Psychology Research, May 2022, Vol. 12, No. 5, 238-243
doi:10.17265/2159-5542/2022.05.003

Construction of Structural Elements and Characteristic System of Athletes' Cognitive Ability*

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Cognitive ability is important component of competitive ability of athletes, an important content of winning elements in sports, and an important topic of modern sports training and scientific research. These problems will restrict the improvement of athletes' cognitive ability and mental level. Based on the theory of psychology, use multiple hierarchical thinking, research cognitive theory of sports and the characteristics of cognitive ability of elite athletes, research the structure element system of cognitive ability, construct a two-level structure model of the cognitive ability of excellent athletes, summarize specific characteristics of the first level elements, and apply psychological cognitive theory to the training of modern Olympic Games mobilization, so as to provide valuable cognitive training, psychological training, and intelligence training for athletes theoretical guidance.

Keywords: athlete, cognition, cognitive ability, structural elements, characteristics

Preface

Improving the cognitive ability of athletes is one of the important topics in the research of modern Olympic Games. With the rapid development of modern scientific and technological civilization, the level of sports competition in the world is constantly improving. In any sport, the differences between the physical

* **Acknowledgments**: Thanks to Professor Korobeynikov Georgiy of National University of Physical Education and Sports of Ukraine. Thanks to Professor Chen Jinsong of Jiangsu Ocean University of China; thanks for your support and help.
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fitness and skills of excellent athletes are getting smaller and smaller. It is no longer the simple physical skills that determine the outcome of the competition. The mental ability of athletes has become the key to determine the outcome of high-level competition. The psychological and intellectual ability of athletes will inevitably become an important issue that must be studied in modern sports science, such as the cognitive function and personalized training of athletes, the causes and solutions of bad psychological phenomena of athletes in the process of training and competition, the change law and adjustment of excellent athletes' psychological state before competition, etc., which need the use of modern scientific and technological means and cutting-edge professional training. It can help athletes to break through their potential and contribute to the progress of national sports and the development of the Olympic movement.

High intensity competitive events require athletes to have strong physical fitness, superb technical level, strong psychological ability, and excellent intelligence level, and win the match in one-to-one high-strength direct attack and defense confrontation. Modern Olympic Games have very high requirements for athletes' cognitive ability, psychological ability, and intellectual ability. These abilities are just the important core competitive ability of special sports. Its constituent elements and characteristics directly reflect the essence of sports and the law of winning. It is an important subject of modern sports training and scientific research to study the structural elements and characteristics of athletes' competitive ability and cognitive ability. By using the methods of literature review and induction, this paper discusses the existing problems in the field of sports cognition in China, studies the theory of sports cognition, the mental ability, and characteristics of athletes, and constructs the structural element model and characteristic system of athletes' cognitive ability.

Review of Related Concepts of Motor Cognition Theory

Cognition is a professional term in psychology, and is psychological behavior or psychological process in which external information obtains and applies knowledge through feeling, perception, thinking, and experience analysis (Oxford Dictionary, n.d.). Cognitive process includes the use of existing knowledge and the generation of new knowledge. In other words, cognition is a process in which the human brain receives external information, processes it, and transforms it into internal psychological activities, so as to acquire knowledge or apply knowledge. The main elements of cognition are: feeling, perception, thinking, imagination, memory, and language.

Cognitive function is the advanced neural activity of human and animal brain, mainly including all aspects of mental and intellectual activities, such as feeling, perception, learning, and memory, among which the most important is learning and memory. Cognitive function includes perception, memory, learning, attention, understanding, calculation, decision-making, and language ability (Zhang, 2019).

Cognitive abilities are the most important psychological conditions for people to successfully complete activities. They are the ability of human brain to process, store, and extract information. Chen Huichang (1995) believes that cognitive ability refers to the ability of human brain to process, store, and extract information, such as observation, memory, and imagination. People know the objective world and obtain all kinds of knowledge, which mainly depends on people's cognitive ability. Che Wenbo (2001) believes that cognitive ability refers to the ability of learning, research, understanding, generalization, and analysis, and the ability of receiving, processing, storing, and applying information. American psychologist R. M. Gagne (1984) proposed that cognitive ability includes: speech information; intelligence skills; cognitive strategy; attitude; motor skills.

Cognitive function and cognitive ability are important concepts in cognitive theory. A correct understanding of these concepts is helpful to the study of motor cognition. Then we can see that the brain has a unique function of cognition and memory, which is based on the process of cognition and memory. Continuously acquire new knowledge and experience. Cognition is a process of psychological and intellectual activities of constantly acquiring and applying knowledge. Sports cognition is a cognitive activity related to sports, which determines the level of athletes' learning, mastering and using of sports knowledge, sports skills, and sports tactics.

