Book of abstracts

of

The 14th ITTF Sports Science Congress and 5th World Racquet Sports Congress

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The 14th ITTF Sports Science Congress and 5th World Racquet Sports Congress

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Message from International Table Tennis Federation

ITTF President's Message

As a prelude to the individual World Table Tennis Championships it has become a tradition to hold a gathering of sport scientists interested in table tennis. This time Suzhou has an honour to host sports scientists from all over the world. But this time our ITTF Sports Science and medical Committee has taken a step forward and combining the sports science medical knowledge of all four major racquet sports. So Suzhou will witness another very successful ITTF Sports Science Congress and Racquet Sports Congress, unfold prior to the start of the competition.

It is only fitting that this event is held at Soochow University, which specializes in "communications". It is utmost importance that research papers and scientific findings are "communicated" to table tennis community in practical terms to be understood by the coaches and players. The same thoughts are also sent to other racquet sports. At this point I would like to underline, that the most important from the point of view of ITTF is "applied" research. Applied research that will provide practical, theoretical and immediate applications. Applications that will support our decision when we need to change our activity and improvement by finding solutions to our problems. This statement stands true especially in direction of our PP5 development plan.

I urge sport scientists and researchers – not only from table tennis but also from other racquet sports – to look for the future, to anticipate trends, to provide us with a glimpse of what could be and what should be our sport in years to come, to help us leap forward based on scientific principles. I urge you to combine the knowledge of all racquet sports and find the way to make our sport even healthier. The ITTF counts on you to guide the way to a healthy and safe future for our sport while maintaining the athletic and technical performance of our athletes. I also ask you to work closely with the coaches and the players to develop future trends that would enhance our sport.

On behalf of the ITTF, I welcome you all to the 14th ITTF Sport Science Congress and the 5th Racquet Sports Congress and I hope that the more than 235 abstracts submitted by contributors from 14 states and 3 continents will ensure an interesting debate and be thought-provoking for all the participants.

I am very grateful to the organizers of this event, the 53rd WTTC Organization Committee, Soochow University, China Table Tennis Association and members of the ITTF Sports Science and Medical Committee. I hope you enjoy the Congress and make new friends while renewing old ones. I also invite you after the congress to watch exciting matches at the 53rd World Table Tennis Championships.

Thomas Weikert
President ITTF

Message from Chinese Table Tennis Association

CTTA President's Message

Upon the opening of the 53rd World Table Tennis Championships, I am deeply delighted to see best researchers and scholars in our sport have assembled in the beautiful city of Suzhou from all over the world to exchange latest progress in research, and to discuss the trend of development. Hereby, on behalf of the Chinese Olympic Committee and Chinese Table Tennis Association, I would like to extend my warmest welcome to all the representatives present, and express my sincere congratulations to the grand opening of the Sports Science Congress.

Science and technology innovation, a powerful engine to the sustainable development of sports, has driven all the progress of table tennis, from chop to loop, backspin to topspin, and smaller to bigger ball. With a history of more than a century, table tennis has developed into a sport that is not only loved by people as an active event in international competitions, but also a popular way for the public to improve physique and keep fit. Research has shown that playing table tennis regularly can enhance the intelligence of young people, temper their willpower, and improve their mental capacity to stand setbacks; In addition, it will also play a positive role in upgrading public health and happiness. I sincerely hope that Chinese Table Tennis Association can work together with you in promoting the continuous progresses of table tennis, and to make it our common aspiration to attract more people around the globe to join the game and enjoy the fun it brings.

The Organizing Committee of the 53rd World Table Tennis Championships has paid great attention to the Congress, The Chinese Sport Science Society has offered huge help, and the Soochow University has done painstaking hard work in preparation. Hereby, I would like to express my sincere gratitude and appreciation to all of them.

To conclude, I wish this Spot Science Congress a great success, and everyone a pleasant stay in Suzhou!

Cai Zhenhua
President CTTA

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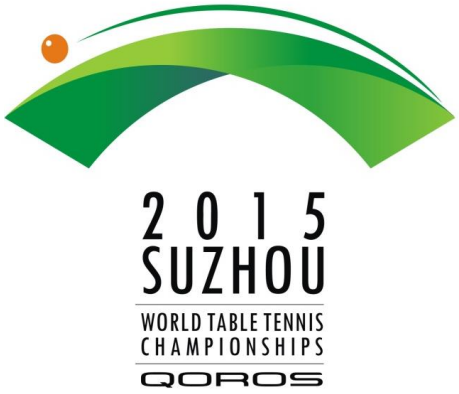

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STRENGTH-RATIOS IN JUNIOR AND ELITE-BADMINTON-PLAYERS

Abstract

Only little research has been done on the estimation of strength-relationships of the muscles in Badminton (Ng & Lam 2002). No research is done for the whole body muscles, which are also necessary for a good performance in Badminton.

The purpose of this study is to investigate the muscle strength ratios obtained from all relevant muscles/muscle-groups in Badminton. The study focusses on the question, which are specific strength-ratios in Badminton. Furthermore we investigate whether these values / ratios (especially shoulder/arm muscles) has an effect of on a sports-specific movement pattern; velocity of a smash.

Furthermore, these strength ratios of specific muscle groups are used with junior and elite athletes to assess the risk of injury and to guide rehabilitation and prevention (Zanca et al., 2011; Ayala et al., 2012; Edouard et al., 2013).

Therefore, it is considered to be important to analyse values and ratios parameters to obtain information for optimization the strength training and technical training (of the smash).

Research questions:

- What are the strength values / strength ratios of important muscles in Badminton?
- What is an imbalance of strength in Badminton?
- Is there a correlation between strength values / strength ratios and the maximum shot velocity of a smash

Key words: *strength-ratios, fore-hand-smash, training, prevention*

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A MULTIDISCIPLINARY INVESTIGATION OF THE EFFECTS OF STATE ANXIETY ON SERVE KINEMATICS IN TABLE TENNIS

Abstract

Displays of anxiety in table tennis were assessed through subjective (self-report questionnaire), physiological (heart-rate variability) and kinematic variables. Using a within-groups crossover design, 9 university-level table tennis players completed a series of serves under low- and high-anxiety conditions. Anxiety manipulation was achieved through the introduction a national standard table tennis player, known to the participants, to receive serves in the high-anxiety condition whilst serves were received by no opponent in the low-anxiety condition. Automated motion capture systems consisting of high-speed 3D motion cameras and analytical software (QUALISYS) determined the subject's movement kinematics: bat face angle (degrees) and serve routine duration (seconds). Self-reported state anxiety (MRF-Likert) and heart rate measurements were collected to examine changes between conditions. Contrary to the hypothesis, bat face angles did not change significantly between anxiety conditions ($F(1.8) = 2.791$, $p = 0.133$) and movement times were faster in the high-anxiety condition. In light of these findings, research into other facets of movement behaviour must be analysed to gain a further understanding on the effects of anxiety on performance, which remain unclear.

Key words: *anxiety, bat kinematics, mental readiness form-Likert, heart rate, table tennis*

Günter Straub

German Association of Table Tennis Coaches/ VDTT

A COMPARISON OF THE TABLE TENNIS CAPABILITIES OF CHINA AND ITS OPPONENTS AT THE 2014 WORLD TABLE TENNIS CHAMPIONSHIPS

Abstract

The Chinese research activities in the field of tactical performance analysis in table tennis are traditionally based on a diagnostic method using indices to evaluate three different stages of a rally. In the light of the 2014 world team table tennis championships, an analysis of strong and weak points of the best men´s and women´s teams was conducted by using the three-stage skill diagnosis. The performance standards set by the Chinese national teams in the course of their struggle for the medals were compared to those of their direct opponents. In addition, the results were subjected to a comparison between the sexes, among the members of the two Chinese teams as well as between the male and female players of the opposing teams. The collected data supports the notion that the Chinese top-players are distinctly superior in all respects examined although these differences on the various performance indicators are tendentially not as huge among male players compared with the female ones. Finally, the analysis of the correlations between the match-playing skills und the competition results casts a light on distinct stages of a table tennis rally which are especially important for the diverse groups of players.

Key words: *tactical performance analysis–three-stage skill diagnosis–scoring rate–usage rate–technique effectiveness–competition performance*

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ASSESSING PERSONAL TALENT DETERMINANTS IN YOUNG RACQUET SPORT PLAYERS: A SYSTEMATIC REVIEW

Abstract

Since junior performances have little predictive value for future success, other solutions are sought to assess a young player's potential. The objectives of this systematic review are 1.) to provide an overview of instruments measuring personal talent determinants of young players in racquet sports, and 2.) to evaluate these instruments regarding their validity for talent development. Electronic searches were conducted in PubMed, PsychINFO, Web of Knowledge, ScienceDirect, and SPORTDiscus (1990-31th March 2014). Search terms represented tennis, table tennis, badminton, and squash, the concept of talent, methods of testing, and children. Thirty articles with information regarding over 100 instruments were included. Validity evaluation showed that instruments focusing on intellectual and perceptual abilities and coordinative skills discriminate elite players from others and/or are related to current performance, but their predictive validity is not confirmed. There is moderate evidence that the assessments of mental and goal-management skills predict future performance. Data on instruments measuring physical characteristics prohibit a conclusion due to conflicting findings. This systematic review yielded an ambiguous endpoint. The lack of longitudinal studies precludes verification of the instrument's capacity to forecast future performance. Future research should focus on instruments assessing multidimensional talent determinants, and their predictive value in longitudinal designs.

