

# Study on the Development and Innovation of Competitive Swimming Techniques from the Perspective of Competition Rules

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**Abstract:** Among the various factors in promoting the development and innovation of swimming techniques, the most important one is the change of competition rules. Every change of the rules would bring revolution in swimming techniques. This paper had made a research on the development and innovation of competitive swimming techniques from the perspective of competition rules, which is helpful for us to understand the development trend of competitive swimming techniques under the influence of changes in rules.

## 1. The Concepts of Swimming Competition Rules and Competitive Swimming Techniques

### (1) Swimming Competition Rules

The Rules of Swimming Competition were formulated by the Chinese Swimming Association Referee Committee in accordance with the Handbook of the International Swimming Federation (FINA) and in light of the actual situation of swimming competitions in China, which can be used for all levels of competitions in the country.

### (2) Competitive swimming techniques

There are mainly four kinds of competitive swimming techniques, which including swimming start, swim distance, turning and final spurt. Among them, the swim distance techniques include body posture, arms techniques, techniques of legs, etc. The development and innovation of competitive swimming techniques involved in this study were all related to swimming competition rules.

## 2. Development and Innovation of Starting Techniques

### (1) Overview of Starting Posture Development and Innovation

#### 1) Outline of Development and Innovation of Starting Platform and Starting Position

In 1973, the height of the block was raised to "50-75 cm", with acreage of "50 cm square" and a reduced tilt angle of "100". The raised height of the starting platform enable the athletes to jump farther, the enlarged area could give the athletes more moving space, and the reduced tilt angle could make the athletes more stable in preparation for departure.

In the rules of swimming competition in 2003, the requirement of starting position on starting platform was changed, and the new requirement of "unlimited arm position" was added. This change enabled the athletes having more using space to exert arm skills when they start. And the back squat starting technique has become more and more popular since then.

In the rules of 2010 to 2014, the surface area of the starting platform was increased by at least 0.50m\*0.50m (the surface area of the starting platform for major swimming events was at least 0.50m in width and 0.60m in length). The increase of the length and surface area of the new starting platform can effectively provide convenient for the squatting athletes, especially the tall male athletes.

#### 2) Overview of innovation and development of the backstroke starting position

In 2005 to 2009, the rules that unchanged for 50 years of "both feet (including toes) should be below the surface of the water" were deleted by the FINA. With the modification of this rule, the backstroke swimmer's body in the water decreased and taking off position increased when kicking off the wall of the pool and starting. This kind of starting position could efficiently reduce the

departure resistance and greatly improve the departure score.

A new term "backstroke starter" came into being in the new rules of 2014-2018. The new rules stipulated that when starting with backstroke starter, both toes must be in contact with the wall of the pool or the pool board, and no toes should be hooked on the edge of the contact board. The emergence of backstroke starter enabled athletes to get more power in the process of backstroke kick-off, and the starting techniques had been improved.

(2) Overview of Development and Innovation of the techniques after entering the water

1) The development and innovation of the legs techniques underwater

The 1979 Swimming Competition Rules emphasized the dolphin leg technique of butterfly swimming, which attracted the attention of coaches and athletes and was widely used in underwater legs after starting and turning. In 1992, the rules of the diving distance should not exceed 15 meters in the backstroke section was proposed for the first time. Then in 2003, the same requirements were also put forward in the freestyle and butterfly sections. Athletes then adjusted their underwater legs technique after departure to ensure that they do not break the rules and reach 15m with the fastest speed.

2) Overview of the Development and Innovation of Long Stroke Techniques in Breaststroke

In the 1992, the long stroke techniques in breaststroke were standardized for the first time. Only after the start and each turn can an athlete make a full backward stroke of the arm to the leg and a kick when his whole body is submerged in the water, but his head must be exposed before the second stroke to the widest point and the inward stroke of both hands.