Athletes' Cognitive Ability and Its Characteristics

The essential attributes of sports create the unique cognitive ability of athletes. The psychological and intellectual ability of an athlete determines the intensity, nature, and characteristics of his psychological activities. Different cognitive abilities directly affect the level of the athlete's learning and application of skills and tactics, and determine the quality and level of the athlete's competitive ability. The higher the cognitive ability of an athlete, the higher the level of the athlete's acceptance, mastery, and application of skills and tactics; in the competition, the more we can give full play to our advantages and defeat our opponents. According to the constituent elements of sports cognitive ability (the main constituent elements of sports cognitive ability are: sports perception, sports attention, sports thinking, sports imagination, and sports memory), this paper discusses the athletes' cognitive ability and its characteristics.

Motion Perception

Motion perception mainly includes space perception, time perception, and speed perception. Athletes have a strong ability to receive and understand external information, and they have the characteristics of fast and accurate response to action time, speed level, and spatial direction. In front of a close opponent, they should be good at analyzing the opponent's sports style and characteristics, and use their own cognitive ability to effectively read and understand the competition, so as to make full use of their strengths and avoid weaknesses, seize the fleeting opportunity, and make rapid progress reaction (such as effective dodge, quick counterattack), and precise defense and attack, to win the game.

Sports Attention

Sports attention is the direction and concentration of psychological activities to certain objects in the process of sports, mainly including observation and distribution. The observation ability of sports attention has the characteristics of clarity, agility, accuracy, and timeliness. Athletes should clearly observe the opponent's speed, strength, endurance, technical combination, tactical use, and other characteristics in the competition. According to the observed information, they should make a quick judgment, take timely countermeasures, and carry out accurate and effective defense and attack. Attention distribution has the characteristics of stability, concentration, comprehensiveness, and flexibility. For example, the attention stability of combat athletes is generally high, concentration and flexibility are strong, but the scope of attention is not high, and the comprehensiveness of attention is low.

Sports Thinking

Sports thinking is a psychological process of accepting, analyzing, understanding, mastering, and applying sports knowledge or skills, including operational thinking, predictive thinking, and tactical thinking (Zhu & Hu, 2013). Boxing requires high operational thinking of athletes, and has strong processing ability of competition

information, which is mainly manifested in the ability of comprehensive analysis, calculation, and interpretation of information of competition field and opponents, independent thinking and winning by wisdom. Predictive thinking is mainly reflected in taking effective measures according to the opponent's technical style and action habits, or making reasonable strategic arrangements for their next action quickly according to the actual situation of the game. In terms of tactical thinking, athletes need to adopt different tactics according to the different styles and levels of their opponents, actively grasp the initiative of the competition according to the skills of their opponents, and use techniques and tactics according to the characteristics of their own physical skills. Moreover, their playing styles are flexible and changeable, making their opponents unpredictable.

Research on the Structural Elements of Athletes' Mental Ability

Based on the basic theory of psychology, this paper analyzes the composition of the first level elements of motor cognitive ability, and holds that the motor cognitive ability mainly includes space perception, time perception, and speed perception. Sports thinking mainly includes operational thinking, predictive thinking, and tactical thinking. Sports attention mainly includes motor observation and attention distribution. Sports imagination mainly includes imagery training and competition imagination. Sports memory mainly includes short-term memory, long-term memory, and motor memory. According to the research needs, the sub elements of the primary elements are regarded as the secondary elements of motor cognitive ability.

The main characteristics of the first level elements of motor cognitive ability are described concretely, and the model and characteristic system of motor cognitive ability are discussed.

(1) Main characteristics of motion perception ability are the rapidity and accuracy of the response to information stimuli such as action time, speed level, and spatial direction.

(2) Main characteristics of sports attention ability are: clarity, agility, accuracy, and timeliness of sports observation, stability, concentration, comprehensiveness, and flexibility of attention distribution.

(3) Main characteristics of sports thinking ability are comprehensiveness, agility, and flexibility.

(4) Main characteristics of motor imagination are: predictability, reasoning, and suggestibility.

(5) Main characteristics of motor memory ability are integrity, clarity, and relevance.

After summing up characteristics of the first level elements of sports cognitive ability, it is found that the characteristics of the first level elements cannot clearly express the requirements of sports events for athletes, so it needs further detailed research.

Based on the research of sports cognitive ability and its characteristics, combined with the special characteristics of sports, this paper deduces and summarizes the elements of athletes' mental ability, analyzes the secondary structure elements of athletes' special mental ability, and concretely describes the importance of the secondary elements.

