Technical and Tactical Analysis of Zhang Yufei's 200m Butterfly Stroke

Xing,Zhi

Zhaoqing College, Zhaoqing, Guangdong, 526061, China

Abstract: Objective: This paper takes the women's 200m butterfly final of the Tokyo Olympics as a study, analyzes and researches Zhang Yufei's technical and tactical movements in the women's 200m butterfly final of the Tokyo Olympics and summarizes the technical and tactical characteristics by repeatedly watching the video of the women's 200m butterfly final of the Tokyo Olympics in 2020.

Methods: The video data software was used to analyze the video footage of the women's 200m butterfly final at the Tokyo Olympics, and Excel and other processing software were used to analyze the data for statistical plotting and combined with the results of the competition in the official website of FINA to analyze the technical and tactical aspects of the final of the women's 200m butterfly final of Zhang Yufei.

Results: The result shows that Zhang Yufei's segment performance is the fastest in the first segment, and the remaining three segments are relatively average; the starting and turning technique is the advantageous technique, the mid-swimming technique is relatively smooth, and the sprinting technique needs to be strengthened; analyzing from the angle of tactics, and combining with the actual situation of the game, the final adopts the "leading tactics". Conclusions: To study the technical and tactical characteristics of Zhang Yufei in the 200m butterfly final of the Tokyo Olympic Games, to provide reference for coaches to guide the future training of China's female butterfly swimmers, to further improve the technique and to enhance the competitive level.

Keywords: Zhang Yufei; 200 meter butterfly; Technique and tactics

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1. Preamble

Women's 200m butterfly is our advantageous program, 200m program is one of the toughest events in the competitive swimming program, which requires athletes to have sufficient physical fitness, strong willpower, and ultra-high level of special swimming techniques. In the past international competitions, many excellent athletes have emerged in China. There are the famous women's butterfly swimmers Wang Xiaohong and Qian Hong who have won many international competitions for China. In the twenty-sixth Atlanta Olympic Games shine Liu Limin, Cai Huiyu and other athletes. After the Athens Olympics, Liu Zigong and Jiao Liuyang have become one of the world's top athletes with their strong strength, and in the 2008 Beijing Olympics, Liu Zigong and Jiao Liuyang both broke the world record, and in the 2009 Women's 200m Butterfly Butterfly Race at the National Games, Liu Zigong, on behalf of the Shanghai team, won with a time of 2:01.81, which created a new world record that has been maintained to this day, and as of 2013 National Games, Liu Zigong and Jiao Liuyang have both won the 200m Butterfly Race. As of the 2013 National Games, both Liu Zige and Jiao Liuyang won the Grand Slam in 200m butterfly. ^[1]Zhang Yufei won the second place in the women's 100m butterfly and the women's 200m butterfly.

In addition to the extremely advanced swimming technique, strong heart and sufficient physical ability to achieve excellent results in competitive swimming competitions, the tactics most suitable for the athlete are formulated according to the athlete's own analysis as well as the opponent's analysis, and through the use of various tactics, the athlete can overcome the opponent and achieve excellent results in the competitive swimming competitions. Some scholars, Gao Jie, have studied and analyzed the characteristics of Liu Zige and Jiao Liuyang's butterfly swimming

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techniques and tactics.^[2],It is with these excellent scholars on the butterfly technical and tactical data analysis and research, to seek the winning rule of the project, and put forward a lot of suggestions and methods, in order to help the butterfly competitive swimming performance improvement. 2020 Zhang Yufei in the Tokyo Olympic Games in the women's butterfly 200 meters event won the championship, not only rely on the individual high level of technology, the reasonable tactics on the field of the game is equally important to deal with different tactics and different opponents. Different tactics are also important to deal with different fields and different opponents. This paper analyzes the video of women's 200m butterfly final in Tokyo Olympics, collects the important data of Zhang Yufei's start, stroke, turn, sprint and other technical aspects of the event, and understands the technical and tactical characteristics of Zhang Yufei in the 200m butterfly final in Tokyo Olympics. The purpose is to learn the advantageous techniques of excellent athletes, improve the technical and theoretical knowledge of swimming events, and provide certain technical support for the teaching and training of butterfly swimming in the future. The study of the technical and tactical characteristics of Zhang Yufei in the 200-meter butterfly final of the Tokyo Olympic Games provides a reference for coaches to guide the future training of China's female butterfly swimmers, to further improve the technique and to enhance the competitive level.

2. Research Objectives and Methods

(1) Research target

This study was conducted with Yufei Zhang, a finalist in the women's 200-meter butterfly at the Tokyo Olympics.

(2) Research methodology

1) Documentation method

Through the China Knowledge Network database, newspapers and magazines, with "butterfly swimming technique" or "swimming technique and tactics" and other key words, to search and organize the relevant theoretical knowledge, for this study to do sufficient literature support.

