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Theoretical and Methodological Problems of Psychomotor Qualities Formation in Volleyball

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Research considers problems of player's psychomotor qualities formation in modern volleyball, its theoretical and methodological substantiation on the basis of the analysis of sports kind specificity and the basic psychofiziological laws of sportsmen organism. The key part of a practical technique of perfection of sportsmen motor abilities certain formation in training process of time, spatial and force muscular distinctive sensitivity to players of various game roles. The technique of development and perfection of motor qualities of volleyball players is theoretically proved and developed for practical application, its substantive provisions are certain and stated, stages, working toolkit and a quality monitoring of development dynamics of players abilities to differentiate micro intervals of time, efforts and spaces, estimated criteria.

Keywords: volleyball, psychomotor qualities, speed of reaction, distinctive sensitivity.

Introduction

The modern level of development of world sports demands from sportsmen of very high degree of development as separate base physical, technical, tactical and mental qualities, and abilities effectively to integrate them in severe constraints of sports competitions. Thus the sportsman depending on specificity of a sports kind frequently competes in conditions of a rigid limit of time, in situations of reciprocal actions not programmed in advance, at physical contact to the contender, very precisely and flexibly dosing out time, force and spatial parameters of the

movements which efficiency finally determines its result. On a degree of the specified characteristics variation of competitive activity and a significance value each of them separately in achievement of final sports result various kinds of sports can be divided on two groups, essentially differing by character of predefiniteness of sportsmen actions, a programming level all complex of mental and motor activity.

To the first group (Matveev, 2010; Platonov, 1988) it is possible to carry kinds in which sportsman competitive activity is carried out in enough rigid existential and dynamic conditions

with a high programming level, both structures of separate movements, and their connections in complete motor acts (track and field athletics, gymnastics, navigation, shooting, rowing, weightlifting, skis, bicycle, etc.). A various sort tactical actions during wrestling, despite of the specific form in each of these sports kinds, as a rule, rather slightly change kinematic both dynamic parameters and structure of movements. In the second group of sports kinds sportsman movement represent, first of all, reciprocal actions, as at direct contact to the contender (sports game, fencing, combat sports, etc.), and without it (volleyball, tennis, table tennis, badminton). Thus from separate, enough standard elements and the receptions studied, fixed and generated in the certain stereotype on trainings, develop the complete motor act, existential and which dynamic structure is formed directly during wrestling in conditions of a rigid limit of time (sometimes – tenth shares of second) and high mental intensity. In them tactical variability is extremely high, and success of the sportsman or team performance in competitions is determined, how a variety and high quality of performance of separate techniques, and in the speed and reliability of their formation in the reciprocal motor act adequate to a situation (Markov, 2001).

From the specified points of view, among sports kinds of the second group the volleyball takes a special place that is connected with two its basic features. The first – consists that the volleyball is a unique sports kind in which character of contact to a ball, quality and duration of contact with it of the player is regulated that is not present in one sports game. On this parameter the significant share of all game mistakes fixed by judges is necessary. The second feature following from first and allocating volleyball (together with tennis, table tennis and badminton) from the second group of situational sports kinds, consists

in absence of any pause for acceptance of the next, tactical decision corresponding a situation and a choice of the most rational technical action. One of the major on a degree of influence on final sports result is the problem of sportsmen game mistakes which in volleyball is exclusive owing to very big percent, the so-called, «resulting» mistakes at once bringing points to the contender and leading defeat. As a result of last changes of rules by the international federation of volleyball any mistake in each set is a point to the contender.

Especially high level of development is necessary for the successful decision of competitive tasks sensemotor qualities of the sportsman, being a fundamental principle of sports-technical skill. Special value thus development on their basis variable, reliable and automated skills and receptions, and also development of ability to forecasting possible situations, especially on sensemotor and perception levels gets. It is obvious also, that so high requirements to a level of psychomotor development of sportsmen are dictated also with necessity of meeting selection for children's sports (Bril', 1986). Parameters of psychomotor development should take also the important place in complex system of functional diagnostics, especially in those kinds of sports where alongside with a high level of functional preparation it is required thin «muscular sense», advanced «motor memory», high sensemotor functions efficiency. The big influence on a level of development of these qualities the supreme hierarchical levels of mentality of the person (motivation, social status, type of the supreme nervous activity, etc.) (Markov, 2001; Ozerov, 2002; Surkov, 1984).