Key words: *tennis, table tennis, badminton, squash, aptitude, gifted children*

Irene R. Faber[1], Frits G.J. Oosterveld[1], Silvio van den Heuvel[2,3],Paul M.J. Bustin[1], Marije T. Elferink-Gemser[4,5], Maria W.G. Nijhuis-Van der Sanden[3]

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HIGH POTENTIAL IN TABLE TENNIS FROM THE PERSPECTIVES OF ELITE PLAYERS AND THEIR YOUTH TRAINERS: A MULTIPLE CASE-STUDY

Abstract

Many table tennis associations use talent development programs for identifying young high potential players and to support children aiming to become elite players. Selection criteria to participate in such programs are often based on performance results, coach's judgments, physical appearance, perceptual-motor tests for speed, agility and coordination, motivation, self-efficacy and parental support. However, identifying young children with the potential to become a world class player is a challenge, since the key factors for future success remain ambiguous. An extensive determination of the nature of potential for table tennis is suggested to provide a better understanding of these success factors. Consequently, this multiple case study attempts to get a grip on what is meant by 'high potential' for elite table tennis from the perspectives male elite players (world top 20) and the coaches of their formative years. Semi-structured interviews were conducted to unravel the multi-dimensional concept of 'high potential'. After transcribing the interviews, open and axial coding will be carried out by three independent coders. Consecutively, all authors will be involved in a peer debriefing. Results of the qualitative analytic process, including a preliminary proposal of the concept of 'high potential' in table tennis, will be presented during the congress.

Key words: *table tennis, aptitude, gifted children*

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THE EFFECTS OF DETRAINING ON THE TECHNICAL PARAMETERS IN YOUNG TABLE TENNIS PLAYERS

Abstract

Technique is one of the most important factors which define the match performance of Table Tennis players. The aim of the present study was to evaluate the effects of a 20-day detraining period on the technical parameters in young Table Tennis players. Twenty five (n=25) athletes (15 boys & 10 girls), aged 12±1.8yrs with body mass of 45.9±12.9 kg and stature 1.52±0.1cm participated in the current study. All athletes were right-handed and they were considered as advanced players, having 5 training sessions per week and they performed an in season 10-week Multiball Table Tennis specific protocol. The Table Tennis Specific Test Battery (TTSTB) with the balls launch rate at 80balls/min was applied in order to identify the effects of lack of training on the technical modelling of the Table Tennis players. The technical parameters which were recorded in the study subjects were: Reaction Speed 1, 2 (RS), Displacement Speed 1, 2, 3 (DS), Skill Speed 1, 2 (SS) and Ocular Manual co-ordination (OCM) and they were applied pre-and-post the 20-day detraining period. A t test was used to identify the differences in the playing parameters from the initial to final technical evaluation of the TTSTB. Spearman's (ρ) analysis was applied in order to determine whether the testing parameters were significantly correlated. All statistical analyses were carried out with the IBM-SPSS 21.0 for Windows. The results showed that the mean scores of Displacement Speed 1 [t (1, 24) = 2.32, p=0.29] and Displacement Speed 3 [t (1, 24) = -3.01, p=0.06] were significantly decreased after the 20-day detraining. In the amount of the studied subjects, all the mean scores of the TTSTB during the final technical evaluation were recorded lower than the initial but without any significant differences in the technical efficiency of the players. The total scores in the Reaction Speed 1 recorded 9.7±3 successful shots, while the Displacement Speed 3 recorded 10.2±3.4 accurate shots. Spearman's (ρ) correlation analysis reported a statistically significant negative correlation between the DS3 and SS1, (ρ= 0.53, DF=25, p<0.01) and a significant interaction between DS3 and OCM, (ρ=0.64, DF=25, p<0.01). In conclusion, the better the playing technique is learned by applying the Multiball training method, the longer it will be retained in the developmental age Table Tennis players, even after a 20-day detraining period. However, it should be noted that the above findings mainly regard the technical improvement of the players in the training rather than the evaluation of a match in Table Tennis.

Key words: *table tennis, training, technical efficiency, coordination*

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SHORT TERM DETRAINING AFFECTS THE PHYSICAL FITNESS IN YOUNG TABLE TENNIS PLAYERS?

Abstract

The nature of the requirements in Table Tennis makes the planning of the training process complex due to the required physiological demands. Because of the fact that the detraining affects the playing performance since the training stimulus is insufficient, the aim of this study was to evaluate the effects of the 20-day detraining period on the physical fitness of young Table Tennis players. Twenty five (n=25) athletes (15 boys & 10 girls) aged 12±1.8yrs with body mass of 45.9±12.9kg and stature 1.52 ± 0.1cm performed an in-season 10-week training program by applying the Multiball Table Tennis protocol. The sport-related tests of the Eurofit Fitness Test Battery were: i) Sit-and-Reach, ii) Hands grip, iii) Flamingo balance, iv) Agility 10x5m, v) Sit-ups 30s, vi) Arm hang, vii) Standing broad jump, vii) Tape-platting and they were applied during the competition period prior and after the 20 days of inactivity. The t test (repeated measurements) was used to compare the testing variables of the studied samples pre and post the detraining, whereas the non-parametric Spearman's (ρ) analysis was applied in order to determine if the players' initial and final testing performance were significantly inter-correlated. All data analysis was performed using the IBM-SPSS statistical software 21.0 for Windows. The results showed that after the 20-day detraining period no significant differences were recorded in the majority of the Eurofit testing parameters. Although, noticeable differences in the variable of dominant hand speed [t(1 23)=1.19, p=0.62] and non-dominant hand power [t(1,16)=-2.05, p=0.57] were presented between the initial and final measurement. In addition, the mean values of moving speed in both hands were found similar for the right hand (dominant) 12.8±2.6s and for the left hand (non-dominant) 12.8±2.2s. Spearman's (ρ) correlation analysis obtained significantly negative correlation between the right hand strength and the moving speed of the left hand (ρ =-0.64, DF = 24, p<0.01). Moreover, the right hand as well as the left hand speed were significantly interacted, (ρ= 0.69, DF=24, p<0.01), while the agility speed (10x5m) and the strength of the abdominal muscles were significantly negative correlated, (ρ=-0.63, DF =25, p <0.01). Conclusively, the findings of this study show that after the 20-day detraining period no negative effects were recorded in the physical fitness level of the young Table Tennis players, with the speed and the upper body power to be marginally affected. From the training perspective, the above scientific evidence could offer valuable information assisting the coaches in the design of the training periodization in the developmental age Table Tennis players.

Key words: *table tennis, detraining, developmental age, performance*

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IMPROVED AND ENHANCED, MODULAR AND LOW COST ELECTRONIC SCOREBOARD USEFUL FOR TABLE TENNIS AND SQUASH

Abstract

This paper shows a low cost electronic scoreboard, for use in table tennis and/or squash, but it can be used in others sports. The scoreboard includes several options for controlling input data, also as for displaying the score. The design is modular in such way that can be used from a minimum quantity of parts (e.g.: 1 keyboard and one display) until several parts, multiplatform and simultaneous matches (multiple LED displays; projectors; webpages; tablets instead of keyboards; computers). All the scores can be projected to a big screen, or can be seen from the local network or from internet, if it's available. Any people with a smartphone, tablet, or laptop can follow all the scores.

In order to avoid any security issue, an industrial network can be used for the scoreboards. The chosen industrial network (CAN) has algorithms for detecting and correcting errors in data reception and it retry the data sending when there are any corrupted data.

When tablets or smartphones are used as controlling device for the scoreboard, a cluster of matches can be preloaded in the device. This is useful for a previously known, group of matches, such in preliminary group rounds. In this case, a register file is stored in the controlling device. This file has a full register of all the points of all games in every match. Each register includes the time (hh:mm:ss) and the player server of each point.

This modular scoreboard system is similar to the professional system used in big tournaments, but its low cost allow use it in local tournaments, clubs, or any similar competition.

Currently this system is being used in a small local club: Table Tennis and Squash" Lomas del Valle" in Morelia, Michoacán, México. The sports in this club are precisely table tennis and squash.

Key words: *modular system, electronic scoreboard, internet, multiplatform*

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RALLY LENGTH IN TOP LEVEL TABLE TENNIS

Abstract

Problem: In table tennis, the position of a stroke in the rally stands for tactical meanings and options e.g. the second stroke (return) has to deal with quality of service and to give a response ideally in creating an advantage. Therefore, rally length and success/failure rates of different strokes are of particular interest in studying the structure of table tennis (Zhang, Liu, Hu & Liu, 2013).

