Study on Technical and Tactical Development Characteristics of Outstanding Female Table Tennis Player Wang Manyu

Li Jiaxuan
School of Physical Education and Health, Guangxi Normal University, Guilin, Guangxi, China

Abstract: Wang Manyu is currently one of China's top female table tennis players, renowned for her comprehensive skills and advanced playing style, making her a key focus in the national team's training program. the World Table Tennis Championships stands as one of the nine major tournaments in the sport and serves as a benchmark for evaluating athletes 'performance. To better analyze Wang Manyu's tactical evolution in recent years, this study employs methods including literature review, video analysis, four-stage performance evaluation, and statistical analysis. the research specifically examines her serving phases (serve-and-attack segment, first rally phase) and receiving phases (receive-and-attack segment, second rally phase) regarding scoring efficiency, tactical utilization, and technical elements such as serving techniques, forehand/backhand placement patterns, and their combinations. By compiling detailed statistics from her World Championships women's singles records spanning 2019, 2021, and 2023, the study conducts comparative analysis of her tactical characteristics to identify developmental trends. These findings aim to provide actionable insights for optimizing her training strategies and competitive tactics. the research results demonstrate:At the 2019 World Table Tennis Championships, Wang Manyu demonstrated her strongest performance in the first stage of rallies, where her dominance was most evident. She showed significant advantages in the receiving and attacking phase compared to the serving and attacking phase and the second stage of rallies. However, her ability in the serving and attacking phase remained relatively weak, while the stability in the second stage of rallies was the poorest. the second stage of rallies and the serving and attacking phase were the primary stages for point losses during the 2019 tournament. At the 2021 World Table Tennis Championships, Wang Manyu demonstrated optimal stability during the first phase of rallies. the second phase of rallies showed better consistency compared to the serve-and-attack phase and return-and-attack phase. While scoring was notable in the serve-and-attack phase and the second phase of rallies, their utilization rate remained relatively low. Throughout this tournament, Wang Manyu's performance across all four phases remained commendable overall. At the 2023 World Table Tennis Championships, Wang Manyu demonstrated superior performance in the rally I and II phases compared to the serve-and-attack and return-and-attack phases. Her serve-and-attack phase showed the poorest performance, becoming the primary scoring weakness in the tournament. the rally I phase exhibited the highest stability, serving as one of the key scoring opportunities. the rally II phase demonstrated relatively consistent performance with minimal fluctuations. Although the return-and-attack phase generated high points, its utilization rate remained low, failing to fully leverage its inherent advantages. A three-year match analysis reveals that Wang Manyu has shown improvement in her Phase II rallies, though her scoring consistency remains inconsistent. Her Phase I rallies demonstrated the most stable output performance throughout the period, with minimal fluctuations—a key scoring advantage for Wang Manyu. However, her serve-and-attack phase exhibited significant volatility and poor consistency, showing a declining trend over three years, with exceptions in 2021 where she conceded points through defensive lapses. While retaining certain strengths in the receive-and-attack phase, Wang Manyu has limited usage frequency and few scoring opportunities, requiring active improvement in application frequency. Overall, her Phase I and Phase II rally capabilities have improved over three years, while her serve-and-attack

skills have declined, with the receive-and-attack phase presenting the greatest room for growth.

Keywords: Table Tennis; Female Athletes; Tactics and Techniques

1. Introduction

1.1 Basis for Topic Selection

Table tennis boasts a rich array of competitive elements, particularly in technical and tactical aspects. the sport encompasses diverse techniques including offensive shots, topspin shots, push shots, and footwork, while tactics involve strategic combinations of these skills based on opponents 'strengths and one's own condition. By leveraging their advantages and minimizing weaknesses, players aim to restrict their opponents' gains, thereby securing points and victory. This demonstrates that technical and tactical proficiency remains a decisive factor in table tennis matches. the ability to flexibly apply these strategies according to game dynamics is a critical step in becoming an elite table tennis athlete.

Literature review reveals scarce research on Wang Manyu's technical and tactical strategies. As a representative figure of the new generation of women table tennis players, her signature two-sided double counterattack and loop offensive style remains one of the most advanced playing techniques in modern sports. This study analyzes Wang Manyu's tactical evolution through three consecutive World Table Tennis Championships singles tournaments, aiming to identify her weaknesses and provide theoretical foundations and data support for her future training and competitive performances.