Specificity of psychomotor actions in volleyball

The volleyball by virtue of some requirements of game rules, features of refereeing, influence of these criteria on result occupies absolutely

unique, not estimated properly, a place among different sports specializations.

First of all, unlike many other things sports (alongside with tennis, table tennis and badminton), it does not suppose the game pauses connected with long possession by a ball by one player or a team. On reciprocal actions the player has the tenth shares of second, unlike football, hockey, basketball and many other things games where the player owning a ball, on game rules can stop, look round, take a ball, etc. This feature, from the point of view of movement's psychophysiology, makes rigid demands to ability of the player to predict character of development of game events. Ability to *антиципации* is integrating all the basic characteristics of touch systems, central nervous system (CNS) in perception and processing of the primary information, speed and quality of separate motor acts. The major reason of many game sportsmen mistakes here lays. The second feature of volleyball (volleyball – a “flying” ball) is that one of the basic kinds of mistakes – contact of a ball with a court (in all sports, except for badminton, field, court, table – working game surfaces). It demands from players of extremely high motivation and selflessness in game actions as well as possible characterizes a necessary internal spirit of players.

Combination of these features form a situation, demanding obligatory performance from first steps of training to volleyball of main principle: «the ball flies – I run». The player can be mistaken, but has no right to stay idle, observing as the ball falls on a court. Attempts to build training by a principle: «look – think, and then operate», are doomed to failure. Not casually even at the highest level it is possible to see, how players see off a sight a falling ball, «calculating» a point of its falling, instead of an obligatory conditional motor reflex on a flying ball (Markov, 2001). From the point of view of psychophysiology

such situation demands development at the natural gifted to given action sportsman absolutely special, high motivation psychomotor structure of game actions. Obviously, what exactly in these qualities unique world «stars» of volleyball especially strongly differ from simply good and, especially, ordinary players. And, at last, the third feature of volleyball which are absolutely not having analogues in any other sports kinds are extremely rigid requirements to character of the player contact with a ball (throws, captures, double contacts). Any of sports with a subject (football, hockey, handball, rugby, water polo, tennis, badminton, baseball, golf, etc.), any of track and field athletics kinds (throwing, pole vaults) does not limit character of the sportsman interaction with these subjects on time, by the form and structure of actions.

In view of a known share of subjectivity, and also the productivity of mistakes mentioned earlier strengthening intensity, it is easy to present, what thin muscular differentiations on time, efforts, kinematic characteristics provide correct psychomotor acts (service, service reception, false hit in attack). Important as well that on a set of the technical actions separate, original and not integrated with each other (service, service reception, top set, defense, block, attack, etc.) At rigid requirements to character of contact to a ball and in conditions of time deficiency, volleyball – undoubtedly one of the most complicated sports kinds. It is enough these features to recognize complexity and the highest level of the requirements shown, both to natural endowments of the sportsman, and to its psychomotor luggage, harmonious development of separate major motor qualities (in some cases antagonistic: speed – endurance, force – flexibility, force – thin muscular sensations and so forth).

The task at the given stage consists in that, being based on the basic works of sports

psychophysiology and according to the common dialectics and logic of scientific knowledge, to choose a little bit enough simple, reliably tested physiological processes and the parameters underlying technical skill of the sportsman and defining his class. Considering high specific requirements of a sports kind to accuracy of technical and tactical actions, it is logical to assume, that they are provided with mechanisms of touch distinction, a spatial, time and dynamic differentiation of movements in spheres visual, proprioception and vestibular sensitivity. Efficiency of game actions will be determined by a level of mental processes of sensation and perception with development in sportsmen distinctness of visual, motor and other sensations, purchasing of skills thin to differentiate actions on time, space and efforts. Distinctive sensitivity these parameters of movements forms a physiological basis sensomotor cultures of the sportsman.