Method: The sample consisted of 81 women's and 141 men's single matches (only matches between offensive players). The matches were chosen from final stages of world table tennis top events. Data were collected by recently developed match analysis software for real-time match analysis in table tennis. Impact of sex, rankings and service on the rally length was statistically analysed.

Results: Whereas there were no differences in rally length in matches between different performance levels of male athletes ($F=0.906$, $p=0.479$, $eta2=0.032$) there were significant differences in female athletes ($F=3.811$, $p=0.004$, $eta2=0.203$). We also found a significantly higher rally length in female compared to male table tennis. This difference is mostly due to differences between the sexes in matches of top class players, e.g. top class vs. top class: mean male=4.73, mean female=5.79, $t=4.112$, $p=0.002$. In matches between lower ranked athletes there were no significant differences.

Conclusion: Rally length is a first and crude variable to characterize table tennis matches. We found several characteristic relationships to start from in further studies.

Key words: *table tennis, real-time match observation, rally length*

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VIDEO-BASED TACTIC TRAINING IN YOUTH TENNIS

Abstract

Problem: In Germany, tactic training with young tennis players is not very common. Training focuses mostly on technical and physical aspects, and there is hardly any coupling of match and training. Video is mostly used as feedback in motor learning cycles but taking video clips from youth player's matches for tactical improvement is frequently considered to be too time consuming in practice. The advent of digital video made it possible to introduce game analyses on a regular base in training and preparation of matches. Methodological issues were addressed by several studies, e.g. the use of qualitative methods for video-based game analysis (Lames & Hansen, 2001) or didactical decisions to be taken like social configuration (single, group, team), choice of scenes (e.g. positive or negative ones) or number of scenes to be analysed per session (Dreckmann et al., 2009). This study aims at assessing the effects of video-based tactic training with 12-14 year-old tennis players.

Methods: A field experiment with 12 players in control and treatment group was conducted. The treatment consisted of 12 weeks with two sessions per week devoted to video-based tactic training. Characteristic psychological variables for sports talents were assessed by questionnaires (Beckmann & Elbe, 2008). A video-based tactic test was developed to analyse player's ability in detecting and interpreting tactical behaviour. Tactical behaviour in typical match situations (>85 rallies per player per test) was assessed by expert ratings.

Results: Although there were some positive tendencies, there was no statistical evidence that psychological traits were altered during the experiment. Hardly surprising, the proficiency in video based analyses of tactical behaviour became superior in the treatment group ($F=22.133$, $p<.001$, $\eta^2=0.502$). The same results turned out for tactical appropriateness of match behaviour, e.g. for service ($F=18.165$, $p<.001$, $\eta^2=0.452$).

Discussion: The experiment demonstrated that video-based tactic training is feasible in practice and leads to significantly improved tactical capabilities and match behaviour. It can be recommended even for young tennis players.

Key words: *tennis, tactic training, youth tennis, field experiment*

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THE RELATIONSHIP BETWEEN BALL SPIN RATES AND BALL SPEED ON GROUND STROKES IN COLLEGIATE MALE TENNIS PLAYERS

Abstract

In recent years, tennis performance to achieved higher level by equipment evolution to produce highly ball spin rates. To control ball spin rates widely is one of key factor to determine players' level. It has increased to report papers about ball spin rates (Cross and Lindsey, 2005; Goodwill et al., 2007). However, there is no combined data about ball spin rates and ball speed on ground strokes. The main aim of this study was to clarify the relationship between ball spin rates and ball speed on ground strokes. High-speed cameras (MEMRECAM HX-1 and HX-5, nac Image Technology., Inc.) were used to record the motion of the ball during the hitting test. The ball spin rates were measured by counting the number of revolutions of the logo on the ball. The participants were 3 male tennis players who belonged to the tennis team of a local university. They modulated ball spin rates to three stages (flat drive, top spin, and heavy spin) themselves in a specific hitting test. Consequently, it was found a strong negative correlation between ball speed and ball spin rates on ground strokes in each player ($p < 0.01$). It suggests that this relationship between ball speed and ball spin rates represent player's stroke characteristics and play-style.

Key words: *hitting test, high-speed camera, speed gun*

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A TRAJECTORY-BASED METHOD OF AUTOMATIC DATA COLLECTION IN TABLE TENNIS

Abstract

1. Background: Table tennis coaches and players have rarely conducted performance analysis due to the heavy workload required for the data collection. The essential problem of the conventional data collection is because of its dependence on the operation of manual input. Automatic data collection is therefore urgently required. If we could obtain the 3D trajectories of table tennis balls easily, this problem would be solved. A method that reconstructs 3D trajectories of table tennis balls was recently proposed by the authors and the proposed method makes it easy to obtain 3D trajectories of table tennis balls with unsynchronized cameras. A method that extracted performance indicators from 3D trajectories reconstructed with unsynchronized cameras is proposed in this research.

2. Problem statement: A 3D trajectory of table tennis ball provides the following indicators: impact position (or time), rebound position (or time), traveling velocity, and time interval between two impacts. By estimating rebound positions and impact positions, the others can be computed easily. Therefore, the problem is how to estimate rebound and impact positions from 3D trajectories.

3. Proposed method:

3. 1 Rebound position: The ball positions are computed at fixed time intervals from a 3D trajectory at first. The period of times when a ball was continuously under the threshold height, which had been assigned manually, are then extracted and assumed that the ball is colliding to the table tennis court at that time. Rebound time and positions are estimated by seeking the time when the distance between the ball and the table gets the closest to the ball's radius.

3. 2 Impact position: The four velocity vectors are computed at fixed time intervals from a 3D trajectory at first. If the velocities meet the following two conditions, an impact is assumed to have happened. (1) the change rate of the velocity in the direction of the side-line surpasses the threshold, (2) the traveling directions in side-line axis of the first two vectors are same and the last two vectors are same, and the first two and the last two are different.

4. **Experimental results and discussion:** Rebounds and impacts of a table tennis match were estimated by the proposed method. The match was recorded with two normal cameras at 60 fps. The detection rate of rebounds and impacts were 97.2% and 65.0% respectively. Measurement error of rebounds and impacts were 2.9±3.4 cm and 9.5±20.2 cm. When we use only two cameras for recording a match, balls can be missed around the players and that makes it impossible to estimate impacts accurately even if the proposed method worked well. It can be concluded that the proposed method can be expected to realize trajectory-based automatic data collection in the near future, but should be experimented again with the 3D trajectory which was reconstructed perfectly.

Key words: *table tennis, performance analysis, computer vision, unsynchronized cameras*

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THE RELATIONSHIP BETWEEN INTER-SHOT TIME AND ERRORS ON GROUND STROKES IN WOMEN'S TENNIS

Abstract

The purpose of this study was to clarify the relationship between inter-shot time and errors on ground strokes in women's tennis. The subjected matches in this study were collected from world top ranked women's players and regional collegiate players in Japan. We analysed the results of each rally, kinds of errors and inter-shot time of ground strokes with computerized scorebook for tennis (Takahashi et al., 2006). Errors were classified to net, side-out and back-out. Those results were compared between world top ranked players and regional collegiate players. As a result, collegiate players showed long inter-shot time on forehand errors. It suggested collegiate players made forehand errors on easier situations than backhand errors. Collegiate players should control to middle area of the court in easy situations. They imaged to hit a winner to close area like world top-ranked players.

Key words: *kinds of errors, baseline rallies, player evaluation, tactics*

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IMPACT OF STROKE NUMBER ON WINNING PROBABILITY IN TABLE TENNIS IMPROVED ALGORITHM BASED ON MARKOV CHAIN MODELING

Abstract

Problem: The impact of certain behaviours on overall success in game sports may be assessed by simulation using discrete states of the game and transitions between them. Modelling here is a two-stage process. First, under the assumption of Markov chain property winning probabilities are calculated. Second, behaviour of interest is modelled by manipulating transition probabilities. These manipulations are modelling behaviour modifications of comparable difficulty for the players to realize. After this second step of modelling one may calculate again the winning probabilities with the difference to the original ones giving an estimate of the importance of the modelled behaviour. This method was developed in tennis (Lames, 1991) and found applications in different sports, e.g. table tennis by Hohmann et al. (2004).This study introduces an improvement of the method cited above. It skips the second step of modelling by taking the directional derivative of the function calculating the winning probabilities from the transitions. As there is no analytical derivative numerical derivation is used (Press et al., 2007). This improvement frees from the task of modelling alterations of game behaviour of comparable difficulty.

Methods: Table tennis was modelled by introducing the following 14 states: first to fifth stroke, more than fifth stroke and point, each for player A and B. Transition matrices were calculated from a sample of 115 top levels male table tennis matches. Directional derivations were calculated for winners and errors of each stroke length. Central difference method issued for numerical differentiation.

Results: Results showed that in general it is more important to avoid errors than to score winners, e.g. 4th stroke: mean winner=0.238; mean error=0.286; t=-2.455; p=0.008. Strokes with largest difference between importance of winners compared to errors is 3rd stroke (.056), followed by service (.049) and 4th stroke (.048).