1.2 Research Objective and Significance

1.2.1 Research Objective

The study primarily analyzes Wang Manyu's technical and tactical development through three World Table Tennis Championships women's singles tournaments: her 2019 matches against Sato Hitomi, Sun Yingsha, and Chen Meng; 2021 encounters with Chen Xingtong, Chen Meng, and Sun Yingsha; and 2023 confrontations with Hanna Harpunova, Nina Mitram, and Chen Xingtong. Covering a total of 9 matches across 49 games, the analysis focuses on scoring rates and utilization patterns during serving rounds (serve-and-attack phase, first rally phase) and receiving rounds (receive-and-attack phase, second rally phase), while evaluating technical aspects including serving techniques, forehand/backhand placement patterns, shot trajectories, and their combinations. These data-driven insights aim to identify Wang Manyu's evolving tactical strategies, providing actionable guidance for her future training and competitive performances.

1.2.2 Research Significance

Compared to elite table tennis players like Sun Yingsha and Chen Meng, Wang Manyu has relatively limited documented research materials. Despite participating in numerous competitions as a key player, there has been scant study on the evolution of her technical and tactical approaches. This research on Wang Manyu's developmental characteristics not only provides systematic data for her future training and competitive performance but also offers valuable insights for table tennis enthusiasts.

2. Study Subjects and Methods

2.1 Study Subjects

This study focuses on the technical and tactical development characteristics of outstanding female table tennis player Wang Manyu, analyzing her performance across three World Table Tennis Championships (2019, 2021, and 2023) in women's singles matches comprising 9 games and 49 sets. Detailed match information is presented in Table 1.

Table 1. Detailed Singles Matchups of Wang Manyu at the 2019, 2021, and 2023 World Table Tennis Championships

Event Name	opponent	results
2019 Budapest World Table Tennis Championships	Round of 16 Wang Manyu vs. Sato Hina (chop)	4:2
	Round of 16 Wang Manyu vs Sun Yingsha	4:2
	4th Round Wang Manyu vs Chen Meng	0:4
2021 World Table Tennis Championships in Houston	Round of 16 Wang Manyu vs Chen Xingtong	4:0
	4th Round Wang Manyu vs Chen Meng	4:3
	Final: Wang Manyu vs Sun Yingsha	4:2
2023 World Table Tennis Championships, Durban, South Africa	Round of 16 Wang Manyu vs Hanna Harpunova (chop)	4:3
	Round of 16 Wang Manyu vs Nina Mitram	4:1
	Round of 16 Wang Manyu vs Chen Xingtong	0:4

2.2 Research Methods

2.2.1 Literature Review Method

Search for relevant literature on keywords such as "Wang Manyu", "Four-stage indicator evaluation method", and "table tennis tactics and techniques analysis" on websites like China National Knowledge Infrastructure (CNKI) and China journals, and conduct reading and analysis for reference.

2.2.2 Video Observation Method

By searching video clips of Wang Manyu's three matches in the women's singles events at the 2019, 2021, and 2023 World Table Tennis Championships, relevant data were collected using calculation formulas and Table 2.

Calculation formulas for usage rate and scoring rate per section (Yang Q. et al., 2014):

Scoring rate of the first strike segment = $\frac{A^{+}+B^{+}}{A+B+C^{-}}\times 100\%$

Flash sale section usage rate = $\frac{A+B+C^{-}}{A+B+C+D}\times 100\%$

Scoring rate in the rebounding segment = $\frac{X^{+}+Y^{+}}{X+Y}\times 100\%$

Score rate in stalemate stage I = $\frac{C^{+}+D^{+}}{C^{+}+D}\times 100\%$

Score rate in stalemate stage II = $\frac{Z^{+}}{Z}\times 100\%$

Usage rate of stalemate stage II = $\frac{Z}{X+Y+Z}\times 100\%$

Table 2. Technical and Tactical Points and Losses Codes in Table Tennis Matches (Yang Q, 2014)

turn	batting	Scoring observation points and codes	Scoring observation points and codes	Total code
Serve wheel	serve a ball	Opponent's serve error (A+)	This player committed a serve fault (A-)	A
	Third beat	The opponent made a mistake on the 4th shot (B+)	The third shot error in this sequence (B-)	B
	Beat 5	The opponent made a mistake on the 6th shot (C+)	The fifth strike error in this sequence (C-)	C
	be locked in a stalemate I	The opponent's mistake on the 8th shot and beyond (D+)	The mistake occurred from our 7th stroke onwards(D-)	D
Serve and return wheel	receive	The opponent made a mistake on the 3rd shot (X+)	Receiving serve error (X-)	X
	Beat 4	The opponent made a mistake on the 5th shot (Y+)	The fourth shot in this sequence was incorrect (Y-)	Y
	be locked in a stalemate II	The opponent's mistake on the 7th shot and beyond (Z+)	The error occurred from our 6th stroke onwards(Z-)	Z

