
**PSYCHOMENTALITY IN THE DIALOGUE OF CULTURES: COMPARATIVE ANALYSIS
PERFORMANCE IMPROVEMENT PSYCHOMOTOR ABILITIES OF LOCOMOTION DURING THE
DEVELOPMENT OF SPORTS AND RECREATION OF EAST AND WEST**

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Annotation. *Purpose.* Comparative analysis of the characteristics of development of the Eastern and Western health and fitness systems as basic assumptions preparedness dealing with specific aspects of motor activity. *Material and methods.* The study involved two groups (5 years experience of employment) of 10 people each. Orientation training of the first group - improving the system of Tai Chi Chuan, the second - sports and health systems of the West. *Results.* Established a more positive activating effect of employment on the eastern systems of physical training on the central nervous system. In the first group there is a growing capability musculoskeletal system, the emergence of psychomotor functions, improving the accuracy of the final procedural and motor acts. *Conclusions.* Prolongation of study related aspects of psychomotor preparedness and spatio- temporal parameters of motor acts will reveal structural base optimization dialogue of cultures on the physical and spiritual development of man. While taking into account the direction, tools and techniques to achieve this goal.

Keywords: dialogue, comparative, physical education, health, psychomotor, locomotion, accuracy.

Introduction

Consciously controlled movements can be regarded as certain wholeness, the structure of which is determined by integrative character of mental and physical qualities' manifestation [10]. This principle shall completely be the main one when regarding mental principles of functioning and mastering of health related physical culture systems of East and West. Peculiarity of oriental health related systems is orientation not only on technical side and structural "effectiveness" of movements, but also their compliance with nature and efficiency of combination of a subject's objective perception of all forms of mental reflection, starting from sense and finishing with complex forms of coordinated motion functioning. It is not surprising that in oriental health related physical culture systems, in contrast to western ones, there is no movement, which would not require from subject movements, oriented on practical manifestation of individuality that is achieved by initial orientation on conscious control of movements' coordination.

With different movements of torso, head and limbs, there are determined more than 107 main directions of movements (degrees of freedom), while arms and legs have only by 30 degrees of freedom. In this connection main difficulties in controlling of motor system are: distribution of attention between movement in many joints and links of body and need in their strict coordination; overcoming of great number of degrees of freedom; elasticity of muscular system [3].

We can not but agree with N.A. Bernstein that coordination of movements is nothing but overcoming of excessive degrees of freedom of our organs of movement, i.e. their transformation in controlled systems [1]. And we can add that above mentioned orientation on practical individualization of the mastered movement, permits to avoid "involving" of excessive for the given executor of movements degrees of freedom in mastering process. Just in this context fulfillment of difficult complexes of oriental health related systems is based on controlling of motor system with constant overcoming (to be more exact – not admitting) of excessive degrees of freedom.

As far as all free and controlled human movements, which are fulfilled in space and time with certain straining of supporting motor system are always integral and division of movements in space, time and strength components is conventional [8], then, owing to already mentioned initial principles the result of trainings in oriental systems is high coordination and wholeness of movements.

Constant changing of motion program, when one program is smoothly (without pauses) transfers to other, more complex, instead of overlapping the other is of great importance in constructing of holistic movements and controlling of them in oriental systems. Simultaneous and successive transference is possible, if in central structures, controlling movements, there exist two or several alternating programs instead of one and it is a key mechanism of formation of movements' bio-mechanical structure [7]. That is why, programs of movements are accumulated motion experience, based on mechanism of movements' coordination with its content (integration of the past, present and future).

In organization of coordinated actions several levels of movement's construction function simultaneously, with it, the level, at which the movement is constructed, is leading one and all lower levels are background [1]. However, in the process of motion skill's formation by constant repetition of movement with application of different specific physical exercises from oriental systems, there was created inner image of movement and "recruiting" of ready motion blocks in one "phone" base (as per N.A. Bernstein – set of phones, the scope of which influences on motion abilities and even skills). Recruited ready blocks permit quickly, on the base of positive transferring, lead to qualitative perfection – "Jumps" – with coordinated controlling of complex movements and with development of human motion abilities.

In this aspect it is necessary to specify conceptual apparatus, concerning definitions, which characterize procedural and final accuracy of fulfilled movements. *Procedural accuracy* is connected with accuracy of movements in the process of their fulfillment: evaluation of measuring, differentiation and exact reproduction of programmed parameters of movements (time, space, time-space and strength), *Final accuracy* is manifested in achieving of certain result, which is ensured by many direct and feedback links and by high preciseness of inter muscular and joints' coordination.