The system organization of psychomotor functions

Psychomotor processes represent objective perception the person of all forms of mental reflection, since simple sensations and finishing complex forms of intellectual activity. Psychomotorik of sports activity differs variety of separate motor acts and an originality of their existential organization, especially anticipation, as integrator of psychomotor actions. Thus psychophysiology analysis of the person movements (and at the sportsman mainly) should start with the purpose these movements which in aggregate with it form structure of motor action (Anokhin, 1968; Bernshtein, 1947).

Initial concepts and definitions

Sports motor activity, from the point of view of psychophysiology, consists, first of all, in specific in each of sports kinds of the spatial-

time organization of psychomotor acts. One of the major substructures of such organization is diverse kinds sensemotor reactions: simple and complex sensemotor reactions, sensemotor coordination. In them it is possible to allocate 3 cores, the typical mental act:

- The touch moment: process of detection and perception of stimulus, motor reaction on which is the purpose of actions;
- The central moment: processes of processing apprehended with distinction, an estimation and a choice of those or other stimulus;
- The motor moment: the processes, determining has begun movements.

On complexity of the central moment simple and complex reactions differ. Simple sensemotor reaction is probably prompt reply in advance known simple single movement on suddenly appearing, but in advance known signal. Speed of simple reaction is estimated or on latent time of reaction from the moment of occurrence of a signal prior to the beginning of reciprocal action, or on common time of reaction. Complex sensemotor reaction depending on character of the central moment can be:

- Reaction of a choice if necessary differentiation of the necessary motor answer from of some possible;
- Reaction of distinction if on one of signals it is necessary to do the certain movement, and on others of any movement to make it is not necessary;
- Reaction of switching at change of definiteness of semantic communication of stimulus and possible motor acts.

It is necessary to add this traditional classification, in our opinion, still with reaction of a delay. The essence of this reaction consists that it should be not so much fast, how many duly, that is separated from stimulus precisely measured and differentiated interval of time.

The originality of such reaction consists also that the contents of the central moment, except for a thin differentiation of a time interval, can be simple and complex enough, similar above considered sensemotor reactions. In volleyball such situations are very widespread and represent the greatest complexity.

Hierarchy of psychomotor functioning levels

In a basis of modern representations about the organization and management of psychomotor actions position about their multipurpose and hierarchical structure (Bernshtein, 1947) lays.

The supreme level «E» operates a semantic part of the motor act. It is connected with intellectual functions of the person and plays a role of a leading level.

The level of subject action «Д» serves the decision of a semantic task of movement, drawing up of the connected circuits of movement, movement with a subject. It covers as the leader almost all semantic movements and as a background level provides «supreme automatism».

The level «C» – one of the cores in a class of psychomotor movements with their differentiation, provides moving a body to space and time. It plays the important role in all kinds локомоций, ballistic movements, at an extensive background role in semantic movements.

The level «B» provides a direct control of muscular synergies, struggle against jet forces, creation of dynamically steady movement. It plays a role of rather extensive background level.

The level «A» narrowly operates the organization of a muscular tone and degree of a muscle or muscles group excitability. It is even less connected with a semantic program part of psychomotor action and concerns to a background level.

From the presented scheme follows, that:

- The organization, programming and management of any psychomotor act occurs on different floors CNS hierarchically;
- Hierarchically presented levels constantly cooperate by a principle of a dynamic subordination.

Such organization of management by psychomotor actions provides a variety of auxiliary touch corrections alongside with the realized leading semantic corrections. They automatically provide to the motor act stability of basic parts of a body, «muscular smoothness» on all parts of a kinematic circuit, profitability of power inputs at a level of optimum technics of movements, spatial and time accuracy, etc.

