

# Reflections on the Basic Training of Ballet from the Perspective of Human Sports Science

Yu Yuanyuan

Dance Department, School of Music and Dance, Northern University for Nationalities, Yinchuan City, Ningxia Hui Autonomous Region, Zip Code 750021, China

yuyuanyuannx@126.com

**Keywords:** Joint type; Motion mode; Training logic; Training purpose.

**Abstract:** After hundreds of years of development, ballet art has formed a scientific, systematic and comprehensive teaching system. It starts from human anatomy and constructs a teaching system based on the relevant theoretical knowledge of bones, joints and muscles. Each ballet action in training is designed according to the type of joint structure of the human body. The whole set of training basically covers all kinds of movement modes of all joints in the whole body. At the same time, it trains three contraction modes of muscles in combination, and finally achieves the completion of ballet postures and movements, and muscle switching during movement. This paper takes human body science as the breakthrough point, deeply analyses the action design and combination arrangement of ballet basic training, and strives to master how to make students possess the physical abilities required by dancing through ballet basic training.

## 1. Introduction

Ballet is a very noble and relaxing art. Its elegant, graceful and graceful dance posture, lightweight, free-flowing jump and high-difficulty tiptoe technology bring audiences into a fantastic artistic realm and are regarded as the "Pearl of the Crown of Dance Art".

Ballet art has a history of hundreds of years since its birth. As early as in Italy during the Renaissance, people under the influence of humanism began to attach importance to the value and role of the human body itself. With the profound influence of ancient Roman and Greek classical cultural heritage, Italy became the birthplace of the Renaissance, thus promoting the rapid development of society's economy, science and culture. Especially in art, there has been unprecedented prosperity. Ballet is in this historical background, on the basis of primitive folk dance, from a kind of game dance, in the Italian court gradually formed a unique style, rich dance steps and difficult skills of art form.

Ballet did not have tiptoe technology in its initial stage of development. After a long and complex stage of development, such as Renaissance, Classicism, Enlightenment, Romanticism and Realism, after several generations of ballet actors, teachers and directors constantly enriched and perfected, the technical skills of classical ballet gradually developed and enriched, until the 1920s, the tiptoe of exquisite skills. Artistic talent has been developed and widely used. The lifting technique of double dancing has also begun to develop slowly. The technical difficulty and expressiveness of classical ballet have been greatly improved.

However, although ballet originated in Italy, it took shape in France, reached its peak in Russia, and finally moved from Russia to the rest of the world. In the course of more than 500 years' development, ballet has gone through five periods: early ballet period (Enlightenment period), Romantic Ballet period, classical ballet period, modern ballet period, and finally contemporary ballet period. Throughout its development history, we can easily see that it is active in the world dance circle with infinite charm and tenacious vitality. Today's ballet teaching is a systematic, scientific and perfect teaching system formed after hundreds of years of development. The reason why this training system can be developed for a long time and has a profound impact is that ballet is based on human

anatomy and constructs a teaching system according to the relevant theoretical knowledge of bones, joints and muscles, in which each Ballet movement is based on human beings. The joint structure type of the body is designed. The whole set of training covers all kinds of movement modes of the joints of the whole body. At the same time, three contraction modes of the muscles are trained in the combination, and finally the continuous switching of the muscles during ballet dancing and movement is achieved.

## **2. Scientific Embodiment of Basic Ballet Training**

The reason why the basic training of ballet is scientific, systematic and complete is not due to its hundreds of years of history, but because ballet is aimed at training the ability of all joints and muscles of the whole body.

### **2.1 Design actions according to the types of joints**

Every movement and shape in ballet training is combined according to the movement pattern of joint type. The joints of the whole body are mainly divided into fixed joints, movable joints and fretting joints. Ballet training is mainly for movable joints, of which hip, knee and ankle joints are the main training for lower limbs. For example, in the ground training, the hook foot movement is mainly aimed at the dorsiflexion and toe flexion of the talus and metatarsophalangeal joints. In addition to the movement mode of dorsiflexion and toe flexion, it can also do minimal abduction and adduction, and the training of abduction is often neglected. The subtalar joint can rotate inside and outside around the oblique sagittal axis. All these sports models should be reflected in the training, otherwise the students will have imbalance of muscle strength or the corresponding movements can not be completed well. Another example is the hip joint, which belongs to the spherical fossa joint. It can move on three planes, including flexion and extension on the sagittal plane, abduction and adduction on the frontal plane, and rotation on the horizontal plane. Its range of motion is large. Hip joint is the key part of ballet training, and its six movement modes are reflected in ballet training. For example, the forward rubbing action in Battement tendu combination is the compound action of hip joint external rotation and forward bending, the backward rubbing is the compound action of hip joint external rotation and backward extension, and the lateral rubbing is the compound action of hip joint external rotation and abduction. It is difficult to find the external rotation of hip joint throughout, and the aesthetic opening of ballet is reflected here. Therefore, when we design the training action, we need to know the type of the joint first, and grasp what kind of motion the joint type can do, and then arrange the combination according to all the motion modes of the joint, which can be called complete training.

