

> *So far, scientists have identified around 20 to 30 cognitive and motor abilities, and they anticipate discovering more in the future* (Schmidt & Wrisberg, 2008, p. 165).

While looking at figure 2 one learns what is the most important trait of this way of research. Whole the process of induction happens close to reality (as a rule, at the level not higher than that defined by arithmetic average, standard deviation or correlation coefficient). So, it is quite immune to false interpretations, because of close relations to "hard facts". On the other hand, such a way of reasoning it is quite immune to any interpretations at all, so it makes no basis for generalizations and thus developing the universal theories. A really creative process needs more abstract (and intellectually more risky) information processing and even change of information modality (e.g. construction of mathematical model).

Statistics eliminates some observational noise and makes the image of reality more sharp, indeed, but – unfortunately – it does not explain "by itself", what namely such a sharpened image presents. So, Schmidt and Lee wrote:

> *Fleishman's work leaves a legacy for future efforts on solving problems of prediction*. (Schmidt, Lee, 2011, p. 309).

It is worth noticing that they wrote not about "*solving problems of prediction*", but about "*future efforts on solving problems of prediction*". By now, this stream of researching has no significant successes and evidently cannot make a reliable basis for "strong" predictability. Schmidt and Wrisberg wrote:

> *Thus it appears that predicting future performance on the basis of people's abilities alone is, at best, an imperfect science* (Schmidt, Wrisberg, 2008, p. 182).

3. Abductive paradigm in motor abilities identification in humans; The Bernstein's ladder

The abductive method enables more universal generalizations than the inductive method, and supports formulation of a THEORY BECAUSE. It takes the real facts, at low part of Einstein's spiral, then forms the abstract premises, and creates the abstract mechanisms, at high part of Einstein's spiral, which produce the model relations between causes and effects (it has been achieved a given effect, **because**...). Such a theory enables prediction also outside the field of knowledge acquired empirically; it might be compared to mathematical extrapolation.

The abductive way of motor abilities categorization might be traced in the works by N.A. Bernstein (Bernstein, 1947; Bernstein, 1991; Bernstein, 1996). He followed the evolution of vertebrates and joined the development of their central nervous system (CNS) and movement potentialities. So, in this case the rationale was not a superficial observation, supported by statistical calculations, but the evolving structure of the CNS. At this point the inductive method of reasoning would be infertile, so it became necessary to apply the abduction.

The abduction is no doubt intellectually riskier than induction because the conclusions association with reality is indirect. Nevertheless, it is the only way for creation of theories BECAUSE. As a matter of fact, only such a mental structure deserves the title of genuine theory. However, to develop a theory BECAUSE it is necessary not only to discover the superficial regularities, but also to figure out the mechanisms underlying them

Summing up, the "prediction giving mental construct" based on induction R. Dawkins termed "**theorum**"; the one based on abduction – "**theory**"; and the one completely detached from reality (e.g. of purely mathematical nature) – "**theorem**.In this paper, the basis for abduction makes the five-level Bernstein's pattern of motor control in humans. It bases on anatomical and functional division of the central nervous system. Level A controls muscle tonus and level B – muscle synergies. Both they are being controlled by sub-cortical structures.Level C is divided into two sub-levels: C1 and C2. The former controls the movement of a whole body in environment (great motoricity), whereas the latter manages the precise movements of working organs and other objects (small motoricity). C-level makes a specific bridge between sub-cortical and cortical control centres, because C1 level is being regulated by sub-cortical centres, whereas the C2 – by cortical ones.Two highest levels, D and E, are fully cortical and purely intellectual, i.e. they are not directly "connected" to sensory organs. The former manages the real motor programmes embedded in "stiff" time-space continuum, whereas the latter deals with fantastic, often not realizable representations of motor performances enveloped in "flexible" time-space continuum.The A, B and C levels may be termed "sensory levels", because they are somehow connected to reality perceivable by sense organs. The A level reacts to stimuli from inside the organism. The higher B and C levels make "sensory gates" to environment: the former a "contact gate", the latter a "remote gate". The D and E levels have no their "own" sense organs and they may influence the lower ones only by the agency of memory, i.e. abstract representations of reality.

The simplified diagram of motor control system in humans is shown in figure 3.The simplified diagram of information processing paths in human movements' management system; the codes' ladder.