When making analysis, it is important to consider that some indicators of accuracy are not always coordinated between each other. For example, ability to differentiate movements' amplitude at good level can coincide with relatively bad reproducibility, i.e. with ability to repeat the set parameter.

The level of coincidence in controlling of movements, considering procedural and final accuracy, is determined by level of psycho-motor abilities, which participate in fulfillment of complex coordinated movements. It is not surprising that K.K. Platonov refers to sphere of psycho-motor human system rather a lot of factors (practically everything): from different kinds of sensorimotor human responses to complex coordinated and multi parametrical movements, in structure of which their space, time and strength components are presented as an integrity [8].

Psycho-motor abilities, in opinion of V.V. Klimenko, ensure continuous transitions of the reflected content in reflection and vice versa: reflection – in real movement. Psycho-motor level is rather complex mechanism of functioning; it includes stimulating and executive regulations as a single mechanism. The first is based on many forces, which stimulate to actions and behavior. The second realizes intentions, satisfies demands and facilitates achievement of targets [4].

Human psycho-motor levels are complexly organized cognitive-regulatory systems, which include motivational, functional and operational components in their unity. It is obvious that accuracy, intensity and effectiveness of movements' control depend on and are substantially determined by functioning of such mental processes as sensing and perception. On the one hand it is connected with development of human visual, motion and other senses and, on the other hand, with acquiring of skill to control actions, precisely differentiate them by parameters of space, time and intensity of muscular efforts [10, 12-15].

And still, in spite of importance and urgency of the problem of our research, specific features of psycho-motor abilities' development as well as development to procedural and final accuracy of movements of oriental and western physical cultures have not been studied sufficiently yet.

The conducted in 2011-2012 in Byelorussia, China, Russia and Ukraine monitoring of persons, who master definite sport and physical culture systems of East and West (N=1876) permitted to understand urgency and importance of specialized, tool-based research of theses systems' influence on improvement of psycho-motor abilities and locomotion's accuracy, because there were found substantial differences in the trainees' readiness to restoration of motion skills (see table 1; see also [9]).

Table 1
Self-estimation of trainees' readiness to mastering of motion acts and restoration of lost skills n= 1876

Indicator	Trainees	
	By oriental systems	By western systems
<i>Mastering of motion skills</i>		
Psychological self-assertion	3.43	3.24
Quickness of mastering of actions' automatism	3.52	3.33
Quickness of mastering of movements' variability	3.57	3.22
<i>Ability to restoration after long breaks between trainings</i>		
Spontaneous character of skills	3.82	3.66
Variability of movements	3.74	3.44
Endurance	3.24	3.29
Sport form in general	3.51	3.37

The work has been fulfilled as per plan of scientific & research works of department of physical culture theory and methodic of educational establishment "Byelorussian state pedagogic university, named after Maxim Tank".

Purpose, tasks of the work, material and methods

The purpose of the work is studying of psycho-motor abilities and space-time parameters of movements, which are characterized by procedural and final accuracy of their fulfillment in tasks with complex motion structure.

The methods and organization of the research

The researches were carried out on the base of state university “RNPC of neurology and neuro-surgery” at laboratory of equilibrium studies in period from December 2013 to January 2013. The research covered persons, who specialized in health-related system thai-chi-chuan for 5 years (n=10) and those, who specialized in health related systems of West (n=12).

In the course of research we used the following methods: analysis and generalization of literature sources; testing of psycho-motor abilities with the help of complex computer psycho-diagnostic program «Effecton Studio 2007» [11]. The set of tasks included the following tests (with calculation of 15 indicators):

- sensorimotor responses : simple visual-motor response – response to quick change of color (10 attempts); simple audio-motor response – response to sound irritator (10 attempts); complex visual-motor response – response to one color (yellow) from three variants; response to moving object – accuracy of sensorimotor response to moving object.

- mental cognitive processes: re-switching and distribution of attention “Red-black table” – for certain period of time it is required to close 49 figures on screen (25 red – in progressive order and 24 black in regressive order); scope of attention – it was required to remember location and quantity of appearing objects and point them just after their disappearing; stability of sensor attention – during 3 minutes concentration of attention at appearing of even and odd figures (with even figures it is necessary to press “arrow to the right”, with odd figures – “figures to the left”; stability of attention with deficit of time: during 1 minute it is necessary to trace with mental vision 10 routs and determine their place at finish.