Discussion: Although there are still issues to be better understood, the method introduced is conceptually an improvement of the formerly developed method to assess the importance of behaviours. Results are in agreement with common assumptions on the importance of strokes in table tennis. They differ from the old method especially in service and return with typically low winner and error rates indicating that the new method is more adapted to deal with marginal transition probabilities.

Key words: *table tennis, Markov chain model, stroke number, game structure*

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COMPARISON OF BEHAVIOR OF PLASTIC BALLS WITH CELLULOID BALLS

Abstract

Background: Players predict behaviours of a ball after collision with a table or a racket since they need to return the ball immediately after their opponent hit the ball. Recently, plastic balls were introduced as official balls in addition to celluloid balls which have been used for long years. Since there are possibilities that the behaviours of the balls are altered with the changes in materials of the balls, it is important for players to understand the differences in behaviour of the two kinds of balls to predict the behaviour of the balls accurately. Therefore, the purpose of this study was to compare the characteristics of the plastic balls with the celluloid balls and determine if there is any difference between those balls. Methods: Characteristics of plastic and celluloid balls were compared by quantifying the behaviour of the balls before and after collision with the table. Both plastic and celluloid balls used in this study were Nittaku Premium 3 stars. The balls were launched from a table tennis machine that can control the spin and velocity of the ball with three rotors. By modulating the spin rate of the rotors, initial velocities of the balls were manipulated. The behaviours of the balls before and after the collision were recorded by two synchronized high-speed cameras at 1000 Hz (Phantom, Vision Research). Based on the brightness and the configuration of the ball, the positions of the ball in each image by two cameras were detected. Then, three-dimensional positional data of the centre of the ball was reconstructed by three-dimensional Direct Linear Transformation (DLT) method. The reconstructed positional data of the centre of the ball was smoothed using Savitzky Golay filter, then the velocities of the balls were calculated. Spin rates of the balls were calculated by measuring the time it takes for completing one rotation. Coefficient of restitution (e) was calculated by dividing the vertical components of the velocity of the ball after the collision by those before the collision. The equation that expresses the relationship between the state of the ball before and after the collision (Shibukawa 1969) was used to compute coefficient of friction (μ). Results and Discussion: The coefficients of restitution and friction varied with the velocity of the ball before the collision. Though the coefficients of restitution did not show differences between two kinds of balls when the velocities of the ball before the collision were smaller, higher coefficients of restitution were observed for plastic balls when the velocities of the ball before collision were relatively higher. The coefficients of friction were also higher in plastic balls than celluloid balls when the velocities of the ball before the collision were relatively smaller. Thus, it was concluded that whether the behaviours differ between celluloid and plastic balls depends on the condition at the time of collision.

Key words: *plastic balls, celluloid balls, coefficient of restitution*

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A 3D SIMULATION OF THE FLIGHT OF THE TABLE TENNIS BALL AND OF ITS INTERACTION WITH THE TABLE

Abstract

It has been quite a technical challenge to experimentally determine the three- dimensional (3D) spin vector as well as the velocity vector of any flying table tennis ball in play in terms of the analyses of high-speed video images. As a preparation for addressing this significant problem in table tennis dynamics, we construct a theoretical 3D web application to simulate the flight of the table tennis ball subject to three forces: the Earth's gravity, the drag due to the air surrounding it, and the lift generated by its spin. Additionally, collisions between the ball and the table are fully taken into account with the use of normal and tangential coefficients of restitution (Araki, Sato, and Yamazaki 1996). We adopt HTML5 and JavaScript as programming languages to take full advantage of the power of WebGL and three.js 3D Graphics Libraries (e.g. Endo 2014).

Key words: *computer simulation, ball trajectory, velocity, spin*

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CONTEXTUAL INTERFERENCE EFFECT OF LEARNING FOUR SELECTED BASIC TABLE TENNIS SKILLS OF UNIVERSITY OF THE PHILIPPINES' TWO MAJOR TABLE TENNIS CLASSES

Abstract

The study determined which practice schedule is most effective in Contextual Interference Effect in terms of a certain span of time. 36 participants, 12 from the Basic and 24 from the Advanced Table Tennis Classes were used. A pre-test using Multiball Training where they were told to hit accurately the targets across the other side of the table adopted from the measurement setup of ETTA's Halex Proficiency Awards using only the skills they already have without any experimental intervention. From this, they are categorized into three practice group's specifically random, blocked, serial group using the ABBA assignment/ counterbalance procedure. Results showed that there is no significant difference between the scores of students from the Basic and the Advanced Classes. In terms of skill and form of execution, results showed that there is no significant difference in all the participants even when grouped separately according to the three practice schedules. However, results showed that the Random Practice Schedule, with regard to the period of time, is the most effective practice schedule because it showed significant differences in terms of the accuracy points gained from the pre-test to post test. All three practice schedules showed improvement in terms of accuracy. Random practice schedule gave a faster improvement from pre-testing to post testing. In future researches, teaching table tennis using practice schedules, the element to be considered is the span of time with the proper guidance of teachers.

Key words: *contextual interference effect, multiball training/drill, ETTA's Halex proficiency award table measurements, ABBA assignment/ counterbalance Procedure, practice schedules*

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A REPRESENTATION OF SKILL KNOWLEDGE OF TABLE TENNIS BY NEURAL NETWORK

Abstract

In motor skill research for human, the movement skill is constituted by hierarchical cerebellum model with feedback and feedforward functions. Kawato has proposed a control model of Allen-Tsukahara as internal model. At a start of the movement, the feedback model is not able to control the trajectory movement smoothly. However, the movement is gradually controlled well because of reducing the error by the inverse model.

In this paper, we adopt the Topographic Attentive Mapping (TAM) network as an internal model, and apply it to extraction of technique skill of the forehand stroke of table tennis. After presentation of training pattern, if the network makes inaccurate output, the attentional top-down signal modulates the synaptic weights in the class and basis layers with winner take-all learning in order to minimize the difference between the network output and the desired output.

In experiment, we selected several subjects who were expert table tennis players, middle level players and beginners. We recorded the trajectory pattern of their forehand strokes at nine measurement markers of the right upper arm with a high speed camera. Using the TAM network, we extracted technique rules as fuzzy rules, and divided them into feedback and feedforward rules as an internal model. In addition, we estimated necessary attributes from measurement markers of body to distinguish table tennis skill. As a result, we obtained the high recognition rate to classify table tennis skill compared with C4.5, Native Bayes Tree, and Random Forest.

Key words: *neural networks, internal model, skill extraction, table tennis*

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ANGER MANAGEMENT: EVALUATION OF A COGNITIVE-BEHAVIORAL TRAINING PROGRAMME FOR TABLE TENNIS PLAYERS

Abstract

Based on a systematic review of the literature on anger management in sports, different types of anger expression strategies used by athletes are discussed (Abrams, 2010). The research literature suggests that cognitive-behavioural intervention programmes can be fruitful in helping athletes to understand and control dysfunctional anger (Steffgen, de Boer & Voegele, 2014). Therefore, the main goal of the present study was to evaluate the effectiveness of short-time training in cognitive-behavioural anger management for table tennis players, which aimed at changing their non-effective anger reactions. The sample comprised 18 young competitive athletes (range 16 to 22 years) divided randomly into a treatment (n = 10) and a control group (n = 8). A trained group leader instructed the treatment group. Six sessions were held over a period of 2 months. Cognitive-relaxation coping skills associated with social skills were compared to the no treatment control. Psychological measurements (i.e. self-reports on anger) were applied before, during and after treatment as well as in a follow-up session. The one-year follow-up session revealed that, in contrast to the control group, the treatment group showed significant reductions of outwardly negative anger expression, anger-related physiological arousal and helplessness as well as anger reactions specific to table tennis (Steffgen & Schwenkmezger, 1994). Despite limitations inherent in the research design, the training programme was deemed as effective. Implications of the findings for the treatment of anger in table tennis are discussed.

Key words: *anger management, evaluation, training programme, table tennis*

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THE RELATIONSHIP BETWEEN STRESS AND COPING IN TABLE TENNIS

Abstract

This presentation will examine the relationship between cognitive competitive anxiety intensity and coping strategies in table tennis players. One hundred and two (102) US competitive table tennis players from ages 10 to 60 filled out a Revised Competitive State Anxiety Inventory-2 (CSAI-2R, Cox, Martens & Russell, 2003) 30 minutes before the start of their tournament match, and a Modified Cope Questionnaire (MCOPE; Crocker & Graham, 1995) 15 minutes after their match. Our study found a significant correlation between high cognitive competitive anxiety and emotion focused coping and avoidance strategies. Our results suggest that there is some connection between anxiety intensity and coping strategies. If the cognitive anxiety intensity (for example, intensity from worrying) is very high, an athlete might have more tendency to use avoidance coping (such as behavioural disengagement) and emotion-focused coping (such as denial and venting of emotions) compared to athletes who have low cognitive competitive anxiety. Coaches and athletes should not only strive to regulate the intensity of anxiety symptoms but also learn that anxiety responses are normal at stressful situations such as competitions. Confidence management techniques such as positive self-talk, breathing techniques and visualization should be taught athletes to assist them to cope with their competitive anxiety better and to perform their best.