The original theory by Bernstein bases on evolutionary and neurophysiological data, so it is too complicated to be adopted in practice in its "rough" form. In the course of evolution, as a result of encephalization, the motor functions of particular elements of the CNS become more and more "fuzzy" distributed among spinal cord, cerebellum, basal ganglia and cortex. Thus, the problem, to what extent say, globus pallidus is responsible for this or that part of a human motor operation may be compared to the question, to what extent the exhaust valve in third cylinder contributes to maximum speed of a car. Accordingly, on the basis of Bernstein's theory much simpler (and more abstract) structure has to be developed to enable creation of a theory that might turn to be useful in practice. In this paper such an intellectual structure includes only two elements "distilled" from Bernstein's theory and coupled with particular Bernstein's levels, i.e. the codes varieties and the spatial-temporal dimensionality specific to particular levels [Petryński, 2008; Petryński, 2010]. Both these factors determine the potentialities of motor performance control. The sequence of codes may be termed the "**codes ladder**" (CL). It has been shown in the middle column in figure 3.The CL seems to be a promising base for building a THEORY BECAUSE concerning human motor behaviour.

3.1. Codes' ladder; time as events' ordering factor

The potentialities of information processing at particular "rungs" of the CL determine the class of motor and intellectual behaviour being controlled at each of the levels.At A-level muscle tonus may control one-dimensional muscle contraction. While taking into account the specificity of motor units action in a skeletal muscle (**all or nothing**), the time function is very simple: now-not now. At "sensory side" of A-level there are intrinsic stimuli, and the information processing capabilities of the code applied at this level enable the control of the intensity of muscle contraction, i.e. the strength at "action side".At B-level muscle synergy controls the two-dimensional joint bend and has to synchronize the action of at least two muscles: extensor and flexor. Here necessary is the more complex synchronization of type: **this one earlier – that one later**. At "sensory side" of B-level one may place the contact stimuli (including inertial ones, perceived as "apparent contact stimuli"), whereas at "action side" of it – the control of speed.At C-level an organism has to control intricate, three-dimensional net of joint bends. The three-dimensional space makes the environment where the events happen, so it cannot be separated from the time. Here a living being comes across time-space continuum. However, the time is being perceived only to the extent limited by sense organs capabilities (in humans mainly vision). Accordingly, one should not speak about four-dimensional time-space continuum, but about "three and fraction-dimensional" C-level environment.The division of C-level into two sub-levels, C1 and C2, enables differentiation and identifying of two motor abilities associated with this level. The C1 whole body movements may be described as "agility", whereas the C2 working organs movements – as "dexterity".Summing up, at "sensory side" of C-level one may place the remote stimuli, whereas at "action side" of it – the control of complex movements structure in space along with its proper timing.In the CL the C-level is the highest one connected directly to reality by means of sensory organs. Here very important is also ability to join sensory inputs coming from various sensory organs to create a complete image of reality. For instance, a snake is able to use only one sensory modality at once, whereas a cat may use at the same time stimuli of various modality to recognize the environment [Gärdenfors, 2003, p. 39].The sequence of three-dimensional nets of joint bends constituting a complex motor performance at D-level is commonly termed "motor programme". It needs designing of a performance reaching into the future beyond the limits set by sensory organs; accordingly, they are not directly useful at this level. Here it becomes necessary to enter the region of abstraction. The price that has to be paid for extending the temporal scale far into past and far into future is switching off the sensory experiences. So, employing the abstract representations instead of sensory perceptions enables using full four-dimensional time-space continuum. It is to be emphasized that it is fully abstract, i.e. the D-level has no its "own" sensory organs. The motor programmes are representations of real (and usually realizable) motor performances, so they have to take into account real conditions. At this level the time-space continuum makes a "stiff frame" for events being programmed. This "stiff frame" mirrors the reality truly, and embedding realizable performances in it is termed "common reason". Here the ability being controlled may be termed "expertise".

