

# Discussion on the Application of Sports Bionics in Core Physical Training

Jingwen Wang

School of Beijing Normal University, Beijing 100875, China

## Abstract

In recent years, as one of sports science disciplines in the field of physical education and sports training, sports bionics blow a stream of the boom, it is people through in-depth understanding and analysis of the structure and function of biological systems, imitation and simulation, and gained enlightenment, and effectively applied to the movement technology, sports training and physical exercise. In this paper, through the method of literature and logical analysis, the research of sports bionics in recent years is summarized, and according to the relevant theoretical knowledge, the methods and matters for attention of the application of bionics in core physical training are proposed, the basic training ideas are summarized, and the significance and value of training is analyzed. In order to provide reference suggestions for the practitioners of youth physical fitness training, physical education, social sports guidance and so on.

## Keywords

Sports; Bionics; Core Fitness Training.

## 1. Introduction

Sports bionics through the study of biological system structure, function and special ability, in sports imitation attempt, so as to improve human sports ability, to achieve the purpose of health. Sports bionics have a long history. Ancient people realized the activity function of birds and animals very early on, and tried to imitate their movements to enhance physical quality and activity ability. As early as the spring and autumn period and the warring states period, the ancients will make out the imitate bears, a bird activity "the bird" bear "of the characteristics of the physical exercise, in the western Han dynasty, and by imitating tiger look back, three kingdoms period, the famous doctor HuaTuo on the basis of the "two birds play "assemble a follow the tiger, deer, bear, ape and bird" WuQinXi "action, spread so far, It is still used in the physical exercise of the masses. Later to the Jin Dynasty, the famous doctor Ge Hong established such sports bionic names as Longdao, Guiyan, Yingfei, Shequ and Tujing, which also had a significant impact on the development of sports and medical rehabilitation in China.

The Xingyi boxing in traditional Chinese sports is based on the theory of Yin-yang and five elements, and the twelve-form boxing is created, which is based on the pictographic practice of twelve animals, such as dragon, tiger, monkey, horse, snake, chicken, eagle, bear, Chinese alligator, sparrow, sparrow and swallow, forming the main routine contents and basic boxing techniques. Xingyi boxing contains not only rich ancient philosophy thoughts, but also rich bionics thought of pictographic understanding.

There are also many cases of bionics in modern competitive sports. The squatt start in track and field was developed by The Australian sprinter Sheryl through the observation and analysis of the body posture of the kangaroo when it started and the imitation training after combining the characteristics of sprinting. Humans long ago created the breaststroke, a longer swim in the water, by mimicking the powerful stroke of a frog. In the 1930 s, people observed dolphins swim on the body and tail kept swinging, and caused the water waves after the flood, produce

swimming speed of reaction, improve to imitate dolphins has created the "body dolphin" this kind of stroke, body dolphin use kick up and down movement of wave, coherent, speed is evener, because its technology is advanced, Has been adopted by the majority of butterfly athletes. In basketball shooting and dribbling, the right type hold golfers should be firm fingers and weak palms, in order to improve the ability of control of the ball, it actually is to learn from the morphological structure of gecko, gecko on the toe of a leaf with strong adsorption ability, sucker can crawl on the surface of the smooth, the ball out of time and space of the palms of their hands to form a similar suckers structure, which can have adsorption on the sphere. In addition, in the beautiful and wonderful gymnastics, there are also many bionic movements, such as fish jump forward roll, swallow balance, etc., these are beautiful postures shown by imitating the form of animal activities.

With the development of bionics, its relationship of sports is more and more close, and its application is more and more extensive, involving in sports clothing, stadiums, sports equipment and other industries. Sports bionics not only improve the aesthetic feeling of sports, but also brings a lot of convenience for people to participate in sports exercise. People's core muscle group can be effectively exercised by imitating the movement towards animal walking. The combination of sports bionics and core physical training is bound to spark innovation of many training methods and provide novel ideas and scientific practical guidance for human physical training.