2.2.3 Four-stage Indicator Evaluation Method

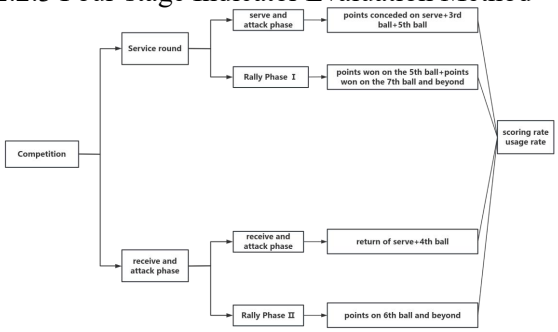

Figure 1. Structure of the Four-Stage Indicator Evaluation Model (Yang Q, 2014)

This study employs Yang Qing's "Four-Phase Indicator Evaluation Method" [1]. Compared to the "Three-Phase Indicator Evaluation Method, " it categorizes athletes' fifth-rally scores as part of the rally phase and fifth-rally losses as part of the serve-and-attack phase, effectively resolving the mismatch between match data from both players. This approach provides clearer insights into whether athletes demonstrate dominance during the serve phase or the return phase of rallies.

The study also established evaluation criteria for scoring rates and usage rates in men's and women's singles (Tables 3 and 4). This paper will conduct a technical and tactical assessment of Wang Manyu's performance at the World Table Tennis Championships based on these criteria.

Table3. Evaluation Criteria for Men's and Women's Singles Scoring Rates (Yang Q, 2014)

		outstanding	good	pass a test	fail
	Scoring rate after free throws/%	>54.32	(54.32, 46.32]	(46.43, 36.95]	<36.95
men singles	Pass recovery rate/%	>58.33	(58.33, 50.00]	(50.00, 42.04]	<42.04
	Stalemate I scoring rate/%	>72.19	(72.19, 56.25]	(56.25, 43.39]	<43.39
	Stalemate II scoring rate/%	>51.05	(51.05, 37.50]	(37.05, 23.08]	<23.08
	Scoring rate after free throws/%	>64.77	(64.77, 50.00]	(50.00, 34.70]	<34.70

women singles	Pass recovery rate/%	>60.42	(60.42, 43.94]	(43.94, 37.21]	<37.21
	Stalemate I scoring rate/%	>70.16	(70.16, 56.57]	(56.57, 50.00]	<50.00
	Stalemate II scoring rate/%	>55.56	(55.56, 40.46]	(40.46, 22.48]	<22.48
Theoretical percentage/%		20	30	30	20

Table 4. Evaluation Criteria for Single-Use Rates in Men and Women (Yang Q, 2014)

		Gao	centre	low
men singles	Flash sale usage rate/%	≥72.22	(72.22, 57.07]	<57.07
	Reception usage rate/%	≥73.86	(73.86, 57.02]	<57.02
	Usage rate of stalemate I/%	≥42.93	(42.93, 27.78]	<27.78
	Usage rate of stalemate II/%	≥42.98	(42.98, 26.14]	<26.14
women singles	Flash sale usage rate/%	≥63.47	(63.47, 48.57]	<48.57
	Reception usage rate/%	≥51.72	(51.72, 41.39]	<41.39
	Usage rate of stalemate I/%	≥51.43	(51.43, 36.53]	<36.53
	Usage rate of stalemate II/%	≥52.14	(52.14, 35.29]	<35.29
Theoretical percentage/%		25	50	25

2.2.4 Mathematical Statistics Method

By analyzing the video footage, we calculated Wang Manyu's per-game scoring rate, usage rate, and other relevant metrics in an Excel spreadsheet using the specified formula.

3. Results and Analysis

3.1 Technical and Tactical Analysis of Wang Manyu at the 2019 World Table Tennis Championships in Budapest, Hungary

The 2019 World Table Tennis Championships were held in Budapest, Hungary. In the women's singles competition, 180 qualifiers were divided into 60 groups of three players each. Group winners earned direct qualification for the main draw. Additionally, four second-place teams were randomly selected through a draw to advance to the finals. the main draw featured 128 spots, including 64 seeded players and 64 qualifiers who successfully progressed from the qualifying rounds.