In a number of situational sports kinds (including, first of all, in volleyball) where the basic part of psychomotor actions in conditions of a rigid limit of time is carried out «automatically, unconsciously» such organization of management is unique. The higher class volleyball teams have more percent of such background operating corrections in sportsmen actions. Accordingly and the contents of training process should be directed on development as possible for a lot of automatically correct actions, switchings from one action to another, fixing of absolutely exact starting positions, forecasting of actions of the opponent in standard situations. It is very important, that this «hierarchy» penetrated all long-term preparation of the player.

Mechanisms of psychomotor actions management

The central part of structure of sports activity (except for motives) the psychomotor action defined by its nearest regulator – acts as the purpose. Motivation activity is considered as the system organization in which psychomotor

actions join as a subsystem. Characterizing neurophysiology mechanisms of a functional motor activity control system of the person, allocate (Anokhin, 1968) its mainframes: afferent synthesis, decision-making, formation of program actions, performances and receptions of result, a feedback. Afferent synthesis covers: the sense organs which are finding out starting signals, processing in CNS starting signals and formation of complete perception of conditions, motivation, long-term and operative memory on which the identification and identification of the starting information is based. The player, visually perceiving hit of the opponent on a ball, in advance prepares for reception, searches for the best way of reaction. Before decision-making he has time to compare starting afferentation to images of memory and conditions (distance up to a ball, a trajectory and speed of its flight, an arrangement of the players and the opponent) and operates according to a situation, bringing corrections at a deviation from standard action. Final result afferent synthesis is initial preparation of the proved decision.

After decision-making the program, ways of execution and reception of the necessary result are formed, means and ways of the decision of motor action are selected. Programming of motor actions as dynamic process provides parameters of movements and the touch control over a course of their realization. The big role in the program formation is played with processes anticipate, that is abilities of a brain, «looking forward» to extrapolate the future (Surkov, 1982). Anticipatory planning in volleyball, reactions of players to a moving ball and of the opponent are constantly operating factor of formation of emergency and alternative programs of action. This prediction cannot be absolute and has likelihood character. The big role in such likelihood programming is played with the last experience of the player,

rich «library» of the standard actions fulfilled in training process and fixed in a competitive practice.

Distinctive sensitivity of movements

Discernability in modern understanding (Kossov, 1973; Ozerov, 2002) is the certain distinctive characteristic of process of the distinction, dated to the certain degree of distinction in objects. It is important the perception factor, significantly defining an originality, qualitative and quantitative laws of all sensor sportsman functions. Accuracy, intensity and a management efficiency movements depend and are essentially determined by a functioning level of such mental processes, as sensation and perception. For this purpose, on the one hand, is necessary development of distinctness of visual, motor and other sensations, and with another, purchase of skills to carry out the control over actions, thin to differentiate them on parameters of space, time and intensity of muscular efforts. The same base qualities underlie diverse forms sensor-perception anticipation game courses in external space, all reactions of the sportsman to a moving ball and players movement. There is also a close connection of the basic psychomotor parameters with stability to stress-factors, high diagnostic sensitivity of mental tolerance critical situations.

And, at last, high forecast reliability of psychomotor tests for an estimation of motor endowments at children's and youthful age, at selection makes a task in view especially actual. From this follows, that the highest results in sports are achieved by sportsmen, not only conceiving, but also is thin feeling, possessing high sensor-perception culture. In a basis of a high technical level, productivity and reliability of actions in volleyball distinctive sensitivity of movement parameters lays. The cores are three

kinds of distinctive sensitivity: on time, spatial and on effort.

Distinctive sensitivity time

Performance of complex technical actions in volleyball in conditions of rigid deficiency of time demands much of the sportsman abilities quickly to perceive by means of analyzers primary stimulus, operatively to process this information and to make a decision quickly, in due time and precisely to carry out actually motor part of the motor act. One of the major characteristics of any sportsman motor action is time. Mastering by sportsmen of an optimum rhythm and rate of movements, skill to differentiate sensomotor reaction is impossible without aggravated "time sense", abilities is thin to perceive intervals, to distribute the actions during strictly set time.