The highest E-level is also of fully abstract nature. However, here the "stiff" is the event, and "flexible" is the time-space continuum. The ability being controlled at this level – sometimes not constrained by reality – may be termed "invention" or "fantasy".Neither D-level, nor E-level has its "own" sensory organs, so the only "fuel" for information processing at both of them is an abstract representation of reality.The E-level with it "rubber time-space dimensionality" with "rigid" events embedded in it cannot control any real motor operation, even indirectly. The D-level, with realizable motor programme, firmly embedded in reality, with "flexible" events that have to be adjusted to it, may indirectly control even a very complex motor operation. However, the highest level able to control directly any real motor activity is the C-level. Otherwise, it is fascinating level. According to Bernstein, from the neurophysiological and evolutionary perspective, in humans just here one may

observe the "evolution at work", i.e. the process of transferring the motor control functions from the sub-cortical to cortical CNS structures. From the point of view of information processing its appearance in the course of evolution may be compared to Copernican revolution. At A (intrinsic) and B (tactile) levels the one's own organism was the whole universe for a living being. Along with appearance of the telereceptors, specific to C-level, the one's own body may be perceived as an element of much more extensive environment. A very important transformation of time perception happened at C-level, too.The visual experience is the reality representation which lasts only as long as a stimulus that evokes it. The word is fully resistive to time lapse. Somewhere in between there is what psychologists termed "object permanence". P. Gärdenfors described it as follows:

The cat has object permanence and can therefore predict that a mouse that runs under one side of an armchair will come out the other side. A snake could never manage that. The cat can "think" of the mouse even when it is receiving no signals from its senses (...) [Gärdenfors, p. 39].

Summing up, A-level may be associated with one-dimensional muscle contraction and time perception "now-not now"; B-level – with two-dimensional muscle synergy and time perception "flexor first-extensor later"; C-level – with three-dimensional agility and/or dexterity and time perception at the level of object permanence (i.e. three-and-fraction dimensionality of time-space continuum); D-level – with full, rigid time-space continuum, completely detached from sensory experiences; and, finally, E-level – with full, flexible time-space continuum also completely detached from sensory experiences.

3.2. Codes' ladder; time as duration measure

The other function of time, as a duration measure, is by far less complicated, even boring. Because of fatigue, each of the already listed abilities may be executed in a limited period of time only that determines a specific kind of **endurance**. Accordingly, one may distinguish:

- At A-level – strength endurance,
- At B-level – speed endurance,
- At C-level – agility/dexterity endurance,
- At D-level – expertise endurance (ability to design realizable, goal-aimed motor programmes),
- At E-level – invention endurance (ability to invent fantastic performance, sometimes bordering on daydreaming).

4. Final remarks

As shown in this paper, the CL makes rationale for the motor abilities as presented in table 1. Motor abilities according to codes' ladder.

All the listed abilities make a continuous system. At lower levels it is of sensory-motor nature, whereas the higher ones are more and more "soaked" with intellectual element and at the same time deprived of somatic one. Moreover, in the CL the borders between particular levels – though much more clear and distinctive than those in original Bernstein's theory – are quite fuzzy. Nevertheless, all they make a system in terms of systems theory [Petryński, 2008; Petryński, 2010; Petryński, Feigenberg, 2011].

While comparing the "rationale" resulting from the "Bernstein's paradigm" with the "experimentale" resulting from the "Fleishman's paradigm", it seems very probable that the observable movements' effects, making the basis for Fleishman's categorization, result from mixed Bernstein's abilities. The Bernstein's model is a system in terms of systems theory, so the results of its action are system effects. By definition, they are not predictable on the basis of their components' traits (Jervis, 1997; Morawski, 2005). Summing up, the "Fleishman's paradigm" may probably produce the "theories THAT", whereas the "Bernstein's paradigm" – and the CL concept, resulting from it – is likely to create the "theories BECAUSE".

It is worth noticing that the formulation "not predictable" bases on current state of science. May be some day in the future it will be possible to use the great legacy of contemporary experimenters and "re-forge" it into useful theory. This makes a basis for the "anything goes" principle by philosopher P. Feyerabend [Feyerabend, 2002, p. 23]. Nevertheless, by now the science has no intellectual tools strong enough to solve the problems of motor control in humans basing on statistical data.

The presented considerations are reflected in practice. As a matter of fact, the sport coaches take as a basis the Bernstein's structure rather, and not the Fleishman's one. So, while training athletes they shape usually strength, speed and endurance (Bompa, Haff, 2009), and not the multitude of abilities identified with statistical methods by Fleishmann and his followers.