Wang Manyu made her debut in women's singles, competing against Cameroon, ADAMKOVA Karin, Elisabetta Samara, Sato Hitomi, Sun Yingsha, and Chen Meng. She ultimately lost to Chen Meng, securing the bronze medal at the tournament. At the 2019 World Table Tennis Championships, her performance was analyzed through three matches against Sato Hitomi, Sun Yingsha, and Chen Meng, with results of 4-2, 4-2, and 0-4 respectively. the detailed breakdown is as follows:

Table 5. Analysis of 4-Dan Indicator Comparison Between Wang Manyu and Sato Hitomi

	Serve wheel		Serve and return wheel	
	Serve and attack phase	Rally Phase I	Receive and attack phase	Rally Phase II
score	6	28	10	16
no	6	14	8	20
Usage rate and evaluation results	22% (low)	78% (high)	33% (low)	67% (high)
Scoring rate and evaluation results	50% (Good)	67% (good)	56% (good)	44% (good)

As shown in Table 5, Wang Manyu demonstrated lower usage rates of serve-and-attack combinations with Sato Hitomi during matches, yet maintained high scoring efficiency. She showed higher utilization rates of stalemate I combinations while sustaining strong scoring performance, though her serve-and-attack combinations remained underused despite consistent scoring potential. the defensive nature of Sato Hitomi's chopping style made it unlikely for Wang to resolve matches within the first three shots, often resulting in prolonged chopping-offensive stalemates. During serve-and-attack phases, Wang predominantly employed low-spin backhand long balls to Sato, creating defensive rallies that allowed her to maintain offensive momentum, explaining the limited use of this tactic. In stalemate I scenarios, Wang strategically employed alternating forehand and backhand drop shots to disrupt Sato's defensive rhythm, increasing her own error rate and scoring efficiency. Her serve-and-attack strategy favored steady push-and-sweep tactics, while stalemate II matches saw Wang consistently targeting Sato's center court to limit spin generation and strengthen offensive dominance. the match progression revealed Wang's gradual adaptation to Sato's spin tactics, coupled with her ability to adjust strategies through balanced offensive play. Her seamless integration of defensive rallies and aggressive

pushes highlighted her consistent forehand stability and refined coordination between defensive and offensive techniques. When facing sudden attacks from opponents, she can promptly mount defense, demonstrating superior performance in rallies compared to serving and receiving rallies. However, when competing against defensive players, she requires not only stable techniques but also exceptional physical stamina. Losing two games was a normal outcome for Wang Manyu.

Table 6. Four-Stage Indicator Analysis of Wang Manyu vs Sun Yingsha

	Serve wheel		Serve and return wheel	
	Serve and attack phase	Rally Phase I	Receive and attack phase	Rally Phase II
score	20	15	27	12
no	22	11	15	16
Usage rate and evaluation results	62% (middle)	38% (low)	60% (high)	40% (Medium)
Scoring rate and evaluation results	48% (passing)	58% (good)	64% (Excellent)	43% (good)

As shown in Table 6, Wang Manyu demonstrated balanced performance against Sun Yingsha in match statistics: moderate usage and decent scoring rates during serve-and-attack phases, low frequency but effective execution of stalemate Phase I, high frequency with excellent scoring rates during return-and-attack phases, and moderate usage with good scoring rates in stalemate Phase II. the two players 'identical playing styles and mutual familiarity with each other's tactics led to fewer serve-and-attack scenarios. Wang's serves predominantly targeted Sun's mid-court short balls with slight topspin to prevent passive situations caused by Sun's backhand topspin loops and forehand lobs. During stalemate Phase I, Wang controlled Sun's offensive trajectories through strategic serves, maintaining offensive pressure while forcing defensive adjustments. Her backhand dominance became particularly evident in return-and-attack phases, where she frequently countered Sun's short serves to mid-court with backhand topspin loops, showcasing her offensive advantages. In stalemate Phase II, Wang outperformed Sun in transitioning between topspin loops and counterattacks, securing a clear advantage. While Wang's return-and-attack performance effectively demonstrated her backhand strengths, her forehand weakness compared to other female players became apparent. Her tendency to retreat from rallies and aggressive counterattacks resulted in slower return speeds than most female table tennis players, leading to frequent point losses due to slower ball speed compared to Sun Yingsha.

Table7. Four-Dimensional Index Analysis of Wang Manyu vs Chen Meng

	Serve wheel		Serve and return wheel	
	Serve and attack phase	Rally Phase I	Receive and attack phase	Rally Phase II
score	7	6	6	7
no	12	11	11	9
Usage rate and evaluation results	53% (middle)	47% (middle)	52% (high)	48% (middle)
Scoring rate and evaluation results	37% (passing)	35% (fail)	35% (fail)	44% (good)