The theoretical substantiation of a development technique of time distinctive sensitivity is based on enough well-known positions of human physiology. I.M. Sechenov (1952) specified on «movement regulation by sense», enabling to improve ability to differentiate microcells of time and to operate motor reaction. Activity of the person has oscillatory character with microintervals at 30-70 ms, and this step can serve as a measure of time. High-speed actions are closely connected with a complex of visual, acoustical, muscular sensations and skill them to estimate, perfection of a feedback, the information on real time of action.

To a certain extent, speed idle time motor is genetically set, however at well thought over system of purposeful education it is possible to develop in the necessary direction such properties of nervous system as force, mobility and steadiness at representatives of various types of the supreme nervous activity. I.P. Pavlov (1949) marked, that genetically certain type of the supreme nervous activity does not program rigidly speed of reaction. Alteration of this stereotype is possible,

however it demands various efforts from people of different typology. Speed of the latent period of simple motor reaction basically depends on speed of nervous impulses distribution from periphery of the analyzer to the center and on motor ways to a muscle. According to G.G. Gellmgolts (Gellershtein, 1958) it makes about 70 km/s. For complex reactions with a choice speed of reaction increases due to delays for ways of distribution of a nervous impulse: the more complex reaction, more stimulus and variants of the answer, the more these delays. Speed of simple motor reaction depends from:

- Motivations of the player;
- Intensity stimulus;
- Interval of time between separate stimulus;
- Abilities to a prediction of events;
- Kind of a signal (visual, sound, etc.);
- Current functional condition of the player.

Ability to distinguish the minimal changes in movements on time variables defines a level of sports opportunities of the given sportsman. In works S.G. Gellershtein (1958), B.B. Kossov (1973), V.P. Ozerov (2002), E.N. Surkov (1984), etc. it is shown, what exactly distinctive sensitivity of time intervals, instead of actually speed of simple motor reaction, limits ability of the sportsman thin to operate speed of motor reactions. The sensor method provides the directed perfection of ability to distinguish microintervals of time and provides carry of accuracy of time differentiations on speed and timeliness of reactions. The practical technique of perfection of distinctive ability on time is under construction on S.G. Gellershtein hypothesis (1958) about existence of dependence of speed of simple motor reaction (its latent period) from time sense, ability to perceive and estimate time microintervals. The big influence renders this quality as well on timeliness of reaction which is based on exact measure off a

pause time from occurrence of stimulus prior to the beginning of impellent actions

Technique of perfection

The primary goals at perfection of the sportsman distinctive sensitivity on time consist in, that:

- To learn to react more precisely, instead of faster, to be able to detain an motor impulse for precisely set time;
- To increase ability to operate in the speed of simple motor reaction.

The concrete intervals of time included in training process proceeding from specificity of volleyball, get out in two ranges: the first – 3-8 sec, connected with actions of players on submission and reception of submission and the second – the order of the tenth and 100-th shares of second for actions in protection and on the insurance, at blocking and attacking impact. Hardware maintenance of perfection process of distinctive ability on time consists in use of the device-reaction meter (in research device MRK-433 – Poland was applied) with wide enough set of functions, 4-5 light and sound stimulus and 3-4 alternatives of the answer with registration of series of answers till 25-30 time in a series (Markov, 2001).

The technique of perfection consists of following stages.

I stage – fact-finding, 2-3 days for reception of average data on motor reaction speed of a team players, acquaintance with the equipment and technics of measurements, psychological adaptation to process (motivation, exhaustion, attention).

II stage – development of ability as much as possible quickly to react to a starting signal, constantly receiving the information on actual time of reaction and its latent period. At this stage the task is put to establish connection between the motor answer and time of reaction. As a

result of trainings strong associations between an interval of time and character of motor sensation, connection of action with sensation of time after each reaction are established.