### **2.2 Comprehensive and complete joint training**

Joint movement modes mainly include: flexion, extension, abduction, adduction, external rotation and internal rotation, but not all joints can do the above six motion modes. For example, the main motion mode of the knee joint is flexion and extension, and it can do slight rotation in the bending state. It is an improved flexion and pull joint, but can not do abduction movement. Again, acromioclavicular joints and sacroiliac joints belong to planar joints, so they can only rotate and slide slightly, but can not do large movements.

The combination arrangement in ballet class must make joint training complete. For example, shoulder joint belongs to spherical fossa joint. It can exercise in three planes. Port de bras in ballet training is just a comprehensive training for shoulder joint. The famous ballet educator Vaganova once said in her book "The Basis of Classical Ballet": "Port de bras is about arms in classical ballet. The foundation of great science." In fact, this science is based on human anatomy. Shoulder joint belongs to compound joint, which is composed of glenohumeral joint, acromioclavicular joint, sternoclavicular joint and scapulothoracic wall joint. We often pay more attention to flexibility training of glenohumeral joint in peacetime training, especially to flexion movement of glenohumeral joint, while ignoring other movement modes. Long-term training will lead to muscle imbalance,

eventually causing pain of the joint, or even the joint. Cause damage. In daily Port de bras training, we often use the accuracy of hand position as a criterion, but the real hand position combination should be designed to train the proprioception of the arm.

### **2.3 Design the movements according to the contraction form of skeletal muscle**

Skeletal muscle is dominated by nervous system, and its contraction can produce joint movement. Skeletal muscle consists of three contractions: centrifugal contraction, centripetal contraction and isometric contraction, in which centrifugal contraction and centripetal contraction can make the joint flexible, while isometric contraction can keep the joint stable. Ballet training should address the various contractile abilities of each muscle, including distal fixation, proximal fixation and no fixation. In ballet training, these three muscle contraction abilities can not only be strengthened, but also be constantly switched in motion. Only when all three muscle contraction abilities are exercised in place, the range and range of motion of the joint can reach the maximum, and ultimately the movement can be better completed. For example, in the Battement tendu combination training, the forward rubbing of the power leg is mainly performed by the iliopsoas muscle, sartorius muscle and other muscles responsible for the forward bending of the hip joint, while the hamstring muscle will be dynamically centrifugally stretched; otherwise, when the power leg rubbed backward, the gluteus maximus muscle and hamstring muscle will turn into centripetal contraction, and the iliopsoas muscle will be dynamically centrifugally stretched. Each group of ballet training is to solve the ability of muscle centrifugal, centripetal, isometric contraction, but also can make them arbitrary restructuring and switching.

### **2.4 Clear and accurate training logic**

The advanced logic of ballet basic training is clear and accurate. It includes ground training, handlebar training, intermediate training, jump and rotation training. The ground training is mainly to establish the correct movement mode, so that students can master the muscle power mode without weight on the ground. The training of supporting handles is an intensive training of movements, while the middle training is a training of expressiveness. The contents of these parts of training are from easy to difficult, from shallow to deep, and progressively. Only by understanding the structure of human body and human sports science can we better explain the scientificity of ballet. For example, from the point of view of joint movement, the training logic of ballet is: first, single joint single movement training; then single joint compound movement training; finally, multi-joint coordination training. From the training purpose, the training logic of ballet is to train the flexibility, stability, balance ability and coordination ability of joints first, and then to train strength and speed, and finally to train explosive force and expressive force. In ballet training, each movement combination is arranged according to the above training logic. Only in this way can we arrange teaching reasonably and effectively, so as to achieve the goal of improving teaching quality.