As shown in Table 7, Wang Manyu demonstrated satisfactory usage and scoring rates in the serve-and-attack phase during her match against Chen Meng, while failing to meet standards in the stalemate I phase. Her serve-and-attack transition showed high usage but poor scoring rates, whereas the stalemate II phase exhibited moderate usage and good scoring performance. In serve-and-attack sequences, Wang frequently served balls to Chen Meng's center court, often initiating rallies after serving. During stalemate I phases, Wang's transition techniques were noticeably unrefined, with her backhand retreats becoming a critical weakness. Slow execution during rallies led to increased errors. In serve-and-attack transitions, Chen Meng frequently served long balls toward Wang's center, forcing her to initiate rallies and resulting in heavy point losses. During stalemate II phases, Wang often employed short serves followed by wide-angle serves to maneuver Chen Meng, causing frequent point losses. Throughout the match, Wang demonstrated limited tournament experience compared to Chen Meng, with awkward tactical execution. Wang favored backhand retreats and rallies, while Chen Meng's close-table counterattacks accelerated play. This mismatch in transition speed ultimately led to errors. Additionally, Wang's backhand was more stable and solid than

her forehand, but Chen Meng's persistent pressure on Wang's forehand prevented her from utilizing her backhand advantages, resulting in defeat through sustained dominance.

In summary, Wang Manyu's performance in the serve-and-attack phase demonstrated two "medium" ratings and one "low" rating, with one "good" and two "passable" scoring rates, indicating limited advantages and inconsistent performance in this segment. During the rally I phase, her usage rate showed one "high", one "medium", and one "low" rating, paired with two "good" and one "unqualified" scoring rates, suggesting unstable execution but latent potential. In the receive-and-attack phase, two "high" and one "low" ratings were recorded alongside two "excellent" and one "good" scoring rates, reflecting certain strengths and effective offensive awareness in receiving serves. the rally II phase saw one "high" and two "medium" usage rates with three "good" scoring rates, demonstrating Wang Manyu's established dominance and relatively stable performance in this critical stage.

3.2 Technical and Tactical Analysis of Wang Manyu at the 2021 World Table Tennis Championships in Houston, USA

The 2021 World Table Tennis Championships were held in Houston, USA. In the women's singles final stage, China's Wang Manyu defeated her teammate Sun Yingsha with a score of 4:2, successfully claiming the championship. As a result, China's women's table tennis team achieved a 14th consecutive title in the women's singles event at the World Table Tennis Championships. In the 2021 World Championships, three matches between Wang Manyu and Chen Xingtong, Chen Meng, and Sun Yingsha were analyzed respectively, with the match results being 4:0, 4:3, and 4:2. the specific details are as follows:

Table 8. Analysis of Fourth-Dan Indicators for Wang Manyu vs Chen Xingtong

	Serve wheel		Serve and return wheel	
	Serve and attack phase	Rally Phase I	Receive and attack phase	Rally Phase II
score	12	9	9	17
no	8	6	5	8
Usage rate and evaluation results	57% (middle)	43% (middle)	36% (low)	64% (high)
Scoring rate and evaluation results	60% (good)	60% (good)	64% (Excellent)	68% (Excellent)

As shown in Table 8, Wang Manyu demonstrated strong performance against Chen Xingtong in the following aspects: moderate usage and high scoring rate in serve-and-attack phases; moderate usage and excellent scoring rate in stalemate Phase I; low usage but outstanding scoring rate in follow-up attack phases; and high usage with exceptional scoring rate in stalemate Phase II. During serve-and-attack phases, Wang strategically served to Chen's mid-court position, creating a stalemate after his return. In stalemate Phase I, she altered Chen's rhythm to increase his error rate. For follow-up attacks, Wang employed twisting and pulling techniques to disrupt Chen's movements, which significantly contributed to her high scoring efficiency. During stalemate Phase II, she executed aggressive positional adjustments to consistently force errors. Throughout the match, Wang maintained a steady and methodical approach, effectively avoiding unnecessary mistakes despite Chen's relentless attacks. Her familiarity with teammates allowed her to employ a relatively simple yet practical tactical framework throughout the game.

Table 9. Four-Dimensional Index Analysis of Wang Manyu vs Chen Meng

	Serve wheel		Serve and return wheel	
	Serve and attack phase	Rally Phase I	Receive and attack phase	Rally Phase II
score	17	19	21	14
no	17	16	16	17
Usage rate and evaluation results	49% (middle)	51% (high)	54% (high)	46% (middle)
Scoring rate and evaluation results	50% (Good)	54% (passing)	57% (good)	45% (good)