III stage – to learn to estimate as much as possible precisely the motor reaction speed, the self-estimation of reaction time obligatory and realized by the player at which the examinee verbally and number characterizes duration of a microinterval. At once after this self-estimation the exact size of reaction and the made mistake is informed the player. Examinees are induced by it to comparison, checking of duration of microintervals in a number of attempts, correct the mistakes. At the first stage sportsmen are capable to make only a rough differentiation, very “fast” players – within the limits of 0,15 sec, very “slow” – 0,3 sec. At a following stage the requirement to accuracy of an estimation increase. To improve «conscientious of sensations», the organization of connection between the previous result, subjective sensation and the subsequent action, it is necessary to aspire to reduce break between result and its self-estimation. After the message of true result of attempt and the made self-estimation it is necessary to give the examinee time to calculate a difference of data and to estimate it. Practically possible and extremely achievable accuracy in our researches is estimated within the limits of 0,03-0,05 sec. At the given stage the examinee does not ask questions on character of their sensations.

IV stage – to learn to operate speed of motor reaction, passing consistently some stages. A task of this stage is achievement of effect of the maximal and realized stability in reproduction of those or other microintervals. The time sensor standard is the parameter of stability, to ability to operate as “time sense”.

At the first stage the examinee, reacting to external stimulus, on each subsequent signal reproduces intervals under orders of (as much as

possible quickly, twice more slowly, with the set step, etc.) with rough enough distinction between two consecutive attempts. After attempt – a self-estimation, then the message of true result.

At the second stage of a stage distinction between two consecutive attempts, set by the examinee from the outside, becomes more “thin” and qualitative (slightly faster, slightly more slowly), and this measure “slightly” can individually be defined and is within the limits of 0,03-0,05 sec. Further – again a self-estimation and the message of true result.

At the third stage the choice of the task for demanded speed of motor reaction is made by the examinee, carrying out the self-task.

At the fourth stage the primary goal becomes as much as possible exact management of speed of motor reaction. Before each attempt the head sets exact value (number) of speed of motor reaction. All other manipulations – are similar previous.

Sensibleness of sensations, the organization of connection between the previous result, its subjective sensation and the subsequent actions underlies success of such training. The aspiration to reduce break between attempt and its self-estimation is reached only at a high degree of motivation of the player.

It is represented rational use of the given method in preparation of the high class volleyball players.

Spatial distinctive sensitivity

Spatial sensitivity (Anan'ev, 1955; Dikunov, 1971; Il'in, 1976; Uruzaeva, 1969), alongside with other parameters, provides accuracy and expediency of motor actions of the sportsman, its high level of development is a necessary condition of mastering by the perfect sports technics. Spatial sensitivity special movements of the sportsman improves in process of growth special training and qualifications. Primary development of distinctive sensitivity separate

variable movements is specific and connected with concrete sports specialization. It is rather informative at overtraining. Its significant deterioration are found out at an optimum level of sensitivity time and effort. Age dynamics (Ozerov, 2002) spatial sensitivity, speaks that the motor-presented children already in the age of 8-9 years differ a high level, intensive dynamics that allows to recommend testing of spatial sensitivity selection of the presented children. Accuracy zones of spatial distinction are defined, first of all, by specificity of functioning of the visual analyzer, vestibular receptors and kinesthetic muscular sensitivity.

One of the most essential characteristics of the visual analyzer is the field of vision. «To see skill a field», advanced peripheral and central sight is especially necessary in volleyball for exact and fast perception of a spatial arrangement is possible a lot of players (partners and opponents) with simultaneous visual procaking behind flight of a ball and an estimation of kinematic characteristics of its movement: trajectories, speeds and accelerations. In various sports kinds under influence of special exercises of the characteristic of a field of vision (the volume and the form) are rather various (Gagaeva, 1969; Medvedev, 1967; Surkov, 1982; Farfel', 1975) also are specific. In volleyball the sizes of a sensor field have special value for processing total amount of the information in conditions of a rigid limit of time, for decision-making and the motor act. Special value gets quality of the visual analyzer work for setters. Undoubtedly, that deficiency high quality setters, alongside with a number of other reasons, speaks an insufficient level of development of the visual analyzer, bad selection in sports schools and absence of special exercises for development of the visual analyzer.