## **3. Problems in Basic Ballet Training**

### **3.1 The purpose of training is not clear**

The basic training of ballet aims at the different movement modes of each joint of the body and the different contraction modes of related muscles. As a teacher, he must master the training purpose of each movement so as to arrange teaching scientifically and reasonably. But consulting the materials of ballet teaching methods in the past, we can find that the narration of training purpose is too vague. For example, Plie's training purpose in a book is to exercise and strengthen the strength of Achilles tendon, ankle joint, wrist ligament and knee, to exercise the strength and elasticity of leg pushing and the control of landing. This training goal just ignores the hip joint. From the point of view of human body structure, Plie's training focuses on the hip joint in neutral position, abduction position, adduction position and adduction position of flexion and extension, so as to solve the flexibility, stability and coordination of hip, knee and ankle joints. At the same time, Plie can further enhance the

hip external rotation and abduction ability, which is a very important dynamic stretching method in ballet training. If the teacher is not clear about Plie's training purpose for the hip joint, he will certainly neglect hip rotation in the requirements, so that the training can not meet the aesthetic requirements of ballet.

### **3.2 Lack of accuracy in teachers' prompts**

Teachers'cue language is very important in ballet training. It can directly guide students to produce brain response, through the central nervous system in the form of impulse to stimulate muscle contraction. In daily training, when students can not fully grasp the main points of action, there will be many problems and mistakes. At this time, teachers need to remind repeatedly in class like a repeater, until corrections. For example, when doing Plie exercises, the teacher will prompt the students to "open knees", "clamp buttocks", "tail vertebrae to heel" and so on. Sometimes these language hints can not help students correct wrong actions accurately, and some even lead students into training errors. Anatomical analysis of these tips is inaccurate, because our knee joint's main movement mode is flexion and extension, but also can do a small rotation under the knee joint bending, its movement mode does not open the action, so the training tips "knee open" can not let students quickly find the way to complete the action, in fact, we want to complete the knee open this. The main action is the maximum external rotation of the hip joint. If the external rotation ability of the hip joint is well solved in the ground training, then the students will clearly feel the feeling of muscle power when the hip joint is external rotation. On the basis of this, the teacher in the Paley training of the handlebar will prompt the students to constantly rotate the hip joint, knee and second toe in the process of squatting. Bit to line, so that students will naturally gradually meet the training requirements.

### **3.3 Muscle recruitment errors**

When students receive ballet training, each movement is controlled by the nervous system, and the effective contraction of muscles drives the skeleton to complete within the range of joint activities. In order to establish a correct movement mode, first of all, let students know clearly what muscles are involved in joint movement. We should resolutely put an end to the wrong action training of muscle recruitment, which will not only affect the improvement of teaching quality, but also make students' muscles deform; secondly, we must first train from the "lying position", because at this time the body is in a static state, and the weight is supported by the ground, so it is easier for students to have a deep understanding, understanding and feeling of their body, and to be familiar with and master it. After all the movements involved in the joint movement mode and muscle recruitment, the ontology consciousness is reconstructed, and then the movement of each joint is carried out from the position of lying down to the posture of kneeling on the ground with hands on the ground. In teaching, teachers should not only clarify the advanced logic of training, the principle of action and the purpose of training, but also have the ability of strain and error correction.

## **4. Conclusion**

Ballet is an exquisite art created by strength, balance and graceful dancing posture. However, the perfect expression of strength and beauty is through the body as a medium. Therefore, only by applying the research results of sports anatomy, sports physiology and biomechanics in the field of human sports science, can students better grasp the balance of body and control muscle contraction in dance. Finally, it perfectly presents the delicate beauty of ballet.

## **Acknowledgement**

This paper is the research result of the project "Dance Science Training Based on the Research of Human Body Structure" in the key education and teaching reform of Northern University for Nationalities in 2018. Project number: 2018ZDJY09.

## References

- [1] Paul Jackson Mansfield Donald A. Neumann. Basic Actinology [M]. Guo Yiliang, compiled by Li Yingqi. Taipei City: Aisiweier, Taiwan, 2013.01.
- [2] Margareta Nordin, Victor H. Frankel. Basic Biomechanics of Skeletal and Muscle Systems (4th Edition) [M]. Lin Yanhui, Zheng Zhixiu, Wei Hongwen Translated. Taipei City: Waterkur, 2013.09.
- [3] Jacqui Greene Haas. Dance Anatomy [M]. Translated by Wang Huiru. Zhengzhou: Henan Science and Technology Publishing House, 2017.10.