## 2. Definition of Core Physical Training

Core physical strength is to point to human body is caused in the process of activity and motion form related small muscle group, abdominal muscle group, back muscle group and hip leg muscle group strength size, and maintain the body stable balance of comprehensive strength [1]. Core physical ability strong and the weak will directly affect the work efficiency of the core muscles, the movement of the human body through the core area of stability for limb muscle power to establish a pivot, to create conditions for onset of power transmission, stability, to power and mobile in the centre of the body to People's Daily activities and physical exercise plays an important role. At present, the core strength training is basic to competitive sports and physical exercise or continue to use and reference in the field of rehabilitation and fitness training methods, the core stability as the main training objectives, static exercises as the main means of training still cannot fully meet the needs of the competitive sports training [2], core strength training should not only confined to the stability, improving the function of the body, Training in coordination, balance and control should also be increased to create a stable and flexible core area.

## 3. Application of Sports Bionics in Core Physical Training

Animals have super control ability to maintain core stability and coordinate the movement of limbs when crawling. Crawling requires hands, feet and torso to complete the movement between moving and imitating the crawling of animals for core physical training, which can scientifically and effectively stimulate the core muscle group and comprehensively improve physical quality.

**Table 1.** Methods of sports bionics applied to core physical training

The bionic training	Action method	Exercise function
The cat climb	Bend over and kneel, hands and feet are separated from shoulder width, hands and feet are supported at four points on the ground, hip flexion and knees are 90°, the core is tightened, the back is straight and parallel to the ground, the pelvis is neutral, crawling with the opposite forefoot and hands, fixed crawling frequency and body stability.	Improve the supporting ability of shoulder and ankle joints, enhance core stability, and promote the coordination development of upper and lower limb movement during marching.
Bear Crawl	Hands and shoulder width support on the ground, hips raised, back straight, knees slightly bent, the first right hand forward, then followed by the left leg, change the left hand forward, followed by the right leg forward, in this way the opposite limb forward at the same time has been marching, core tightening, to avoid collapse or arching back.	Improve core stability and coordination of limbs, increase the support strength of arms, shoulders and legs.
The monkey climbed	Hands feet shoulder-width support the ground, hips raised, slightly bent knees, first hands support the ground, feet slightly jump after relying on the strength of the core of the trunk quickly moved to the side, after landing the center of gravity back hands to the same side to move, keep the core tight.	Enhance the muscle strength of external abdominal oblique, improve the ability of trunk control, promote the coordination of upper and lower limbs.
The crocodile climb	Straight arm supports position, legs straight down together, before the soles of your feet on the ground, the distance between the hands and shoulder are the same as wide, tighten the core muscles during exercise good control the stability of the body, the body do alternating movement before and after training, the first buckling unilateral arm slowly sinks the body, the contralateral leg before buckling outreach and lift the foot pedal, then the other side of the body alternating power forward.	Stimulates the muscles of shoulders, chest, arms, abdomen and legs to improve core stability, increase coordination of upper and lower limbs, and challenge the endurance of muscles throughout the body.
Lizard climbed	Prostrate on the floor, two feet to the rear, knees off the ground, the toes, one side of the foot out to the outer edge of the ipsilateral hand, on the other side of the hand stretch forward crawling significantly at the same time, after sinking body, then the contralateral foot out to the outer edge of the ipsilateral hand, and out of the contralateral hand crept forward and down the body, with rhythm, the repetitive movements.	Increase the muscle strength of pectoralis major, rectus abdominis and serratus anterior around scapulae, quadriceps femoris and iliopsoas muscle of lower body, improve the coordination ability of upper and lower limbs, and promote the stability of trunk.
Spider climb	Bend your knees, your knees bend, your arms back under the shoulders, lift your hips, until your knees and your chest are in a horizontal position, the torso is parallel to the ground, and you take a hand and your feet at the same time, move forward, and move forward.	Stimulate the muscle groups of arms and shoulders, back and legs, increase the core stability of the trunk, and improve the coordination of hands and feet movement.

## **4. Matters Needing Attention in the Application of Sports Bionics in Core Physical Training**

### **4.1. Standardization of Normative Actions**

In the process of bionic core physical training, the trainers are required to act in a standard manner to avoid buckling and arching pressure on the spine. When supporting their limbs, they should not overextend themselves. When moving forward, their hands and feet should coordinate and exert themselves to control the torso stably.

### **4.2. Rhythm with Breathing**

Bionic core physical training has high requirements on muscle strength and endurance. As it needs to support the weight of the whole body, the phenomenon of suffocating force may occur in the process of exercise. Therefore, it is necessary to emphasize the rhythm of breathing in training, breathing slowly when supporting the force and breathing slowly when switching movements.