As shown in Table 9, Wang Manyu demonstrated strong performance in this match against Chen Meng, particularly in serving and attacking phases with moderate usage rates and good scoring efficiency. She showed high usage rates and satisfactory scoring rates in the first phase of rallies, while maintaining moderate usage rates and decent scoring rates during the second phase. In serving and attacking phases, Wang Manyu clearly developed her signature tactics: she would serve to the opponent's center with moderate underspin to disrupt their return

quality before launching counterattacks. During the first phase of rallies, due to Chen Meng's strong table protection skills near the table, Wang Manyu failed to gain significant advantages after forming rallies, resulting in higher error rates. In receiving and attacking phases, Wang Manyu effectively utilized her backhand topspin skills and seamless attack-defense transitions to provoke counterattacks, significantly improving her scoring efficiency. the second phase of rallies saw Wang Manyu fully leverage her backhand capabilities to expand her advantage, becoming a crucial scoring phase. the match between Wang Manyu and Chen Meng was intensely competitive, with psychological factors playing a significant role. Wang Manyu demonstrated superior mental resilience compared to Chen Meng, along with strong backhand control and attack-defense coordination, fully embodying the fighting spirit of table tennis athletes!

Table 10. Analysis of Four-Dimensional Indicators for Wang Manyu vs Sun Yingsha

	Serve wheel		Serve and return wheel	
	Serve and attack phase	Rally Phase I	Receive and attack phase	Rally Phase II
score	15	20	15	16
no	4	23	13	21
Usage rate and evaluation results	31% (low)	69% (high)	43% (middle)	57% (high)
Scoring rate and evaluation results	79% (Excellent)	47% (fail)	54% (good)	43% (good)

As shown in Table 10, Wang Manyu and Sun Yingsha exhibited distinct playing patterns: Wang demonstrated low utilization of serve-and-attack sequences with excellent scoring efficiency, while Sun showed high frequency of stalemate I sequences but subpar scoring performance. the receiving-and-attack sequences were used moderately with decent scoring rates, whereas Sun maintained strong utilization of stalemate II sequences with favorable outcomes. In serve-and-attack scenarios, Wang predominantly employed post-serve offensive plays, including proactive topspin volleys and topspin twists during receiving phases to create scoring opportunities. the stalemate I sequences revealed Wang's limited adaptability in transitioning between offense and defense when facing Sun's close-table defensive tactics, often leading to errors due to Sun's rhythm control. Throughout the match, Wang's performance in stalemate II sequences stood out with superior stability compared to Sun, showcasing exceptional backhand control and steady defensive execution. While Sun and Wang maintained comparable skill levels, Wang's timely mental adjustments ultimately secured victory in this competitive match.

In summary, Wang Manyu demonstrated strong performance in the serve-and-attack phase of this competition, with 2 "medium" and 1 "low" usage rates, along with 1 "excellent" and 2 "good" scoring rates. Although one instance showed a "low" usage rate, the corresponding scoring rate was "excellent, " indicating her solid capabilities in this phase. During the sustained play phase (Phase I), she recorded 2 "high" and 1 "medium" usage rates, paired with 1 "good, " 1 "passing, " and 1 "failing" scoring rate, reflecting inconsistent performance and potential weaknesses. In the receive-and-attack phase, she achieved 1 "high, " 1 "medium, " and 1 "low" usage rates, with 1 "excellent" and 2 "good" scoring rates, demonstrating stable execution but showing occasional hesitation in decision-making. the sustained play phase (Phase II) saw 2 "high" and 1 "medium" usage rates, accompanied by 1 "excellent" and 2 "good" scoring rates, indicating Wang Manyu maintained significant dominance while demonstrating smoother transitions compared to the receive-and-attack phase.

3.3 Technical and Tactical Analysis of Wang Manyu at the 2023 World Table Tennis Championships in Durban, South Africa

The 2023 World Table Tennis Championships were held in Durban, South Africa. the draw for the Chinese women's singles team allocated Sun Yingsha to the 1/4 bracket, Wang Yidi to the 2/4 bracket, Chen Meng to the 3/4 bracket, and Wang Manyu and Chen Xingtong to the 4/4 bracket. In the women's singles quarterfinals, Wang Manyu was defeated 0-4 by her teammate Chen Xingtong, failing to advance to the semifinals. This article analyzes three matches featuring Wang Manyu against Hanna Harpunova, Nina Mitram, and Chen Xingtong during the 2023 World Championships, with results of 4-3, 4-1, and 0-4 respectively. the detailed breakdown is as follows.

As shown in Table 11, Wang Manyu demonstrated lower utilization rates and average

scoring efficiency in the serve-and-attack phase during her match against Hanna Harponova. She exhibited higher usage rates and favorable scoring performance in the first-phase rallies, while showing lower efficiency and decent scoring rates in the return-and-attack phase. the second-phase rallies saw particularly high utilization rates and excellent scoring performance. Wang's performance remained inconsistent throughout the match, as Harponova's unconventional playing style combining slice shots with inverted topspin left her struggling to adapt initially. the constant spin variations frequently resulted in unnecessary errors. Wang maintained a conservative approach by primarily targeting Harponova's backhand, but Harponova's inverted topspin techniques consistently forced her to execute half-high shots, creating offensive opportunities. During serve-and-attack phases, Wang predominantly served long backhand shots, leading to prolonged rallies. Her solid fundamentals and stamina allowed her to consistently pressure opponents during first-and second-phase rallies, significantly increasing their error rate. the match revealed Wang's noticeable lack of experience when facing specialized playing styles, coupled with overly conservative defensive strategies. These observations suggest that Wang should intensify training with players employing unconventional tactics in future practice sessions.