2) Mathematical and statistical methods

The use of video data software for video footage of the Tokyo Olympics women's 200 m butterfly final, the use of Excel and other processing software for statistical plotting and analysis of data, Zhang Yufei women's 200 m butterfly final segment results plotted charts.

3) Video analysis method

The underwater action video of Zhang Yufei in the women's 200-meter butterfly final at the Tokyo Olympics was technically analyzed by technical software based on sports anatomy to derive her average stroke frequency, average stroke length, segmental stroke length, and segmental stroke frequency on the way to the competition.

3. Findings and Analysis

(1) Segmental performance analysis of the top three athletes in the women's 200-meter butterfly at the Tokyo Olympics

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name and	sequence of	position in a	50 motors	50 meters 50-100 meters 100-150 mete		150-200 meters	Cumulative
surname	passages	ranking of names	Joineters			150-200 meters	time
Zhang Yufei	4	1	26.92	31.37	32.74	32.83	2:03.86
SMITH ·Regan	6	2	28.12	32.27	32.81	32.10	2:05.30
FLICKINGER ·Hali	5	3	28.43	31.43	32.51	33.28	2:05.65

Tabel 1 Tokyo Olympics Women's 200m Butterfly Final Top 3 Sectional Results

From the parameter of the first three athletes' segment results, Zhang Yufei's swimming speed in the first segment is ahead of the second and third place is larger, and in the second segment also relatively maintain a relatively fast swimming speed, Zhang Yufei in the third segment swimming speed and the second and third athletes are not much difference, although in the fourth segment swimming speed is slower than the first, but by virtue of the advantages of the first and second segments, for the final championship to lay the foundation! The first and second segments of the race set the stage for the final win.

(2) Technical analysis by Zhang Yufei

1) Departure techniques

Tabel 2 Zhang Yufei Tokyo Olympics women's 200m butterfly final departure technical parameters

time of departure reaction (s)	Time to start 15m (s)	Distance to water (m)	Underwater butterfly leg count
0.6	6.1	14	11

Departure technique, as the beginning of the whole race technique, plays an important role in swimming performance^[3]. Different distance events have different degrees of dependence on the starting technique, 200m butterfly as a long-distance event, the importance of the starting technique is relatively important compared to short-distance events, and the excellent starting technique together with the appropriate race tactics can determine the direction of the winners and losers of the race.^[4]. In the final, Zhang Yufei's departure used the squatting departure technique. Table 3 shows that Zhang Yufei's reaction time in the competition was 0.6s, which was the fastest reaction among the final athletes, and she came out of the water at a position of about 14 meters after eleven underwater butterfly legs. In the video, Zhang Yufei's position out of the water is longer than other competitors, reflecting that Zhang Yufei has rich experience in competitions as well as excellent starting technique.

2) Touhou technology

From the video, we can see that Zhang Yufei used irregular arm stroke and breathing frequency in the final. Zhang Yufei used the breathing rhythm of one arm stroke and one breath then two arm strokes and one breath in the first and second segments, one arm stroke and one breath then one arm stroke and one breath then two arm strokes and one breath in the third segment, and then resumed the breathing rhythm of one arm stroke and one breath then two arm strokes and one breath then two arm strokes and one breath in the third segment, and then resumed the breathing rhythm of one arm stroke and one breath then two arm strokes and one breath in the fourth segment. The fourth segment resumed the breathing rhythm of one stroke followed by one breath plus two strokes and one breath. The breathing rhythm was analyzed in relation to the swimming speed of each segment. The one arm stroke and one breath sustained twice after the first turn may have increased the speed by adjusting the respiratory rhythm to maintain the advantage gained in the first segment; the change in respiratory rhythm in the third segment may have increased the intake of oxygen in the third segment in order to slow down the rate of lactic acid production and to maintain the speed of the swim during the race; and the rhythm was restored in the fourth segment to the one arm stroke and one breath then two arm strokes and one breath to increase the speed of the swim. A breathing rhythm of one breath, increasing the frequency of the stroke to slow down the speed drop and to sprint.

In addition, Zhang Yufei in the final four-quarter section are used twice to beat the leg and a rowing hand with the swim, and the two beat the leg to press down the foot action there are differences, the first beat the leg when the knees are slightly apart and feet together, the second beat the leg is not together; from the effect of hitting the water, propulsive force, the first beat the leg to the propulsive force than the second to be smaller, and at the same time the two beat the leg to the depth of the same difference is not big, but the second beat the leg to press down the hip rise is slightly smaller, the first beat the leg hip rise is bigger, the buttocks exposed to the water. However, when the second leg is pressed down, the rise of the hip is slightly smaller, and

the rise of the hip of the first leg is larger, and the hip is exposed to the water. Therefore, it was judged that Zhang Yufei's first leg stroke was heavy and the second one was light.

