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Iosif M. Feigenberg, Wacław Petryński

Probabilistic prognosis in sport kinetics

Introduction. The efficacy of any human motor performance is limited by three factors: speed of movement, economy of motion and accuracy of movements. The authors hypothesize that all of them are strongly influenced by probabilistic prognosis (PP).

Aim of the study. The main task was proving the assumption that the human behavior is mainly of affective and not reactive nature. So the most important factor influencing the run of sensorimotor events is the PP rather and not the sheer reaction to extrinsic stimuli.

Material and methods. To demonstrate this, five experiments have been carried out. To the examinee the specific light stimuli were presented, to which the suitable choice response should be made. The measurements of reaction time enabled drawing conclusions about importance of the PP.

Results. In all the five experiments the crucial role of PP has been confirmed. As the movement is the only externally observed symptom of human's brain activity, its observation enables building a model of information processing including intelligence, intuition and instinct. All these mechanisms the PP plays the crucial role. In sport, the PP enables clear differentiation between tactics and strategy. According to function of PP, the sport disciplines might be divided into groups three groups: of negligible function of PP (e.g. track-and-field sports), of important function of PP (e.g. combat sports and team games), and of decisive function of PP (e.g. chess, bridge).

Conclusions. The presented experiments confirmed the hypothesis that active behavior of a human is determined by PP rather and not by stimuli received from environment.

Bruno Pena Couto, Sara Andrade Rodrigues, Rafael Soncin Ribeiro, Marcos Daniel Motta Drummond, Barbara Marcelina Ribeiro Rocha, Leszek Antoni Szmuchowski

Effect of strength training with vibration on bilateral force and impulse difference

Aim of the study. The purpose of the present research was to verify the chronic effects of vibration during bilateral strength training on the force and impulse difference among contralateral limbs obtained in the vertical jump.

Material and methods. Fifty-one untrained male volunteered to participate in this study. Volunteers were randomly distributed in 4 groups: the Isometric group ($n = 13$), the 8-Hz group ($n = 13$), the 26-Hz group ($n = 13$) and the Control group ($n = 12$). Volunteers were submitted to 4-week of isometric training (Isometric group), isometric training associated with the application of 8 Hz (8-Hz group) and 26 Hz (26-Hz group) frequency of vibration. This training was done three times a week and made up of 12 maximal voluntary contractions (MVCs) in a semi-squatting position. The Control group did not execute any kind of training and was instructed not to execute any kind of systematic physical activity during the period of the research.

Results. Only the group submitted to 8-Hz vibration frequency had a significant decrease in force ($p = 0,005$) and impulse ($p = 0,017$) difference among contralateral limbs. The 26-Hz frequency, unlike imagined, did not reduce de force ($p = 0,261$) and impulse ($p = 0,925$) difference among contralateral limbs.

Conclusions. In conclusion, exposure to 4-week isometric training, when applying vibrations with frequencies of 8 Hz in the direction of the resultant muscle forces' vector addition, was able to significantly decrease the force and impulse difference between limbs. Conventional isometric training and exposure to vibration frequencies of 26 Hz did not produce the same effects.

Alina Klonova, Juris Klonovs, Andrea Giovanardi, Antonio Cicchella

The sport dance athlete: aerobic-anaerobic capacities and kinematics to improve the performance

Introduction. Little is known about the relationship between physiological and biomechanical parameters of sport dancers. Partners' body contact and posture are important to achieve top results. Knowledge of the links between these aspects could be of help for couples' matching and for improving the dance technique through the assessment of relevant parameters.

Aim of the study. In our study compared with the few previous studies, we found that age and VO_{2max} of the dancers increased from earlier studies, while body height and weight remains similar over the years.

Material and methods. Data on hip alignment, knee kinematics, VO_{2max} , Anaerobic Threshold and Lactate on top level couples were compared with amateur athletes showing that the discriminator factor is the hip kinematics and that no differences exists in physiological parameters.

Results and conclusions. While we found a difference in VO_{2max} between males and females, we didn't find any statistically significant correlation between the athlete position in the world ranking and VO_{2max} , anaerobic threshold and lactate production. VO_{2max} and lactate of nowadays top level dancers are higher than in the past, due to increases in athletic training. Knee kinematics are described for Quickstep, Slow Waltz, Tango, Slow Foxtrot and Viennese Waltz showing great differences in lower limbs action and thus in energy requirements. In conclusion, technical skills are confirmed to be the main influencer of the performance albeit a certain degree of fitness is necessary to sustain long training and competition sessions.

Václav Bunc, Marie Skalská

Effect of walking on body composition and aerobic fitness in non-trained men of middle age

Introduction. An effect of physical exercise may be assessed by level of aerobic fitness (AF) and body composition (BC).