Table11. Analysis of 4th Segment Indicators between Wang Manyu and Hanna Harpunova

	Serve wheel		Serve and return wheel	
	Serve and attack phase	Rally Phase I	Receive and attack phase	Rally Phase II
score	11	24	8	30
no	12	17	6	20
Usage rate and evaluation results	36% (low)	64% (high)	22% (low)	78% (high)
Scoring rate and evaluation results	48% (passing)	59% (good)	57% (good)	60% (Excellent)

Table 12. Analysis of 4th Segment Indicators between Wang Manyu and Hanna Harpunova

	Serve wheel		Serve and return wheel	
	Serve and attack phase	Rally Phase I	Receive and attack phase	Rally Phase II
score	14	10	22	8
no	16	5	10	8
Usage rate and evaluation results	67% (high)	33% (low)	67% (high)	33% (low)
Scoring rate and evaluation results	47% (passing)	67% (good)	69% (Excellent)	50% (Good)

As shown in Table 12, Wang Manyu demonstrated high utilization rates and satisfactory scoring efficiency in the serve-and-attack phase during her match against Nina Mitram. the rally I phase showed low usage rates but maintained good scoring performance, while the receive-and-attack phase exhibited high utilization rates with outstanding scoring results. the rally II phase displayed lower usage rates yet maintained excellent scoring efficiency. Throughout the match, Wang Manyu maintained relatively stable performance. In serve-and-attack sequences, her shots lacked precision, leading her to frequently push the ball to opponents for errors—though this approach appeared overly conservative. During receive-and-attack phases, she executed spin shots when conditions permitted, transitioning to offensive plays after defensive adjustments when unable to execute spin shots. In both rally I and II phases, Wang Manyu maintained high-quality shots while consistently prioritizing stability, scoring points through continuous opponent manipulation and control.

Table 13. Analysis of 4th Segment Indicators between Wang Manyu and Hanna Harpunova

	Serve wheel		Serve and return wheel	
	Serve and attack phase	Rally Phase I	Receive and attack phase	Rally Phase II
score	2	10	10	8
no	9	16	5	14
Usage rate and evaluation results	30% (low)	70% (high)	41% (low)	59% (high)
Scoring rate and evaluation results	18% (fail)	38% (fail)	67% (Excellent)	36% (passing)

As shown in Table 13, Wang Manyu demonstrated lower utilization rates and subpar scoring efficiency in the serve-and-attack phase during her match against Chen Xingtong. While she showed higher usage rates and decent scoring performance in the rally phase I, her serve-and-attack phase utilization remained low with excellent scoring efficiency. Conversely, her rally phase II exhibited high utilization rates and satisfactory scoring rates. Throughout the match, Wang Manyu's performance consistently fell short of Chen Xingtong's. Chen's

straightforward tactics—constantly breaking Wang's central forehand position—forced her into defensive positions and led to frequent errors. the two players engaged in intense rallies during phases I and II, with Wang continuously enhancing the quality and spin of her forehand shots to maintain steady point control. However, Chen's relentless pace escalation during rallies effectively suppressed Wang's offensive capabilities, ultimately resulting in her defeat.

In summary, Wang Manyu's performance in the serve-and-attack phase showed 1 high and 2 low usage rates, with 2 pass rates and 2 fail rates, indicating she lacks dominance in this segment and needs to adjust her serving strategy to minimize opponents' aggressive attacks. During the rally I phase, the usage rate recorded 2 highs and 1 low, with 2 good and 1 fail rate, reflecting inconsistent performance. the receive-and-attack phase demonstrated 1 high and 2 low usage rates, paired with 2 excellent and 1 good scoring rate, suggesting Wang Manyu maintains certain advantages in this segment with relatively high execution quality. In the rally II phase, the usage rate showed 2 highs and 1 low, with 1 excellent, 1 good, and 1 pass rate, indicating unstable performance where she struggled to leverage her strengths in spin control and power generation.