3) Turning technique

Since it is not possible to derive Zhang Yufei's exact turn time in the final and the distance out of the water in the video, we can only derive a relative reference value, and there may be errors. Zhang Yufei's time of 2.97s in the first 5m before touching the wall in the first turn was the fastest, and the same time of 4.11s after the first turn to the exit of the water was also the shortest, and the distance of 8m was also the furthest, and the relative speed was also the highest in the first turn. Compared to the second turn with the same number of strikes, the distance to the water dropped by 0.5m, and the time taken was 0.72s slower than the first turn. After the third turn, Zhang Yufei's underwater butterfly leg movements were reduced from five to four, but the distance out of the water was about 7m, which was still a relatively high speed.

4) Sprint technology

Tabel 3	List of	data f	for the	last 5	5m s	print to	the	side
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Time used (s)	average speed (m/s)	Frequency (times/minute)	delimit (m)
3.56	1.4	50.84	1.67

From Table 3, we can see that Zhang Yufei's swimming speed in the last 15m of the final was decreasing due to the decreasing of her physical ability, and the last 5m sprinting to the edge took 3.56s, and the average speed of the last 5m was 1.4m/s. Comparing the sprinting speed with the average speed of the fourth section and combining it with the video, it can be seen that the decrease of Zhang Yufei's speed in the fourth section was more obvious. In the last 5m, Zhang Yufei still used the breathing rhythm of one arm stroke and one breath, then two arm strokes and one breath, which may be one of the reasons for the decrease of the last stroke frequency and stroke length index to the side. Combining the last 5m, Zhang Yufei's breathing and the stroke frequency and speed, Zhang Yufei's backstroke stamina and sprinting to the side technique are her weak parts.

(3) Tactical analysis of Zhang Yufei

1) Segmented tactics

The analysis uses 50 meters as a segment, from the segment results and segment speed Zhang Yufei adopts the characteristic pattern of fast, slow, slow, slow, she swims in quickly from the beginning of the race to reach her own maximum speed to complete the first sub-segment, the second sub-segment speed has a more obvious decline, the latter two sub-segment speed tends to a steady decline. Zhang Yufei was the fastest in the first segment of the final race (average speed of 1.857m/s), slow in the second segment (average speed of 1.593m/s), slow again in the third segment, but relatively flat (average speed of 1.527m/s), and closest to the third segment in the fourth segment (average speed of 1.522m/s); from the segmentation speeds as well as the race video, Zhang Yufei adopted the From the segment speeds and the race video, Zhang Yufei used the tactic of "preemptive strike", swimming at high speed in the first segment to gain the advantage, and then maintaining the advantage and speed in the middle and later segments to finish the race. The time allocation is characterized by a fast start, followed by a steady even-speed swim, and a final even-speed or accelerated sprint^[4].

2) Departure tactics

In the final with a shorter reaction time than the preliminaries and semi-finals: 0.60s, gained a slight advantage before entering the water; after entering the water, actively doing underwater dolphin style leg strikes, maintaining the speed advantage of the departure quickly transitioned to normal butterfly, so that the butterfly swim in the process of speed more easily to reach its own maximum swim speed, and out of the water close to the 15-meter limit of the distance of the underwater dive, in the water when the lead position, the In the end, the first split achieved a

large advantage.

3) Mid-swim tactic

The first, second, and fourth segments all use one stroke and one breath followed by two strokes and one breath, while the third segment uses two strokes and one breath followed by two strokes and one breath. There is a noticeable change in tempo in the third subparagraph, which is most likely the cause of the decrease in tempo in the third subparagraph.

4) Sprint tactics

Zhang Yufei's speed in the latter part of the race was declining in a slow straight line, and her average speed in the last five metres was 1.4m/s. It was found in the video that Zhang Yufei did not sprint in the last five metres, but maintained the rhythm of the stroke to complete the last five metres. According to the observation and analysis of the third section, the tactic of conserving energy and resuming one stroke and one breath followed by two strokes and one breath in the fourth section is to maintain the speed and slow down the speed decline. It is speculated here that Zhang used the last 50 metres as this sprint, and the final drop in speed was due to a drop in fitness or a build-up of lactic acid.

4. Conclusion

Through the analysis, Zhang Yufei's segment performance was the fastest in the first segment, and the remaining three segments were relatively average; the starting and turning technology was the advantageous technology, the mid-swimming technology was relatively smooth, and the sprinting technology needed to be strengthened; analyzing from the perspective of tactics, and combining with the actual situation of the game, the final was adopted as the "leading tactics".

5. Research Shortcomings and Prospects

The conclusion of this study is based on the analysis of the data, the collection of information only through the video recording observation and official data, which may cause some errors in the analysis results, in the future, we can consider obtaining more accurate data through the field test of professional technical equipment or multifaceted data collection channels, in-depth study of Zhang Yufei's technical and tactical characteristics. Secondly, this study only studied one match, and in the future, the method of tracking research can be applied to study the application of technical and tactical skills in depth.

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