Key words: *avoidance, competitive cognitive anxiety, coping strategies, emotion focused coping strategies, mental toughness, table tennis*

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BIOMECHANICAL ANALYSIS OF SPEED IN BADMINTON JUMP SMASH

Abstract

In badminton, the smash is an essential part of a player's game (Tsai & Chang, 1998). The power and speed of the badminton smash make it a powerful offensive weapon for a player (Lo & Stark, 1991). Currently there is no consensus regarding which aspects of the smash technique are the best indicators of shuttlecock speed after impact. Aim: The aim of the current study was to identify the key aspects of smash technique characterising the fastest shuttlecock speed. Methods: Three-dimensional kinematic data were collected using an 18 camera Vicon Motion Analysis System; 400 Hz. Twenty-five elite badminton players (mean ± standard deviation: age 24.1 ± 7.0 years; height 1.83 ± 0.08 m; body mass 77.8 ± 8.6 kg) participated in this investigation. The best trial with maximum shuttlecock speeds with minimal marker loss, were identified and used for each player. All statistical analysis was performed within Statistical Package for Social Sciences v.17 (SPSS Corporation, US). The variations observed in each technique parameters were assessed using forward stepwise linear regression. Results: The results show that the elbow plays a major role in shuttlecock speeds. A greater range of motion throughout the movement caused greater velocities. Conclusion: The results of this investigation are likely to be very useful in the coaching of badminton smash technique and in talent identification among young players. Further research into how technique affects accuracy and consistency will be looked at in future studies. Future studies should address the effect that racquet-head velocity has on shuttlecock speed after impact.

Key words: *badminton, biomechanics, smash, technique*

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COMPARISONS OF ARTIFICIAL INTELLIGENT TECHNIQUES FOR VISUALISATION OF OFFICIAL DATA FOR GRAND SLAM TENNIS CHAMPIONSHIPS (2005 TO 2010)

Abstract

This study aimed to compare difference visualization methods among artificial intelligence techniques on official stats of men's single tennis player. Totally, 2,060 series of data from 228 players from 2005 to 2010 tennis Grand slam competitions were considered and gathered into MS Excel 2010. And a Matlab 14.0 version with Self-organizing map toolbox was used to design the Sammon's mapping and Self-organizing map projection. Sammon's mapping techniques were designed as 3-dimensional structure and a size of the Self-organizing map was [17 13]. After the training of Self-organizing map, the quantization error was 1.451 and the topographic error was 0.066. As results, firstly, the Sammon's mapping technique was unable to descript the details of data hardly when the size of data was huge, but it was able to visualise data easily on x-y, x-z and y-z coordination graphs. Secondly, the Self-organizing map brought an advantage of visualisation for data process using comprehensive neurons which could apply variables' characteristics into the results.

Consequently, the visualization methods using the artificial intelligent given potential methods to present complex data that it would be useful tools in a practical perspective.

Key words: *artificial intelligence, visualisation, tennis, performance analysis*

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Jordan

"THE MG- SHIP"- TT TECHNICAL SYSTEM

Abstract

A TT technical playing system (style or grip) referenced to the traditional systems, the European "Shake Hand" and the Asian "Pen Hold". "The MG-Ship" was innovated questing the TT sport development with a 3rd, "dream", style that combines the merits (advantages) of both classical grips while discarding their weaknesses from the point of view of the players, thus appreciated as the first major TT-techniques development (a leap of evolution) in 25 years, since the last European revolution led by Sweden in late 1980's. The MG-Ship style is distinguished from former 2 styles with special concentration of utilizing the handle part of the Paddle (Racquet) for driving various strokes in a manner "almost" resembling the handle's role in greater sister racquet(and few other) sports such as: The "Tennis" and The "Golf", but still using "<=50%" of the Index finger to control the rubber circular part of the paddle, enhanced with certain modification in the structure of the handle to achieve required control. The breakthrough innovation is targeting a more-easy-to learn, more enjoyable and more effective Table Tennis technical system spreading new horizons to players while refreshing the sport's business and industry world-wide. The "MG" indicates the creator's initials, while the "Ship" symbolizes a "mixture" of "Sh" from shake hand and "P" from Pen hold, as well as resembling the "ship's" smoothness of movement over water versus rough land vehicles driving on earth as compared to the "MG-Ship" playing smoothness versus playing with the two classical systems.

Key words: *table tennis*

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DETERMINING INSTANTANEOUS SHUTTLECOCK VELOCITY: OVERCOMING THE EFFECTS OF A LOW BALLISTIC COEFFICIENT

Abstract

This study aimed to develop a method for accurate determination of post-impact instantaneous shuttlecock velocity as well as the identification of racquet-shuttlecock contact timing. Three-dimensional kinematic data were recorded during three badminton jump smashes for each of 25 male badminton players. Curves were fit separately to the pre- and post-impact phases of the shuttlecock position data in three planes according to a logarithmic equation. A Trust-Region algorithm was utilized to obtain values for the two constants in the equation. Time of impact was determined as the mean time at which the pre- and post-impact curves intersected in each plane, with resultant instantaneous velocity at this time calculated via differentiation of the post-impact curves. Jump smash velocities ranged from 60.0 to 99.0 $m \cdot s^{-1}$ (mean 81.9 ± 7.8 $m \cdot s^{-1}$). R^2 values for the goodness of fit pre- and post-impact were 0.99 ± 0.02 and 0.97 ± 0.07 medio-laterally, and 1.00 ± 0.00 for all anterior-posterior and vertical fits. Differentiation over 1 or 10 time intervals at 400 Hz would have resulted in mean shuttlecock velocity differences of 4.5 ± 11.0 or 14.8 ± 3.3 $m \cdot s^{-1}$ respectively. The curve fitting methodology enables racquet-shuttlecock impact timing and post-impact instantaneous shuttlecock velocity to be determined more accurately than differentiation methods.

Key words: *badminton, shuttlecock, velocity, curve fitting*

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ESTABLISHING RELIABILITY OF THE COMPETITIVE READINESS SCALE FOR TABLE TENNIS ATHLETES (CRSTTA)

Abstract

The Competitive Readiness Scale for Table Tennis Athletes (CRSTTA) was initially developed and presented during the last ITTF Sport Science Congress held in Paris, France in 2013. The purpose of the test was to measure a table tennis athlete's readiness to compete. At present, there is no available instrument to measure a table tennis athlete's readiness to compete, hence, the development of this test (scale).

Using test construction methodology through face and expert validation, items were generated according to the concepts of mental toughness, coach ability, physical readiness, tactical readiness, concentration, anxiety, self-confidence, motivation, and team sociability. The researchers were able to present the items and content validity (expert validation) of the instrument. Initial item analysis was also done. In this study, the researchers intend to present further the reliability of the CRSTTA using appropriate statistical tools. The results showed that the overall reliability of the questionnaire by calculating Cronbach's Alpha (α) value, at confidence level 95% was found at .890 while individual item reliability range was found at .901. Four classifications of scoring interpretation such as, Very high level of Competitive Readiness, High Level of Competitive Readiness, Low Level of Competitive Readiness, and Very Low Level of Competitive Readiness were obtained for specific and general interpretations of results. Since there were suggestions made by some foreign participants in the last ITTF Congress to use the instrument in their respective table tennis clubs, an appropriate language translation process be done, and establishing the equivalence of ratings obtained with this instrument when used by different observers known as inter-rater reliability is highly recommended.

Key words: *competitive readiness, test-item reliability*

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EXPLORING THE TEMPORAL AND SPATIAL CHARACTERISTICS OF THE STROKE PERFORMANCES IN THE SEMI-FINAL OF THE MAN'S SINGLES IN 2015 TABLE TENNIS WORLD TEAM CUP

Abstract

Table tennis is a sport of fast pace. Many points are determined within the first 4 strokes. Therefore, the performances of the first 4 strokes of a rally have become the focus of the game analyses. Most of the table tennis research investigated the type of strokes used and the effectiveness of the early phase of the rallies while little attention has been paid to the temporal and spatial characteristics of each stroke. The purpose of this study was to examine the performance of the stroke time and the range of landing location in table tennis competitions. Two singles matches were selected from the man's semi-finals (Chinese Taipei vs. China) of the 2015 Table Tennis World Team Cup. The notational analysis was used on the basis of the video playback. The results showed that the mean flying time of the ball for the serving strokes was longer than that of all the other strokes. One player showed a significantly shorter flying time and a wide range of landing location for the second stroke than those of all the other strokes and the other players. This indicates the planned attacking tactics of the return strokes. In conclusion, the temporal and spatial characteristics of the table tennis performance provide useful information to understand the tactics used by the players and can be used in training and coaching education. Future studies will extend the application of the temporal and spatial analysis to different levels of players.