The rules of 2003 updated the long stroke technical movements of the breaststroke. The permissible use of dolphin legs increased the second power after the long arm stroke, which made the athletes "play" farther. Therefore, the starting 15m and turning performances were greatly improved. While in 2009, FINA added detailed regulations on the timing of dolphin leg kicking in long stroke. In accordance with the rules of FINA 2009, the technical part of breaststroke long stroke was also changed in swimming competition rules of 2010-2014 in China, requiring that the timing of butterfly leg kicking in long stroke should be in the process of backstroke.

(3) Overview of Development and Innovation of Relay Techniques

In 1979, new content was added to the relay competition in the competition and foul part. It required that when the relay competition was not completely finished, and even the athletes of the team who had completed the competition were not allowed to enter the water, otherwise the result would be invalid.

The rules 2003 stipulated that as long as the former player did not touch the wall of the pool, the result would be invalid if the latter player kicked off the platform with the handover stick. Since Omega electronic timing device set the error to 0.03s, the handover time of relay race is not a foul within - 0.03s. The requirements of this rule were more detailed. The swinging arm step starting technique appeared when handover the relay baton. The athletes could get more power by the arm swing and the inertia brought by the stride, which can help them to achieve a longer distance into the water.

### **3. On the Development and Innovation of the swim distance techniques**

As the most important part of the competition, the swim distance is undoubtedly of great importance and most affected by the change of rules. Competitive swimming includes butterfly, backstroke, breaststroke and freestyle. The development and innovation of the four swimming techniques were summarized separately in this section.

(1) Overview of the Development and Innovation of Butterfly Swimming Techniques

The embryonic form of butterfly stroke is breaststroke, with an incoherent stroke and kick movements and a jumping speed. The competition rules promulgated by the International Swimming Federation in 1937 allowed the use of butterfly techniques in breaststroke competition, and the butterfly techniques has developed rapidly since then.

In the 1954 Competition Rules, butterfly and breaststroke were distinguished from arm movements. The butterfly stroke required that both arms should swing forward (and out of the water)

at the same time, and that both arms should stroke backwards at the same time. The emergence of the rules formed the earliest elbow bending or arbitrary form of air arm-shifting technique in butterfly swimming technology in China. With the dolphin leg technique learned from Hungary training, the pause phenomenon was eliminated fundamentally. The butterfly swimming technique was initially formed and began to develop healthily.

The competition rules of 2003 deleted the old requirement of “shoulders should be parallel to the water surface” and added the new requirements of “allowing underwater side kicking” and “not allowing breaststroke kicking”. “Allowing underwater side kicking” had an impact on the underwater leg techniques after butterfly turn kicking off and no kicking breaststroke leg was the first clear proposal after the continuous improvement and development of butterfly swimming techniques. On the one hand, it standardized butterfly swimming techniques, and more importantly, it promoted the healthy development of butterfly swimming techniques.

#### (2) Overview of Development and Innovation of Backstroke Techniques

In the backstroke section of the 1987 Swimming Competition Rules, an explanation for "normal supine posture" was finally added: "Normal supine posture means that the body and horizontal plane do not exceed 90 degrees, and the head posture is not limited to this". This rule allowed athletes to rotate their shoulders and bodies no more than 90 degrees, which promoted the emergence and widespread application of the concept of body rotation in 20th century. By using this posture, athletes can give full play to the strength of trunk muscle group, maintain the body shape, reduce resistance and optimize the technical level when swimming.

In 1992, the rules of swimming competition stipulated that the diving distance after backstroke departure can only be within 15 meters. Therefore, in order to reduce the resistance during swimming, athletes began to pay attention to the maintenance of body posture.

#### (3) Overview of Development and Innovation of Breaststroke

The 1954 Swimming Competition Rules distinguished breaststroke from butterfly swimming arm movements and the breaststroke's arm movement in the air was forbidden. Although the performance score was greatly improved, it hindered the healthy development of breaststroke techniques.

In 1987, the swimming competition rules were amended to "in each complete action cycle (including one stroke and one kick), a part of the head of the swimmer should be exposed to the water surface". The emergence of this rule had promoted the formation and development of the "dive-style" breaststroke technique with large body fluctuations. Huang Xiaomin, a Chinese athlete, is a typical representative of this technique.