(1) Athletes' perception of movement can be divided into the ability to respond to information stimuli such as action time, speed level, and spatial direction. The main characteristics of action time perception can be summarized as: accuracy, rapidity, predictability, and durability. The main characteristics of speed level perception are agility, accuracy, responsiveness, and predictability. The main characteristics of spatial direction perception are: accuracy, stability, predictability, and rapidity.

(2) Attention ability of athletes mainly includes movement observation ability and attention distribution ability, among which the main characteristics of movement observation ability are accuracy, agility,

comprehensiveness, and clarity; the main characteristics of attention distribution ability are concentration, comprehensiveness, flexibility, and stability.

(3) Sports thinking ability of athletes mainly includes operational thinking, predictive thinking, and tactical thinking. The main characteristics of operational thinking are agility, effectiveness, pertinence, and flexibility. The main characteristics of predictive thinking are: accuracy, pertinence, effectiveness, and flexibility. The main characteristics of tactical thinking are: pertinence, effectiveness, flexibility, and comprehensiveness.

(4) Athletes' sports imagination ability mainly includes imagery training ability and competition imagination ability. The main characteristics of imagery training ability can be summarized as: logic, pertinence, predictability, and suggestibility. The main characteristics of competition imagination are: reasoning, prediction, pertinence, and suggestibility.

(5) Athletes' sports memory ability mainly includes short-term memory, long-term memory, and sports memory ability. The main characteristics of sports short-term memory ability can be summarized as: timeliness, clarity, relevance, and integrity. The main characteristics of long-term memory are: clarity, integrity, relevance, and integrity. The main characteristics of motor recall ability are: relevance, timeliness, clarity, and integrity.

There are great theoretical value and practical significance for modern psychological training to design and construct hierarchical fission structure model of athletes' cognitive ability elements. For example: Athletes' cognitive training or mental ability training can be compared with the elements of athletes' cognitive ability one by one, combined with the inductive description of the characteristics of the secondary elements, analyze the weakness of athletes' competitive ability, deeply analyze the characteristics of athletes' special mental ability, and train, strengthen, and improve them pertinently, so as to provide an important theoretical basis for sports scientific training. In this study, there are still many deficiencies in the design of the structure model of the secondary elements of athletes' cognitive ability. There are still many imperfections in the summary of the secondary elements and their characteristics of athletes' cognitive ability, which need to be further revised in the future study and research.

Main Conclusions

(1) Sports cognition is a kind of cognitive activity related to sports. It is a process of learning, acquiring, and applying sports skills and sports related knowledge in a specific environment and rules. The components of athletes' cognitive ability mainly include motor sense, motor perception, motor attention, motor thinking, motor imagination, and motor memory.

(2) Abilities of sports perception, sports memory, sports perception, sports memory, sports perception, and sports imagination belong to the category of motor cognition, motor memory. Athletes' cognitive ability cannot be equal to psychological ability, intellectual ability, or mental ability. They have different concepts and contents, but they have common structural elements.

(3) Sports cognitive ability contains a lot of complex psychological concept knowledge. Hierarchical fission analysis of cognitive ability elements and exploration of its content microstructure and characteristics will help to clarify the goal, content, and direction of boxing scientific training, and make boxing psychological training and intelligence training more targeted and enrich sports psychology. The purpose of this paper is to promote the application of cognitive theory to training practice.

(4) The application of psychological cognitive theory to the training of modern Olympic athletes is to evaluate and analyze the athletes' cognitive function (cognitive ability), formulate personalized training scheme according to the level of athletes' cognitive function, and carry out grouping and grading training. Theoretically, it is not difficult to understand: Personalized training based on different cognitive levels will help to improve the competitive ability of athletes, and help to improve the level of athletes' training and competition in a scientific and orderly way.

Prospects for further

Modern sports training requires coaches to constantly improve their professional quality, to elaborate every detail of teaching and training, and to design better practice forms and action combinations according to the personalized needs of sports. The knowledge of sports biomechanics is applied to the design and improvement of the movement structure, rhythm, and combination of body exercises, and the scientific diagnosis of technical training is carried out; the knowledge of physiological psychology is applied to the monitoring of sports training process, and reliable reference basis is provided for scientific selection, training, and competition. Personalized training is a special type of sports training, which is an important way to complete sports training tasks and objectives. Personalized training requires that the training time, content, load, resource allocation and utilization must be different from each other, and the overall allocation, grouping and grading training is an effective solution. However, how to train the athletes scientifically in groups and grades is an extremely important task in modern sports training, which needs further study.

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