Key words: *table tennis*

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QUANTIZATION ANALYSIS OF DEVIATION PROPAGATION EFFECT RESULTS FROM ERROR-ESTIMATED TABLE TENNIS PLAYERS' RATINGS ~ *A MONTE CARLO SIMULATION APPROACH*

Abstract

USATT rating system, initiated since 1970[s], had been the most well-known sports rating system in the world. The rating system uses single parameter logistic model derived from Item Response Theory (IRT) to quantize a table tennis player's playing strength. Because it is easy to perform, including ITTF, the system had been widely adapted with some deviations all over the world. As a computer programmer and table tennis enthusiast, I wrote a computer program and devoted in table tennis players rating calculation for the past decade in Taiwan (TWTT Rating System). There had been 36,737 table tennis players registered in our database while 3,147 events and 522,101 matches were recorded for calculating and analysis. A Mote Carlo simulation program was developed in this research to analyse the effect of error-estimated ratings problem. Each simulated player has two rating scores, one represents his real playing strength and the other imply the observation from computer program which might be equal or deviated from his real ability by manipulation. The outcome of all simulated matches were determined by two opponent's real playing strength using single parameter logistic probability model while the observation rating score will be re-calculated according to the outcome above in every simulated match. Deviation between real playing strength and observation rating for error-estimated players and whole population could be thus analysed iteratively. We hope that this simulation can help us for the development of the automatic rating adjustment process for the error-estimated players in the future.

Key words: *TWTT rating system, Monte Carlo simulation, item response theory, standard error of measurement*

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MEASURING PREPLANNED AGILITY USING THE ASPIRE TABLE TENNIS AGILITY TEST (ATTAT)

Abstract

The purpose of this study was to determine the reliability and validity of the Aspire Table Tennis Agility Test (ATTAT). The ATTAT was developed from performance analysis data to measure preplanned agility in highly-trained young table tennis athletes (n= 10, 15.0 ± 1.5 y). The ATTAT consisted of a linear step, linear jump, pivot and two lateral movements in sequence at the table and 3 stationary balls were hit by the racket in hand. The mean time take to complete the ATTAT was 3.94 ± 0.75 s. Reliability was measured using a typical error (TE) score from 10 consecutive pairs of trials 3 days apart. The TE score for the test was 3.98% demonstrating that the ATTAT is reliable at the 90% confidence limit. Validity was investigated using a Spearman's rank correlation analysis comparing the ranking of 10 ATTAT scores against an expert coach's perceived ranking of agility (technique of changing direction) in table tennis and a ranking of leg muscle qualities (physical capability) derived from 3 jump tests. Validity was considered high with correlation coefficients of 0.88 and 0.79 for the coach's ranking and leg muscle qualities ranking respectively.

Key words: *table tennis, agility, reliability, validity*

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PHYSICAL AND PHYSIOLOGICAL FITNESS ASSESSMENT OF FILIPINO BADMINTON COLLEGIATE ATHLETES

Abstract

Numerous studies have assessed athlete's physical characteristics and fitness because of their significant importance in competitive sports such as badminton. This study investigated physical and physiological fitness characteristics of badminton athletes. Eighteen collegiate badminton athletes (female=10, male=8) in one university in the Philippines participated in the study. Basic anthropometric, physical fitness and physiological variables were measured namely, height, weight, waist, hip, medicine ball power throw, flexibility (sit and reach), blood pressure, heart rate and VO2max (multi-stage shuttle test). Results showed that while male badminton athletes were taller, heavier, stronger and fitter; they were less flexible than their female counterparts. On the other hand, other physical characteristics (BMI, waist, hip, WHR) and physiological variables (heart rate, systolic and diastolic pressures) did not show any differences between males and females. This study reveals physical and physiological profiles of badminton collegiate players and provides relevant information about the current status of Filipino male and female athletes concerning these variables. The results also confirm and expand previous data about gender differences in sports particularly in badminton.

Key words: *arterial blood pressure, heart rate, badminton athletes, Filipino, fitness performance*

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THE EFFECTIVE ANALYSIS OF TABLE TENNIS CONNECTION SKILLS APPLYING IN DOUBLES

Abstract

Research purposes -

Introducing the concept of "With-trace Doubles" and "Non-trace Doubles", to elaborate connection skill in Doubles would remove "With-trace Doubles" and would lead to the effective way of using "Non-trace Doubles"

Research Methods –

Through the connection skills during step movements in Doubles, strategy applying effective analysis to further elaborates the feasibility of "Non-trace Doubles" research, to reveal the original form of Doubles.

Results and discussion –

Powerful combination of players and strong cooperation are the keys to victory of Table Tennis' Doubles. Each player has superb skills and the strong cooperation skill can form the greatest powerful team. Strong in Singles skill is the foundation. But if there is no strong cooperation skill with partners, it will not form a strong team. Only if each player has superb skills and can cooperate with each other (achieves "Non-trace Doubles" ability), they can call a perfect match team. How would the players supplement and fully cooperate with each other? Doubles players must think of strategy, target of winning method and create offensive opportunity for their partners for every bat to achieve cooperation skills. To have a perfect partner's match and cooperation status, the players must apply appropriate skills, strategies to achieve "Non-trace Doubles". These skills and strategies are called "Connection Skills" in Doubles. Strategy concepts are come from lines variation rhythm and proactive defensive strategy.

Singles is Doubles' foundation but Doubles has its own rhythm. Not every Singles skills and strategies can apply to Doubles. Because Doubles is affected deeply by Singles, no matter superb Olympic Champion, World Champion or many other top players, they still have some Singles trace. When they form the Doubles, they become "With-trace Doubles".

"Non-trace Doubles" is to remove Singles trace and to apply all Doubles rhythm, skills and strategies reasonably used in Doubles which would achieve fully cooperation and understanding with partners. This can be called as a perfect and ideal Doubles leading to the highest level. And connection skills in Doubles are effective ways to enforce "Non-trace Doubles, leading to the success and supporting skills of cooperation with partners and create offensive opportunity for the partners.

In conclusion, Doubles is based on Singles as foundation. Singles skill, which must be strong, is the first important element. When two of best Single players form a team, their connection skills training must be good. They must handle well the Doubles' rhythm, overcome the "With-trace Doubles" and implement the "Non-trace Doubles". They would form a perfect match which would beat the competitors.

Conclusions -

Applying connection skills in Doubles is feasible. Doubles should have its own connection skills.

Key words: *with-trace doubles, non-trace doubles, connection skills, step movement analysis in doubles, strategy analysis in doubles*

Lan Tong

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EXPLANATION OF CAUSES OF LEADING SKILLS OF COMPETITIVE TABLE TENNIS

Abstract

The leading skills of table tennis have different performance in different stages because they are affected by such elements as the winning elements, movement structure, and the ways of holding the bats, the choices of apparatus and regulations of competition, all of which play a very important role in competition. The paper analyses evolutional factors that influence the leading skills of table tennis from different angles and points out the development trends of today's table tennis leading skills in the hope of enriching the existing table tennis theory, promoting table tennis technology innovation, promoting the continuous development of table tennis and providing a reference for the formulation of training plans and development strategies of China's table tennis team.

Research methods:

Literature research, expert interviews, comparison, logical analysis

Results and discussions:

The table tennis leading skills are the skills that are highly used and get scores in the process of development of competitive table tennis. There are various dominant skills at different stages during the development of table tennis; they have had an important impact in promoting the development of competitive table tennis.

By comparison, it found out that the core elements in the winning elements group show the trends that they are turning from the single element to compound element to compound elements; movement structure has changed into adjusting the preparing position, suitable movement range and returning to the original positions so as to get the best effect of hitting the ball; nowadays, the yield of the talents determines that the use of handshake grip is much higher than penholder grip; the bottom slabs with hi-tech and made of compound materials are the mainstream of apparatus; the regulations of competition play an important role in the changes of leading skills and improvement of promoting the sustainable development of table tennis.

Research conclusions:

1. The leading skills of different stages in competitive table tennis experienced the process of from chopping to attacking and to looping, from a single element of "rotation" to the dual elements of " rotation, being fast" respectively, then to a mixed elements of "being hard, rotation, and being fast."

2. The leading skills of World Table Tennis has a very close connection with winning factors of table tennis both individually and with their combination. The combination and impact among the core elements promote the development of leading skills. The core elements which are consisting of "rotation, being hard, being fast" will continue to play an important role in the development of leading skills.

3. The movement structure of the leading skills in table tennis always changes according to how to improve the quality of batting that is to get the best outcome through the best preparation posture, proper range of motion, and quickly restoring the batting.

4. Present mainstream style of playing, the physical structure as well as the dominant technology in use of effects and other factors determine that the cross-handed usage is much more used than the straight grip. At the same time, cross-handed tends to be "shallow grip", and straight grip tends to be "deep grip".

5. Table tennis racket is evolving form the wood to rubber, then to the sponge, always towards making the ball go faster, and making it easier to control the direction of rotation.

6. Sponge can better meet the needs of athletes for speed, rotation and strength factors, so it will continue to play an important role in the development process of dominant ability.

7. The rules always influence core elements of leading skills, and greatly influence the equipment selection. Rules have a great influence on the trend of leading skills, and play a positive role in the development and regulation of table tennis.