3.4 Analysis of Technical and Tactical Development Characteristics in Wang Manyu's ThreeWorld Table Tennis Championships Competitions

Analysis of Figures 2 and 3 reveals that Wang Manyu's performance in the serve-and-attack phase exhibited the greatest fluctuations and instability over three years. Her 2021 performance was the strongest, while her 2023 performance was the weakest, even lagging behind 2019 levels——a key factor contributing to her point losses in 2023 tournaments. During the stalemate I phase, Wang's overall performance showed gradual improvement with relatively slow growth, marking a period of consistent scoring output. In the serve-and-attack phase, her scoring rate increased over three years but saw declining usage frequency. Although this remains her primary scoring method, low utilization rate significantly impacted effectiveness. the stalemate II phase demonstrated steadily rising usage rates but less stable scoring performance, with relatively consistent overall fluctuations. Overall, across three tournaments, Wang's main scoring phases were the stalemate I and II phases, while her point loss episodes predominantly occurred during the serve-and-attack phase.

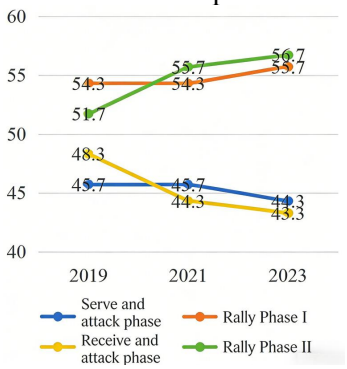

Figure 2. Comparison of Average Utilization Rates Across Three World Table Tennis Championships

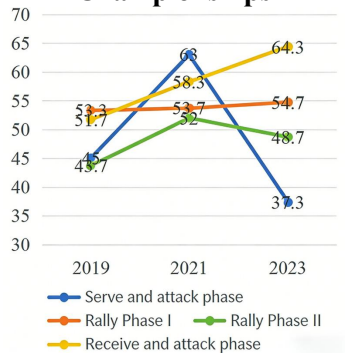

Figure 3. Comparison of Average Scoring Rates Across Three World Table Tennis Championships

4. Conclusion and Suggestion

4.1 Conclusion

At the 2019 World Table Tennis Championships, Wang Manyu demonstrated her strongest performance in the first stage of rallies, where her dominance was most evident. She showed significant advantages in the receiving and attacking phase compared to the serving and attacking phase and the second stage of rallies. However, her ability in the serving and attacking phase remained relatively weak, while the stability in the second stage of rallies was the poorest. the second stage of rallies and the serving and attacking phase were the primary stages for point losses during the 2019 tournament.

At the 2021 World Table Tennis Championships, Wang Manyu demonstrated optimal stability during the first phase of rallies. the second phase of rallies showed better consistency compared to the serve-and-attack phase and return-and-attack phase. While scoring was notable in the serve-

and-attack phase and the second phase of rallies, their utilization rate remained relatively low. Throughout this tournament, Wang Manyu's performance across all four phases remained commendable overall.

At the 2023 World Table Tennis Championships, Wang Manyu demonstrated superior performance in the rally I and II phases compared to the serve-and-attack and return-and-attack phases. Her serve-and-attack phase showed the poorest performance, becoming the primary scoring weakness in the tournament. the rally I phase exhibited the highest stability, serving as one of the key scoring opportunities. the rally II phase demonstrated relatively consistent performance with minimal fluctuations. Although the return-and-attack phase generated high points, its utilization rate remained low, failing to fully leverage its inherent advantages.

A three-year match analysis reveals that Wang Manyu has shown improvement in her Phase II rallies, though her scoring consistency remains inconsistent. Her Phase I rallies demonstrated the most stable output performance throughout the period, with minimal fluctuations—a key scoring advantage for Wang Manyu. However, her serve-and-attack phase exhibited significant volatility and poor consistency, showing a declining trend over three years, with exceptions in 2021 where she conceded points through defensive lapses. While retaining certain strengths in the receive-and-attack phase, Wang Manyu has limited usage frequency and few scoring opportunities, requiring active improvement in application frequency. Overall, her Phase I and Phase II rally capabilities have improved over three years, while her serve-and-attack skills have declined, with the receive-and-attack phase presenting the greatest room for growth.

4.2 Recommendations

Wang Manyu demonstrated excellent backhand performance during the match. During training, she should maintain this advantage while refining backhand spin and speed to sustain her receiving and attacking capabilities. Additionally, increasing practice on serving variations will enhance her serving diversity and strengthen her serve-and-attack advantage. Her most noticeable weakness lies in slow transitions during rallies. Training should focus on near-table defense during defensive plays and aggressive rallies from the back table during offensive plays. This approach not only improves her transition speed during rallies but also ensures consistent defensive and offensive quality. Furthermore, it can address her middle forehand weakness to enhance her first-round rally capabilities while maintaining dominance in second-round rallies.

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