In 2003, the swimming competition rules added the words "except the last action before turning around, the last action when turning around and the last action before touching the wall, the elbows should not be exposed to the surface of the water in the complete movement of the arm". In the process of kicking, the word "trembling kick" in "no trembling kick" was replaced by the word "up and down alternation". Although the rules changed slightly, the breaststroke techniques requirements were become more and accurate.

#### (4) Overview of the Development and Innovation of Freestyle Techniques

Freestyle rules have the smallest changes among the four swimming rules over the years. In summarizing the rules and techniques, it was found that the rules had changed some factors that could indirectly affect body posture techniques, such as the depth of swimming pool and swimsuit.

The 1960 swimming competition rules stipulated that the depth from the water surface to the bottom of the pool should be more than 1.50m. In 1992, the rules again increased to "2m", and in 2010, the "recommended depth" should be "3m" on the basis of "at least 2m". The deeper the swimming pool water is, the smaller the resistance to swimmers will be when the water surface disturbance occurs, and ultimately the body position will be improved.

Four new rules were added to swimsuits in the new rules from 2014 to 2018. Air permeability was added to the material of swimsuits. The swimsuits chose by athletes must be in “the list of qualified swimsuits issued annually by FINA” with “the FINA certification mark”. “Swimsuits that conform to the regulations but do not have FINA certification marks must be checked and approved

by the relevant parts when they set a new record". The modification of the new rules aimed to improve athletes' performance through technical improvement rather than the help of external forces.

#### **4. On the Development and Innovation of the Turning Techniques**

The turning techniques mainly focus on the techniques of the athletes' head reaching 5 meters before turning and 10 meters after turning. Before the 1973 Swimming Competition Rules, although it was mentioned that supine position can be changed after touching the wall and before kicking off the wall when make backstroke turning, few athletes use rollover turning. It was not until 1973 that the rule mentioned the words of "body roll", that the roll-over technique became popular.

In 2010-2014 Swimming Competition Rules, a new requirement of "continuous turn" in the technical part of backstroke turn had been put forward for the first time. And the new rule of 2014-2018 required that a continuous one-arm stroke or two-arm simultaneous stroke be done immediately after touching the wall. The new rules require backstroke athletes to turn more smoothly after touching the wall, which can help standardizing athletes' technical movements as well as improving their backstroke turning performance.

#### **5. On the Development and Innovation of the final spurt**

The final spurt techniques mainly focus on the techniques that the athletes' head enter the last five meters. In the 1973 swimming competition rules, the position of athletes' both hands was specified for the first time in the final spurt, that is, they are must in the same horizontal plane. Beside this, no other specific explanation was given. In 1978, the rules began to explain the "same horizontal plane", that is, "above or below the water surface". In 1982, the rules added the words "along the water surface" to their interpretation.

In 1992, the rule added "Must touch the wall in supine position" to the backstroke sprint. Breaststroke swimmers reach the edge of the pool with half complete cooperative action can only use one quick breaststroke arm action and no leg action in the final spurt according to the rules.

In a word, with the continuous updating of competition rules, competitive swimming techniques are also developing continuously. Coaches and athletes should study and make use of competition rules to realize the development and innovation of swimming techniques on the premise of abiding by the competition rules.

#### **References**

- [1] Ma Jiguang. Advantages and disadvantages of using new rules and techniques for island level swimmers in China [J]. Journal of Chengdu Institute of Physical Education, 04, 2012
- [2] Zhou Yijing, Monitoring and training research on Shaanxi excellent swimmer He Zan's starting, turning and swim distance techniques [J]. Xi'an Institute of Physical Education, 2013
- [3] Ji qiao, Fang Zhenyan, Yan Xi. Analysis of the influencing factors of competition arrangement on young swimmers' competitive ability [J] Zhejiang Sports Science, June 2009