Key words: *table tennis, leading skills, causes, development trends*

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RESEARCH AND ANALYSIS OF TECHNIQUES AND TACTICS OF THE SINGAPORE WOMEN'S TABLE TENNIS PLAYER FENG TIANWEI

Abstract

Introduction: According to the International Table Tennis Federation 2012-2014 released the latest world rankings, Singapore's FENG Tianwei the foreign excellent athlete is one of the most powerful competitor in with Chinese women's table tennis team at present and in the future. In the 50th Moscow the World Table Tennis Championship women's table tennis team finals, Chinese women's team encountered the biggest upset in the final in recent years, with a score of 1 : 3 lost to the Singapore's women's team, encountered a strong opponent. This was the Chinese women's table tennis team once again lost championships in 19 years, is no margin of nine champions, while Singapore women's table tennis team was the first one to get the M Corbillon Cup. In the final between Singapore women's table tennis team and Chinese women's table tennis team, Singapore's athlete FENG Tianwei scored two points by herself, showed Singapore player FENG Tianwei has strong competitive strength. Therefore, this paper aims to explore the characteristics of techniques and tactics of the Singapore women's table tennis players FENG Tianwei, for Chinese women's table tennis team provided a useful theoretical reference for the training and competition.

Methods: In this paper, using the methods of literature, video observation, mathematical statistics, and three-phase indexes evaluation, the characteristics of the technique and tactics of the Singapore women's table tennis player FENG Tianwei were analysed and researched about the 50th Moscow the World Table Tennis Championship women's table tennis team finals FENG Tianwei versus DING Ning, FENG Tianwei versus LIU Shiwen, and the 2012 London Olympic Games women's table tennis singles match for 3 or 4.

Results: From the data in Table 1 can be seen that the FENG Tianwei's average score rate of 73.2% was excellent, the average applied rate of 25.6% in the normal range, in the Phase of attack after service; the score rate of 45.7% between good and excellent, the applied rate of 27.9% higher than the normal range, in the Phase of attack after receiving; the score rate of 51.9% in more than good, applied rate of 46.5% in the normal range, in the Phase of be locked in a stalemate. Data showed, performance of the Phase of attack after service was very excellent, performance of the Phase of attack after receiving and the Phase of be locked in a stalemate showed a good. So, FENG Tianwei was a very strong strength excellent table tennis player, a comprehensive technology, the psychological quality good, the game's performance was very calm.

Table 1 *Analysis results of Feng Tianwei by three-phase indexes evaluation*

Players	Matches	PAS		PAR		PLS	
		Score rate (%)	Applied rate (%)	Score rate (%)	Applied rate (%)	Score rate (%)	Applied rate (%)
FENG Tianwei vs DING Ning	The 50th World Table Tennis Championship	66.6	26.1	39.4	35.9	42.9	38.1
FENG Tianwei vs LIU Shiwen	The 50th World Table Tennis Championship	82.3	16.3	47.8	22.1	48.4	61.5
FENG Tianwei vs ISHIKAWA Kasumi	2012 London Olympic Games	70.8	34.3	50.0	25.7	64.3	40.0
average		73.2	25.6	45.7	27.9	51.9	46.5

Notes: PAS=Phase of attack after service; PAR=Phase of attack after receiving; PLS= Phase of be locked in a stalemate

Conclusions: FENG Tianwei's the technique and tactics ability of the attack after service was very excellent, was her strength; the technique and tactics ability of the Phase of attack after receiving and the Phase of be locked in a stalemate was good, was her relative weakness. Suggestions Chinese women's table tennis team, should draw lessons from the technical and tactical characteristics and experience of the foreign elite female athlete, have to strengthen the training, to formulate the corresponding strategy before the game.

Key words: *women's table tennis, FENG Tianwei, technical and tactical characteristics*

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RELATIONSHIP BETWEEN STRUCTURE AND FUNCTION OF THE PLANE RUBBER AND BUMP RUBBER

Abstract

Loop drive is one of the leading technologies for table tennis. While, why the flat rubber (also known as the anti-plastic, called flat plastic) could produce high-quality spin? Why the bump rubber (also known as positive plastic, called convex plastic) is difficult to produce high-quality spin? There is no illustration could be found yet.

This work states that the flat rubber structure will enhance the elastic deformation along with the cut-in direction, enlarge the contact area between the ball and rubber. Meanwhile, it also provides a continuous structure for rolling and friction, which is significant to increase the friction carry rebound strength, thereby increasing the precession speed and produce high quality loop drive. While, for bump rubber, the contact area between the ball and bump rubber is relative small and cannot provide continuous surface, which makes it hard to increase the friction carry rebound strength, therefore, it is difficult to produce high quality loop drive.

Key words: *structure, elastic deformation, friction carry rebound, loop drive*

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THE FUNDAMENTAL OF LOOP DRIVE TECHNIQUES - TANGENTIALLY HIT

Abstract

How to generate loop drive? There are different interpretations such as “first hit than friction”, “first friction than hit”, “friction produce loop drive” and so on. In this work, we point out the loop drive is swing the racket with its plane for- and downward collides with ball’s edge in a small angle. During this process, the slanting elastic concave-convex space deformation of rubber turns into impact energy and directs the ball moves in tangential direction. Meanwhile, there forms a frictional normal load and accompany with an elastic rolling normal surface structure, which frictionally carries and rebound the ball flying off racket with strong top-spin. We call this process as tangentially hit.

Meanwhile, friction makes the ball hard to across the net, rotation and precession are the co-effect of deformation and friction. Therefore, the tangentially hit, slanting elastic concave-convex space deformation of rubber and tangential deformation are significant for loop drive.

Key words: *slanting elastic concave-convex space deformation, frictional normal load, tangentially hit, loop drive*

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MAJOR FUNCTIONS AND CHARACTERS OF CONTROLLING AND GUIDANCE TECHNIQUES OF ROTATING ARC BALL

Abstract

The character of precession in the banana shape trajectory of the rotating arc ball is caused by the small angle cutting strike between the swing of the paddle and the ball, which leads to the inverted rubber to deform mainly in the tangential direction, and this in turn brings about the rolling friction rebounding carry motion. This is caused by the control and guidance of the cross force of Magnus effect, which deviates the flying trajectory of rotating arc ball. The cross force comes from the non-overlap between spinning angular velocity vector and flying speed vector. This non-overlap is caused by the differences in air flow speed and pressure, which leads to the difference in speed between the two ends.

The precession momentum of the rotating arc ball not only controls and guides the initial banana shape trajectory, but also controls and guides the trajectory after the ball landing on the table; it also controls the precession speed, strength, target of landing, which makes its rotation fast and precession strong, which is the reason why it has high scoring average. This is caused by the successive control and guidance character and function of the precession momentum of rotating arc ball.

Key words: *control and guidance, precession, banana shape trajectory, trajectory change, bounce*

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EXPERIMENT RESEARCH OF HAND SIGNAL FOR ILLEGAL SERVICE

Abstract

In past few years, dispute issues occurred with players' misunderstanding of penalty cause due to umpires' unclear verbal communication of service availability. Accordingly, International Table Tennis Federation Umpires and Referees Committee has been assigned to set up the research of gesture series of service violation penalty by ITTF with proposal being handed on by Hong Kong Table Tennis Association. Delphi method, experimentation and other research methods have been used within empirical study in this paper. The result comes out that concise and practical gestures of service violation could deliver penalty cause to players precisely. The improvement not only has avoided from unnecessary quarrel of indistinct verbal communication but also be very helpful to field audience and tele viewer's comprehension of umpire's penalty decision. Moreover, it does push table tennis event forward by improving spiritual civilization and ornamental value.

Key words: *rule and regulation, illegal service, hand signal*

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ANALYSIS OF CHINA'S COMBINATION OF SPORTS AND EDUCATION BASED ON ALL CHINA SECONDARY SCHOOLS TABLE TENNIS CHAMPIONSHIPS

Abstract

By studying the participating number, participating regions, participating provinces and cities, and competition level of the Chinese secondary school table tennis project, this paper aims at revealing the existent misunderstandings between sports and education departments in practicing combined teaching and training. Through literature review, interview, and mathematical statistics, the paper analysed the status quo so as to find a reliable data and information and finally put forward sensible suggestions and valuable reference for both the education and sports departments.

Key words: table *tennis, All China Secondary Schools Table-tennis Championships (ACSSTC), All China Students Games (ACSG), Combination of sport and education ('Combination'), National Youth Table-tennis Championships (NYTC)*

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COMPARATIVE ANALYSIS ON THE CHANGE OF SERUM CREATINE KINASE, BLOOD UREA NITROGEN AND BLOOD LACTIC ACID OF ELITE FEMALE BADMINTON ATHLETES BEFORE AND AFTER COMPETITION AND TRAINING

Abstract

Aim: Through studying the elite badminton athletes' lactic acid kinase and blood urea nitrogen and blood lactate change rule before and after competition and training. To explore the use of lactic acid kinase and blood urea and blood lactic acid to monitor athletes' competition and training. Improving the efficiency of training and competition. **Method:** Determining the 11 female badminton athletes' CK and BU and Bla on the day morning of the game, 15minutes before the game,5 minutes after the game, 1h after the game and 24h after the game. Determining athletes' CK and BU and Bla on the day morning of the training, 5 minutes after the training, 1h after the training and 24h after the training. **Conclusion:** Outstanding female badminton athletes with anaerobic ability, should combined with physical condition, to improve the training and the competition rhythm, make full use of the physical basis in training, in order to improve the performance of objective. The coaches should focus on the development of special technical ability of athletes in training, to achieve unity of technical and physical. **Recommendation:** According to the test data before and after the game the excellent performance of the athletes, the training methods need scientific guidance correct, improve technical training intensity in training, reduce the consumption of physical training, achieve the combination of competition and training.