- functional state of nervous-muscular system: tapping-test – evaluation of speed characteristics (maximal frequency of movements), stability of moving system and type of nervous system; preciseness of time sensing – stopping of time interval with object’s moving with one and the same speed.

For determination of procedural and final accuracy we used method of video-detecting and digital transposition of movements «S Motion» [5, 6]. Set of tasks included the following tests (with calculation of 25 indicators):

- procedural accuracy (PA) was evaluated in complexly coordinated segmental locomotion of right and left arms; right and left legs; torso. In initial position – main stance – the tested was equipped with electronic marker on every arm, leg, on torso for every test; this marker moved in frontal plane in respect to monitor with movement of body segments. By signal, the tested fulfilled movements, accurately reproducing trajectory of cursor’s travelling on monitors. In the process of movements it was necessary as close to center as possible to correlate with cursor’s travelling. We calculated: PA min. (mm) – mean minimal distance from electronic marker to center of cursor; PA max (mm) – mean maximal distance from electronic maker to cursor’s center; time of procedural accuracy (sec) – time of electronic marker’s being in circle of travelling cursor.

- final accuracy (FA) was evaluated by complexly coordinated segmental locomotion of right and left arms; right and left legs, torso. In initial position – main stance – the tested was equipped with electronic marker on every arm, leg, on torso for every test; this marker moved in frontal plane in respect to monitor with movement of body segments. By signal, the tested fulfilled movements, accurately reproducing trajectory of cursor’s travelling on monitors. By signal, the tested should have quickly responded to sudden appearance of cursor on monitor screen. In test it was necessary to point electronic marker in the center of suddenly appearing cursor. We calculated: FA (n) – quantity of electronic marker’ missing; time of FA (sec) – time of test’s fulfillment with electronic marker’s hitting the center of appearing cursor.

Comparative analysis of development of *psycho-motor abilities and indicators of procedural and final accuracy of movement* of oriental and western systems’ trainees (see tables 2 and 3) permitted to determine the following:

- Concerning representatives of oriental system, we found 8 statistically confident differences (with $t=2.19-2.51$, $P<0.05$), which characterize level of psycho-motor abilities in comparison with trainees by western system, videlicet: between sensorimotor responses, mental cognitive processes and accuracy of time sensing. This fact was conditioned by activating influence of oriental health related system on central nervous system (CNS). As we see purposeful perfection of complexly coordinated movements on the base of practical orientation on individualization results in statistically significant improvement of practically 2/3 of psycho-motor indicators ($P < 0,05$) with exception of the following: quantity of anticipatory and delaying responses, indicators of dynamic workability and instability of motor system, scope of attention. In our opinion the found unconfident differences, to large extent, were determined genetic specificities of nervous system, which can not be easily corrected. In general, it should be noted that nervous system of representatives of oriental physical culture is characterized by more expressed functional activity, high lability, balance character of nervous processes against the background of higher fitness;

- Sportsmen, trained by oriental system, showed 20 statistically significant differences (13 with $t=2.13-2.83$, $P<0.05$; 7 with $t=3.05-3.58$, $P<0.01$), characterizing procedural and final accuracy of movements in contrast to those who trained by western systems. However, in most cases in all kinds of targeted accuracy we observed substantial differences, except time parameters of procedural accuracy of right and left legs and space indicators of left arm’s and right leg’s final accuracy. This fact witnesses that for people, who master oriental systems time parameter of lower limbs’ procedural accuracy and final accuracy of left arm and right leg are not leading criteria in construction and coordination of body movements and its travelling in space.

Table 2

Indicators of psycho-motor abilities of persons' mastering oriental and western health related physical culture systems

Indicators	Trainees		Differences are confident at P<0.05
	Oriental systems M± m	Western systems M± m	
Simple visual-motor response, m.sec	250.80±8.01	269.50±3.65	yes
Simple audio-motor response, m.sec	192.20±7.86	207.25±2.35	yes
Complex visual-motor response, m.sec	382.40±21.87	434.42±15.54	yes
Response to moving object, m.sec	37.20±7.75	52.17±2.87	yes
Quantity of anticipating responses to moving object, conv. un.	7.20±1.50	7.08±1.48	no
Quantity of delaying responses to moving object, conv. un.	10.00±2.30	10.42±1.66	no
Dynamic workability, conv. un.	396.00±39.34	326.33±27.23	no
Lability of motor system, conv. un.	4.60±0.8	3.92±0.26	no
Preciseness of time sensing, %	74.80±5.88	64.50±2.82	yes
Re-switching and distribution of attention, sec.	198.60±13.39	227.42±7.97	yes
Re-switching and distribution of attention, % of mistakes	0.00	7.75±0.75	yes
Coefficient " Re-switching and distribution of attention", %	2.07±0.13	3.02±0.08	yes
Scope of attention, quantity of objects, conv. un.	8.20±0.49	7.50±0.42	no
Stability of attention, % of correct answers	84.00±5.10	68.33±4.97	yes