Aim of the work. In this study we verify the moving program based on walking for influence AF, and BC in middle-aged men.

Material and methods. The energy output of 6270 kJ/week was respected by construction of individual intervention moving programs. The exercise intensity at a level of 50 to 70% VO_{2max} (HR ranged from 65 to 90% of HR_{max} or 130–170 beats \cdot min⁻¹) was used in a group of middle aged non-trained men ($n = 68$, age = 45.7 ± 4.2 years, BM = 79.1 ± 7.1 kg, height = 176.3 ± 4.8 , BF = $19.1 \pm 4.3\%$, ECM/BCM = 0.84 ± 0.05 , $VO_{2max} \cdot kg^{-1} = 33.1 \pm 5.3$ ml \cdot kg⁻¹ \cdot min⁻¹). The duration of exercise session ranged from 20 to 50 min, and exercise was performed 3–5 times a week.

Results. The moving programs consisted aerobic walking (min 80% of whole exercise) or cycling (min 10% of total exercise) at the level of 50 to 70% VO_{2max} . The duration of exercise session ranged from 20 to 50 min, and training was performed 3–5 times a week. The time spent at exercise per week ranged between 85–250 min. The energy output of exercise ranged from 4390 kJ to 7780 kJ [mean 6440 (960) kJ] per week. After 5 months of training, slight but significant BM loss [mean 3.5 (1.9) kg; ($p < 0.05$)], FFM increase [mean 2.6 (1.2) kg; ($p < 0.05$)], and BF decrease [mean 3.2 (1.6)%; ($p < 0.05$)] was found. Aerobic fitness increased significantly by 17 (7.3)%; ($p < 0.01$) of initial value. Similarly as VO_{2max} was significantly increased the maximal speed of running by 15 (2.5)%; ($p < 0.01$).

Conclusions. According to above presented data we may conclude that exercise with total energy content of 6270 kJ/week is enough for significant improvement of AF and motor performance by maximal exercise in non-trained subjects.

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Motor fitness in relation to body build and physical activity in 16–18-year-old youth

Aim of the study. The research was designed to find out whether physical activity analyzed along with somatic parameters would prove to be crucial for motor fitness in youth.

Material and methods. The data includes surveys and measurements collected from secondary school students from Głucholazy, aged 16–18. Three hundred and forty-five students, 165 boys and 178 girls, were measured for body height and mass with which the body mass index (BMI) was calculated. Body build was characterized by tissue components in Sheldon's typology modified by Heath and Carter (endomorphism, mesomorphism and ectomorphism). The motor abilities level was tested by means of five fitness trials for strength, speed and coordination and additionally, a questionnaire with questions on the amount of time spent on physical activity and passive activities in free time was used. The data was processed statistically, arithmetic means and standard deviations of traits for age and sex groups were calculated, and the forward stepwise regression method was employed.

Results. In boys the most important factors in the level of particular motor abilities are the muscles of the upper limb, the endomorphy component indicating the body adiposity and massiveness of lower limb bones. The girls' motor fitness correlates significantly with the time spent weekly on physical activity and passive activities after school. Additionally, somatic parameters were selected – the musculature of the upper and lower limbs, body build slenderness and massive bone structure of the upper limbs.

Conclusion. Physical activity manifested itself as an important factor affecting only motor fitness in girls, whilst in boys the level of the selected motor abilities was affected solely by somatic features of the organism and not by the analyzed factors pertaining to lifestyle.

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Place of residence and physical activity as determinants of Polish 6-year-old children's physical fitness

Introduction. The integrity of physical, motor and mental spheres of development determines the necessity of undertaking interdisciplinary research on the assessment of 6-year-old children's preparation for school education. Among numerous factors affecting "a good start" in the new environment the most significant tend to be motor ability and physical activity. The place of residence is also one of the most important determinants.

Aim of the research. The aim of the research was to determine the level of motor abilities in 6-year-old children at the end of their pre-school education. What is more, the influence of a specific environment on 6-year-old child's motor development which also determines the level of school readiness, as well as the level of adaptive skills in the first year of primary school have been examined. Additionally, the following question was asked: "Does spontaneous physical activity based on parents' subjective opinions diversify the level of physical development and motor abilities in 6-year-old children?"

Material and methods. The material is based on the results of research on children born in 2000 and finishing their one-year pre-school education. In total, 33459 children were assessed proportionally in randomly selected samples for each district (approximately 18% of the whole 6-years-old children population attending kindergartens and primary schools in 2007). The measure of physical fitness was taken through EUROFIT Tests of Physical Fitness. The statistical package SPSS 12.0 was applied to analyse the research data. The research material was grouped and statistically analyzed by means of ANOVA – analysis of variance.