In practice of work with a volleyball team in conditions of summer training gathering some kinds of exercises were applied to development

of peripheral sight in conditions of deficiency of time with simultaneous performance of various motor actions (Markov, 2001). One kind of exercises was carried out in laboratory conditions on reaction meter MRK – 433. The sportsman should react as much as possible quickly and precisely pressing buttons and pedals various sorts signals (color, a sound), supervising the central sight stimulus ahead on distance of 4-5 m. Simultaneously with it in pauses between signals (2-3 sec) trainer, being sideways from the player on distance of 2-3 m, showed cards with large enough figures from 0 up to 9 in any sequence. This operation the player supervised peripheral sight, naming aloud figure. Complexity of exercise changed introduction up to 5 various signals (3 colors and 2 sound different tones) and up to 4 executive actions (2 buttons for hands and 2 pedals for legs). Time of each reaction in a series up to 25 times was registered and analyzed. The arrangement of cards, gradually moving apart a field of vision outside at the left and on the right varied.

The second kind of exercises (specially for setters) was carried out on a court. On its one side after operational development from depth of a court setter made set on attack. On other side, behind a net the trainer periodically during flight of a ball from the defender to setter showed the same cards with figures and the giving in player before a pass should see figure and loudly it names. The condition of exercise varied change of zones of operational development, an initial setter position (zones 2, 3, 6) and various actions (with an output, in a jump, in squat, etc.), change of a position of the trainer with cards.

In the third exercise similar previous, of the setter action became complicated that each figure on a card designated the certain kind of transfer (in zones 4, 3 and 2, highly, low, fast, etc.). Up to setter contact of a ball he should verbally, loudly designate the decision.

The fourth exercise similarly previous, but setter carries out the real set designated by number of a card and according to perception by its player. Similar exercises can be applied for attacking and blocking.

Significant role in maintenance of a high level of spatial sensitivity plays kinesthetic distinction. In sports activity muscular feeling, kinesthetic spatial distinction are a basis of mastering by technics of specialized actions, their operative regulation. It is included a compound part into the acts connected with visually-motor coordination of movements. At sportsmen of various sports specializations, age and qualification under influence of regular trainings simultaneously with perfection of coordination accuracy kinesthetic spatial distinction develops. In different sports kinds «muscular feeling» is specialized and localized, first of all, basically for the given kind motor functions, and accuracy zones of spatial distinction correlate with a condition training the sportsman (Gagaeva, 1969; Keller, 1977; Puni, 1959; Khudadov, 1970).

Development of thin muscular sensations is based not only on perfection of the motor analyzer, but also closely cooperate with speech alarm system; conscious рече́мыслительный the control over learning and differentiation of various movements on amplitude promotes transformation of these psychomotor movements into skill with high ability of distinction and comprehension of changes of characteristics of movement. Testing kinesthetic distinctions is spent on special devices (kinematometer, kurvimetr, etc.) by a method of the minimal increment of a spatial interval of amplitude. At absence of the visual control, on a regular basis returning a hand in a starting position, the examinee reproduces the certain amplitude of movement with minimally felt increment. The quantity of steps in the set interval correctly reproduced by the sportsman determines a level of its distinctive ability in

the given component of perception of movement (Kulagin, 1984; Marishchuk, 2005). In natural experiments studying of spatial distinction is made by result of broad jumps from a place at its step increase in each attempt from 70 % of the maximal result up to limiting with the task of the minimal increment (the greatest quantity} of steps). The previous jump should not repeat or decrease, the visual reference point was absent, the fact of a mistake, without concrete result was informed the sportsman only.

In volleyball the given technique can be used at reproduction upwards from a contact platform. On time of flight (from up to a landing), registered the special electronic timer, to the sportsman informs dynamics of a jump without exact figure of result. Measurement is made in an interval from 50 % of limiting result up to a maximum. Thin differentiation of increments of height of a jump is estimated by quantity of steps in an interval and by quantity of erroneous attempts. In training experiment the given technique is modified to technique of development of distinctive sensitivity similarly described above on time, with similar breakdown and sequence of stages.