### **4.3. Scientific Training Step by Step**

For trainers with poor physical fitness foundation, bionic core physical training needs to gradually increase the load and intensity. Start with static support movements to increase endurance and stability of core muscles. After feeling the improvement of muscle strength, then carry out a small range of crawling practice, the forward distance should not be too long, the distance of a single movement of hands and feet should be shortened as far as possible, in order to improve the balance ability and trunk controls ability. Adaptive exercises after a period of time, can accelerate the pace of movement and distance, enhance the coordination of upper and lower limbs, improve the agility of movement, the ability to increase the weight, in order to improve the degree of stimulation to the core muscle group.

## **5. Significance and Value of Bionic Core Physical Training**

### **5.1. Improve the Scientific Nature of Core Physical Training**

The animal's survival and development to follow the law of survival of the fittest, in the fierce competition in the natural animal physiology and morphology evolution, showed stronger vitality and athletic ability, by studying the human animal physiology and biomechanics analysis its motor function, and to imitate in the core physical stamina training, simulation, make the training more scientific, accurate to stimulate core muscle group, Effective exercise control ability, efficient completion of training objectives.

### **5.2. Increase the Interest of Core Physical Training**

Traditional core physical fitness training mainly adopts statics and specific movements in place circulation, and the muscle groups involved in exercise is concentrated in abdominal muscles and external oblique muscles, which are monotonous in form and relatively low in exercise efficiency. The use of bionic training not only increases the fun of sports in the imitation of animal crawling, and the selected movements can mobilize more core muscle groups, but achieve better training effect in unit time. For young children, the unique movement form of free life training can stimulate their curiosity to imitate exercise, improve the fun of participating in sports, and increase the enthusiasm for exercise.

### **5.3. Promote the Comprehensive Development of Physical Quality**

On bionic core physical stamina training, need to mobilize the whole body muscle group, onset of muscle group for support, stability and control the core muscles of the body, in the process of moving, can fully exercise to onset of coordination, the balance of the body, to exercise

movement by increasing the crawling speed agility, increase the crawling distance and time to exercise the muscle endurance, Give weight exercises to improve muscle strength. Therefore, bionic core physical training can improve overall physical quality and promote healthy development.

## 6. Conclusion

Sports bionics, as a discipline to imitate the excellent form, unique structure and superb motor function of biological prototype, explores the law of enhancing people's physique and constantly improving the level of sports technology. It is the product of mutual penetration and cross between biological science, sports science and some other related disciplines. After evolution, creatures have been able to adapt well to specific environments. By observing and imitating the movement patterns of animals, humans can solve some specific problems and design a more large-scale movement pattern. Used in core physical training bionic action by imitating biological ways to practice, to adjust the motor function, for the purpose of body movements more favours asymmetry movement, so as to activate the hips, torso and shoulders crisscrossed the deep muscles, greatly mobilize muscles involved in sports, enhance strength, coordination, agility, balance and endurance level, Promote the overall development of physical quality, and because of its unique exercise movements to improve people's interest in sports, scientific and reasonable fitness exercise.

## Acknowledgments

The social sciences

## References

- [1] Liang Xiaojun, Yu Weiping, Tang Jianjuan, et al. Cybernetics basketball core physical training from the perspective research review [J]. Journal of shenzhen vocational and technical college, 2020, 12 (4) : 49-54, DOI: 10.13899 / j.carol carroll nki SZPTXB. 2020.04.008.
- [2] Li Yongming, Yu Hongjun, Zi Wei, et al. On Core Strength and Its Training in Competitive Sports -- Origin, Problem and Development [J]. Sports science,2008,28(4):19-29. (in Chinese) DOI:10.3969/j.issn.1000-677x.2008.04.004.
- [3] Wen Jianxiang, Wang Zuopeng, Xue Ming. Application of Bionic Movement Teaching Mode in Basic Motor Ability Teaching of 3-6 years old Children [J]. Sports science and technology literature bulletin, 2019, 27 (9): 168-169172. The DOI: 10.19379 / j.carol carroll nki. Issn 1005-0256. 2019. 09. 070.