Contemporary science tends sometimes to make divisions of what in practice is inseparable. Such is the categorization of reality exploration methods into "phenomenological" and "rational". As a matter of fact, the rational (abductive) way of thinking has to correspond somehow to reality – otherwise the subsequent deduction would be probably directed to nowhere – and the phenomenological (inductive) way inevitably has to run at a higher or lower level (rather the latter) of abstraction. Nevertheless, while taking this division (commonly adopted in science) as a rough approximation, one may conclude that the rational (abductive) ordering of motor abilities seems to have greater "predicting power" than that erected on phenomenological (inductive) fundamentals. Accordingly, one may paraphrase the dialogue between Buddha and Shepherd [Kazantzakis, 2008, p. 19] and say:

> *While looking from codes' ladder, we were able to find rationale for only four motor abilities (strength, speed, agility and dexterity), two their extensions into the purely mental sphere (expertise and invention), and*

six kinds of endurance, corresponding to them. And you, Phenomenologist, can experimentally find as much new, original motor abilities as you please!

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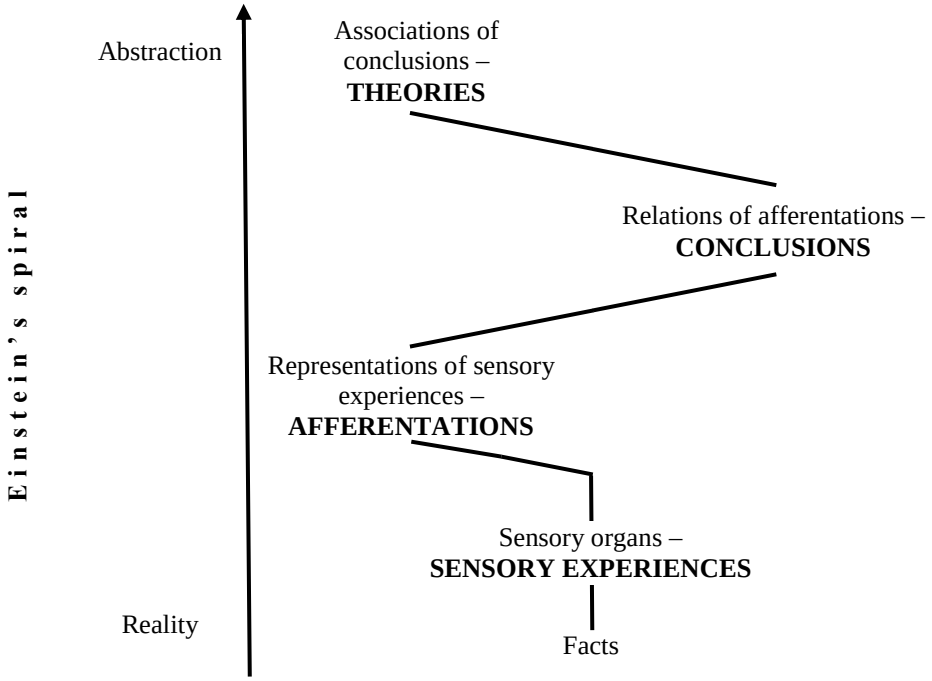

Figure 1. Reality and abstraction in information processing in humans – the Einstein's spiral.

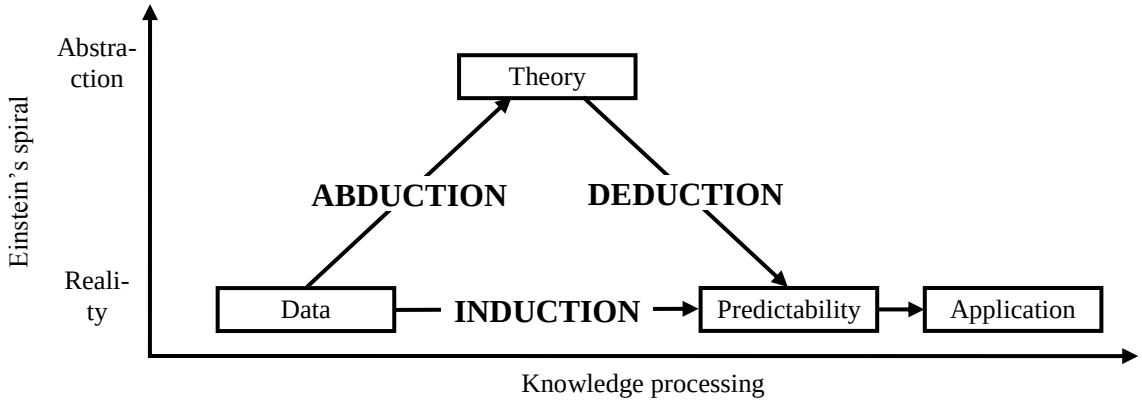

Figure 2. Induction, abduction and deduction.