Results. Significant disproportions in the level of 6-year-old children's motor abilities between the groups distinguished by the place of residence, and children's physical activity reported by their parents were proved.

Development of spatial and temporal orientation abilities in winter sport competitors

Aim of the study. To determine changes in the level of spatial and temporal orientation in young people practicing winter sports during three-year training process (aged 15–18 years). The attempts were made to answer the following questions: 1. Can intensive physical activity essentially affect the level of spatial and temporal orientation in the athletes? 2. Are prospective changes in its level at the same level for both genders?

Material and methods. The material for the study consisted of the results of continuous research of male and female students from LO ZSMS (Liceum Ogólnokształcące Zespołu Szkół Mistrzostwa Sportowego – Secondary School at the Sport Championship Schools Complex) in Zakopane. Comparison material was collected during parallel investigations of their peers. The results of a complete three-year research were used for analysis of development of spatial and temporal orientation. They were obtained from 33 subjects (12 female and 21 male athletes) in athletic group and 59 subjects (19 female and 40 male non-athletes) in control group. All the persons studied were 15 years old at the initial moment of the measurement. The measurements were taken by means of Piórkowski apparatus with stimulus emission rate 107/min and cross apparatus using free series (without a fixed rhythm) through registration of time (in seconds) of performing tasks (49 impulses) by either of hands.

Results and conclusions. During the three-year period of time, an essential and statistically significant improvement in visual aspect of spatial and temporal orientation was observed in both athletic group and control group. However, the obtained results do not demonstrate the effect of training on improvement in the studied ability. The changes are of a rather developmental background. No significant sexual differences in the level of spatial orientation were observed in either athletes studied or control group throughout the period of the research.

Ryszard Panfil

The effectiveness of cooperation in the team game (pragmatic study of unique cases)

Introduction. The characteristic feature of contemporary team games is the high level of dynamic and situation-based organization of the players' actions, and this gives a new meaning to the collaboration. Particularly in these combinations, in the performance of which two or three players whose actions are absolutely dependent on each other participate, the skill of cooperation plays a leading role. Identification of the determinants of team effectiveness requires evaluation of the level of synchronization and coordination of the players' actions because this has an influence on the revelation of various dimensions and levels of synergies. Therefore, while evaluating the effectiveness of team actions, the players should not be treated as separate entities but as sub-subjects co-contributing to the success of the team as an entity.

Aim of the study. To present the possibility of measurable identification and justification of the importance of synergism in the performance of absolutely interdependent actions in team sport games.

Material and method. Based on the video record, a pragmatic comparative study of player cooperation effectiveness in club teams, including in basketball the Orlando Magic and Los Angeles Lakers and in football FC Barcelona, as well as in national representatives, including Brazil, Russia, and Serbia in volleyball.

Results. The results obtained allowed identification of various dimensions and levels of synergism in the team game including: the effectiveness of collaboration among selected players in the positioning of offensive actions and in creating scoring situations, as well as the effectiveness of performing combinations (variants) in the creation of scoring situations and in the positioning of action in the game.

Conclusions. The results obtained enable formulation of the conclusion that the evaluation of the effectiveness of double and triple collaboration may concern both the dimension of the synergy for example the syner-

gic potential of the players, as well as the level of synergy resulting from the level of synchronization and coordination of actions absolutely dependent on each other. Synergic perception of collaboration effectiveness, accepted by the players, favors the development of added value in the team, for example task consistency and as a consequence also emotional consistency, as well as a new quality for example the combination of actions that we cannot analyze in an individualized dimension.

DISCUSSIONS

Robert Szeklicki

Physical fitness norms in children and adolescents: the physical education approach

The physical fitness development is mentioned as one of main aims, not only among short-term tasks of physical education (supporting of physical fitness development), but also among long-term tasks (lifelong physical fitness education). In both cases, the proper measurement and evaluation of physical fitness level are necessary. While we care strongly about the measurement methods (validity, reliability, standardization etc.), much less of our attention is related with evaluation of received scores of physical fitness.

The main aim of this paper was to emphasize the significance of suitable establishment and interpretation of physical fitness norms in children and adolescents. In consideration of the topic the physical education approach was applied and discussion was divided into four sections:

1. **OBLIGATIONS** or endorsement of physical fitness development as one of the basic aims of physical education.
2. **PROBLEMS** or why proper establishing physical fitness norms for children and adolescents is impossible.
3. **MISTAKES** or what we do wrong in establishing and interpreting norms of physical fitness of children and adolescents.
4. **GOOD EXAMPLES** or how to establish and apply norms of physical fitness in children and adolescents.

The additional aim of the paper was introduction and invitation professionals from various sciences to wide discussion about establishment and interpretation of physical fitness norms in children and adolescents.