Distinctive sensitivity effort

Motor activity in any kind of sports is connected with performance of various speed-power exercises. One of them demand the maximal muscular and mental pressure, others – economy and reliability of muscular expenses for a long time, the third depend on accuracy and timeliness of dynamic efforts on time and a place. Skill correctly to distribute efforts in time and space – one of the basic conditions of display of high technical and tactical skill of the sportsman. The estimation specificity of contact quality of the volleyball player described above with a ball in all game elements allows to approve, that thin differentiation of muscular

efforts on size, a place and time of their display in many respects defines a class of the player. It is possible to allocate following basic game actions in which their qualitative performance is to the greatest degree determined by a level of distinction of efforts:

- Service reception: accuracy of operational development, thin differentiation of efforts of hands and feet;
- Service: force and accuracy of spike on a ball;
- The top set: thin distinction of brushes efforts on a ball;
- Attack: alternation strong and false spike, the aimed spike of average force in empty places of the opponent court.

Researches of force sensitivity of sportsmen allow to define following general laws (Markov, 2001):

- Quality and accuracy of efforts differentiation improve during purposeful training, with growth of the sports form is much faster, than accuracy of perception of time and space;
- Between absolute force and accuracy of muscular pressure direct dependence is absent, different on size muscular pressure are differentiated unequally;
- Development specificity of force sensitivity volleyball players of different game roles is revealed;
- The development level of force sensitivity appreciably depends on structure of self-checking by the sportsman of technics elements.

Testing of force sensitivity is possible by means of brushes dynamometer by method of the minimal increment of effort. It is offered to the player without the visual control gradually, it is step with the minimal increment of effort to compress a dynamometer in a range from 0 up to base effort. The quantity of such steps

characterizes a subtlety of a force differentiation. In natural conditions testing of force sensitivity can be lead by a throwing of a ball (tennis, volleyball, stuffed) similar step image from 70 % of the maximal result with the minimal increment in each step up to a limiting throw. Both specified techniques modified similarly described above technique, can be applied in the training purposes to development of special force distinctive sensitivity in volleyball players.

Conclusions

1. Effective perfection of distinctive sensitivity is realized by means of a sensor multistage technique in 4 stages.

2. For improvement of speed of reaction and ability to differentiate and operate by micro intervals of time – with use electronic reaction meter are determined: time of simple reaction for a light signal and the player opportunities to distinguish intervals of time and to reproduce them under orders of the trainer and it is any.

3. For perfection of ability to differentiate and reproduce the set sizes of efforts – with use electronic brushes dynamometer at a level of 70 % from individual maximal ability on the right hand the minimal increments of efforts distinguished and reproduced by players under orders of the trainer and are defined is any.

4. For perfection of the player distinctive sensitivity jump height and reproduction of the set parameters by it – with use of the contact platform having the electronic registrar of time intervals between upwards jump of the player at pushing out from a place and a landing, are defined at a level of 70 % from individual maximal jump height ability to distinguish and reproduce the minimal deviations from the task.

5. For perfection of distinctive sensitivity of spatial parameters and their ability to reproduce by the strongest hand the throw of a tennis ball is tested for range with definition of the player ability to distinguish and reproduce under orders at a level of 70 % from individual maximal range of a throw its minimal deviations.

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Теоретические и методологические проблемы формирования психомоторных качеств в волейболе

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Рассмотрены проблемы формирования психомоторных качеств игроков в современном волейболе, теоретическое и методологическое обоснование которого представлено на основе анализа специфики вида спорта и основных психофизиологических закономерностей организма спортсменов. Ключевым звеном практической методики совершенствования двигательных способностей спортсменов определено формирование в тренировочном процессе временной, пространственной и силовой мышечной различительной чувствительности у игроков различных игровых амплуа. Теоретически обоснована и разработана для практического применения методика развития и совершенствования двигательных качеств волейболистов, определены и изложены ее основные положения, этапы, рабочий инструментарий и методы контроля динамики развития способностей игроков дифференцировать микроинтервалы времени, усилий и пространства, оценочные критерии.

Ключевые слова: волейбол, психомоторные качества, скорость реакции, различительная чувствительность.