Table 3

Indicators of targeted accuracy of people training by oriental and western health related physical culture systems

Indicators	Trainees		Differences are confident at P<0.05	
	Oriental systems M± m	Western systems M± m		
<i>Procedural accuracy</i>				
Right arm	min, mm	8.40±0.40	11.42±0.66	yes
	max, mm	16.00±0.55	23.67±1.34	yes
	Time, sec	13.94±0.38	19.01±1.21	yes
Left arm	min, mm	9.40±0.24	12.50±0.60	yes
	max, mm	18.80±2.18	27.92±1.73	yes
	Time, sec	0.24±0.97	19.93±1.47	yes
Right leg	min, mm	11.00±0.55	13.58±0.92	no
	max, mm	24.20±1.36	31.50±2.07	yes

	Time, sec	23.94±1.66	25.17±1.20	no
Left leg	min, mm	10.60±0.24	14.67±0.94	yes
	max, mm	20.80±0.37	37.58±3.91	yes
	Time, sec	21.30±1.03	26.32±1.52	no
Туловище	min, mm	10.00±0.45	12.75±0.43	yes
	max,	24.80±1.36	30.92±1.38	yes
	Time, sec	19.46±0.17	28.34±1.84	yes
<i>Final accuracy</i>				
Right arm	quantity of missing	2.20±0.73	7.25±1.53	
	Time, sec	30.42±0.23	44.50±2.56	yes
Left arm	quantity of missing	4.40±0.68	8.25±10.31	no
	Time, sec	36.59±1.49	48.24±2.98	yes
Right leg	quantity of missing	7.20±1.16	12.92±2.26	no
	Time, sec	33.92±0.63	50.06±3.25	yes
Left leg	quantity of missing	6.00±0.45	11.83±1.75	yes
	Time, sec	37.26±0.85	49.45±3.59	yes
Torso	quantity of missing	4.40±0.40	7.66±0.99	yes
	Time, sec	36.58±0.69	48.38±3.43	yes

Generalizing the data of comparative analysis, we should note that people, mastering oriental systems of physical culture exceed representatives of western systems by level of psycho-motor sphere's development and it surely influences positively on ability to control and construct new space-time parameters of movements in the aspect of achievement of procedural and final accuracy. This fact is proved by high level of CNS excitation, by speed of excitation's travelling by nervous circuits as well as by anticipation of time of stimuli space position's change and correlation with them of complexly coordinated movements' sensor regulation processes.

Conclusions:

1. Complex approach based on data of social pedagogic monitoring and tool-based researches permit to state that self-appraisals of physical fitness reflect rather exactly situation, concerning trends of formation of locomotion accuracy, determined by tool methods.

2. The present research has shown actual positive activating influence of oriental physical culture trainings on CNS. As a result of regular influence on sensor – motor irritator of oriental systems' representatives, functional abilities of their motor systems develop, psycho-motor functions intensively form, procedural and final accuracies are improved that point at improvement motor programming system. Labile nervous system and nervous processes of high mobility create physiological basis for ensuring of not only external form of movement but also internal structure. Rather high level of nervous system's mobilization (psycho-motor component) is called for ensuring of effectiveness and reliability of fulfillment of highly accurate coordinated movement.

3. The determined peculiarities in development of psycho-motor abilities and indicators of procedural and final accuracy can be regarded as model characteristics of movement's controllability, which shall be considered in practical work of instructors of both oriental and western physical culture systems. Only in this case it is possible to ensure development of psycho-motor sphere and space-time parameters of movement of practical orientation.

4. It is necessary to prolong comparative detail researches of inter-connected aspects of psycho-motor and space-time parameters of movements; procedural and final accuracy of persons, who master oriental and western physical culture systems that will permit to reveal constructive foundations for dialogue of cultures on problems of physical and spiritual perfection, on ways, means and methods for achievement of this purpose.

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