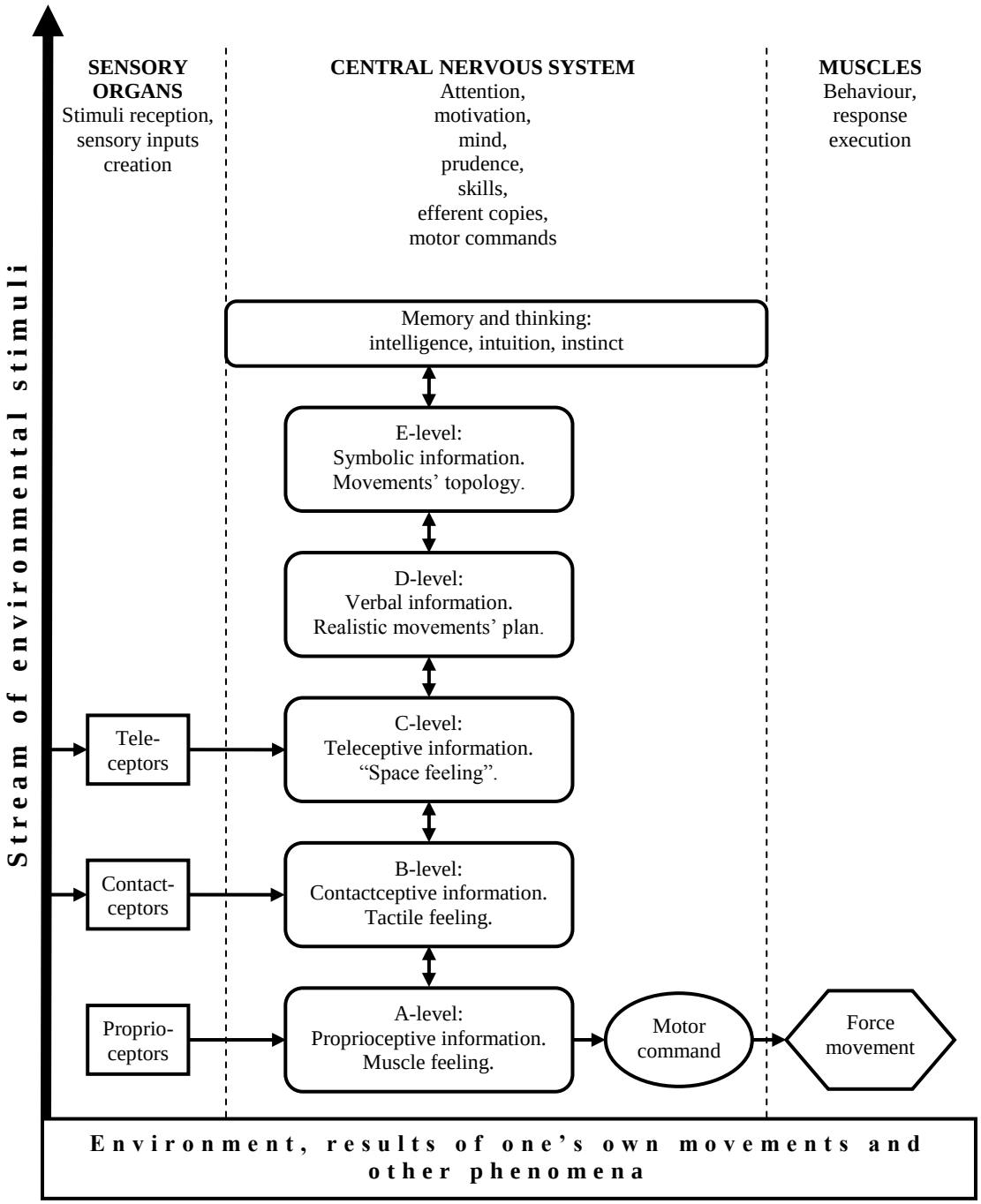

Figure 3. The simplified diagram of information processing paths in human movements' management system; the Bernstein's theory.

Table 1. Motor abilities according to codes' ladder.

Bernstein's level	Time as events' ordering factor	Time as duration measure
E	Invention	Invention endurance
D	Expertise	Expertise endurance
C (C1/C2)	Agility/Dexterity	Agility/dexterity endurance
B	Speed	Speed endurance
A	Strength	Strength endurance

Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIII, ISSUE 2, 2013, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

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