Key words: *badminton, competition, training, lactic acid kinase, blood urea, blood lactic acid*

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STUDY ON CHARACTERISTICS OF AEROBIC CAPABILITIES OF ELITE FEMALE BADMINTON ATHLETES

Abstract

Objective: Aerobic capacity is the basis energy supply of badminton athletes, which is the key to decide the result of the game. Exploring the badminton athlete's aerobic metabolism ability characteristics is very important. Methods: Taking 20 women's badminton athletes performed incremental power cycling experiment, records the gas metabolism index, physiological, biochemical indexes in each stage of dynamic change law and summarize in the process. Results: With the level of athletes, sports grades improving, VO2max corresponds to the higher performance level. Incremental change by variation of power HR, Bla, anaerobic load rate in athletes. Shows the elite athlete aerobic metabolism ability, heart and lung function, speed endurance and tolerance of lactic acid abilities are better than general group of athletes. Conclusion: The combination of physiological and biochemical parameters, real-time analysis and evaluation of effective for athletes training effect, in order to provide the basis of scientific training plan.

Key words: *female, badminton, athlete, aerobic capacity*

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STUDY ON THE CHARACTERISTICS OF ANAEROBIC METABOLISM CAPACITY OF ELITE SQUASH PLAYERS

Abstract

Objective: to anaerobic metabolism capacity of elite athletes of different gender characteristics of squash evaluation, different levels of movement through the determination and the. **Methods:** 16 outstanding squash players as the research object, 10s, 30s, the maximal capacity test on it, recording the relevant indicators and heartbeat and blood lactic acid index. **Conclusion:** anaerobic metabolism capacity of elite squash players showed obvious characteristics of the project, which has strong phosphagen, glycolysis metabolism ability and strong maximal work capacity; gender differences, ability of anaerobic metabolism of male athletes is significantly higher than women's. There is significant difference between the ability of anaerobic metabolism of different sports level squash players, male the actress show, was significantly higher than that of normal group respectively. Combined with the changes of blood lactic acid after exercise, can more objectively and comprehensively reflect the anaerobic metabolism capacity of elite athletes.

Key words: *squash, excellent athletes, anaerobic, characteristics*

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THE CURRENT SITUATION AND COUNTERMEASURES OF REGISTERED ATHLETE EXCHANGE AND MANAGEMENT SYSTEM IN CHINA TABLE TENNIS SUPER LEAGUE

Abstract

With the development of world table tennis and the deepen reform of mechanism of China's table tennis, and the competition market development gradually, Chinese Table Tennis Super League was launched in 1999. Since Table tennis entered the market, athlete mobilization becomes inevitable. Although athletes mobilization has been improved in the past 15 years, but there are still some problems. By the method of literature, questionnaire, interview and logic analysis and other research methods, athletes from 18 Premier League clubs registered at the Table Tennis Badminton management center of Nation Sports General Administration in 2013 were as research projects, and the relevant provisions of the Premier League ball club athlete flows, procedures, status, management and influencing factors were analysed in the study.

The study showed that: (1) the overall athlete mobilization of Table Tennis Super League is still in the early stages of development. And the athletes exchange between the clubs must follow the market rules, relying on market forces, being rational and orderly. Being based on the role of government macro-control and special policies to protect and promote the rational flow of talent is also very important. (2) Starting from the actual situation of Table Tennis Super League, which can be achieved is to further improve the existing athlete exchange regulations in the short term; however the mode of athlete's mobilization management for professional development of table tennis league should be adjusted continually during the process to explore the "dual track" from the perspective of development. (3) Since 2006, athletes exchange and management system featuring "free man delisted" has been constantly changed. For Table Tennis Super League, the free exchange of players among the clubs is the common goal between the club, players and management unit, and it is also the methods of Chinese athlete talent exchange in the future.

Key words: *China Table Tennis Super League, athlete, exchange and management system*

Fund project: Beijing Higher Education Young Elite Teacher Project, No.: YETP169

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MARKET ROLE ON PROMOTING TABLE TENNIS ITEM FROM THE PERSPECTIVE OF ECONOMICS

Abstract

In 2014, the State Council issued a document about some ideas on stimulating sports consumption by accelerating sports industry development. The sports industry is facing a favourable time for growth, meanwhile, table tennis, being an important part of China sports item, will set off the boom. By means of document inquisition, experts' interview and theoretical analysis and market economics theories, this paper aims to analyse several questions about the role of market in promoting economic development and discuss the function of table tennis market's expansion in table tennis item.

Key words: *market, table tennis, development*

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A BRIEF INTRODUCTION OF TABLE TENNIS' THEORY BUILDING

Abstract

1 Research Purpose

The table tennis' theory building is an inevitable need of table tennis' developing. The theory building intends to make learners learn table tennis knowledge fully and systematically in a logic way. Meanwhile, it is a necessary way to re-understanding table tennis, which tries to figure out the relations among table tennis' theory contents and the correlation between table tennis' theory and human being's knowledge system.

2 Research Method:

Literature research method

3 Results and discussion

3.1 The theory foundation of table tennis' theory building

In technological philosophy and body technological theory, while viewing from macro level, the sport technique in sports is involved; when focus on table tennis event, the theory and concepts of technological philosophy and body technological theory can be treat as the theory foundation of table tennis' theory building. Based not only on the three basic contents - knowledge means and methods of technological definition, but also on the show up of characteristic of table tennis' technological theory while analysis from technological philosophy. In other words, table tennis' theory building can be carried on table tennis sport technique's concept in technological philosophy.

Specifically, the system building of table tennis' theory can be built from three aspects as follows: 1) the knowledge of table tennis technique; 2) the means of table tennis technique; 3) the methods of table tennis technique. The three aspects are the logical outset of table tennis' theory building.

3.2 The implementation of table tennis' theory building

Based on the acknowledge of technological philosophy, *Table Tennis Course* which published by Beijing Sport University in 2005 tried to build the table tennis' theory on the foundation of technological philosophy. The contents of table tennis' theory building are: technical knowledge, technical means and technical methods. Table tennis' technical knowledge involves two aspects: one is scientific knowledge, such as physics, biology and psychology knowledge related to table tennis; the other is experience knowledge, such as the developing history, jargon of table tennis and the experience analysis method during table tennis' technical actions teaching. Table tennis' technical means involves the technical movements and technical equipment. Table tennis' technical methods contains of teaching/training methods and judging methods in competition.

4 Conclusions

4.1 The theory foundation of table tennis' theory building is technological philosophy which provides table tennis' theory an open state to build the theory system, so that table tennis (sport event) can get richer and fuller explain from the view of technological philosophy.

4.2 Using technological philosophy to explain build a close relation between table tennis theory (sport theory) and technological philosophy. This relation makes the technological philosophy being showed in a specific event from micro level; meanwhile, the theory explanation existing from table tennis can communicate and share the theory achievements with technological philosophy.

4.3 Table tennis' theory is built on technological philosophy, which not makes the theory systematically, but treats the technical movements of table tennis as a part of human being's technical movements. This is exactly the meaning of table tennis' theory building.

Key words: *table tennis, theory, system building*

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CULTURAL SUPPORT FOR THE SUSTAINABLE DEVELOPMENT OF COMPETITIVE TABLE TENNIS SPORT IN CHINA

Abstract

Using the methods of literature and expert interview, this study has deeply analysed the developing plight of Chinese competitive table tennis sport. The results are: Chinese table tennis "dominance" has caused the world table tennis developing crisis; the long-time leading of competitive strength caused many problems, such as the multivariate functions of table tennis are not sufficient dug, the public attention is decreasing, humanistic education value is missing; athletes training is in the way of “weight material light people”, training efficiency is low; the development of competitive table tennis sport lacks of the support of humanistic culture and the universal culture. Based on this, this study puts forward countermeasures from the perspective of culture, so as to provide cultural support to better promote the sustainable development of competitive table tennis sport in China.

Key words: *competitive table tennis, sustainable development, cultural support*

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THE COMPARISON OF TRAINING SYSTEM OF YOUTH TENNIS PLAYERS BETWEEN CHINA AND AMERICA

Abstract

Purpose: Tennis sport, especially in women's tennis sport performance, developed rapidly in China. However, excellent sport achievements only belong to a small number players and the men's tennis never make any breakthrough in global match. Big differences still exist between China and tennis developed countries. The tennis performance of American players keeping ahead in the world, so the paper studied the management reform, training model, competition system and financing channel of American youth tennis training. Learning from tennis developed countries is of great importance to improve tennis performance of China.

Methods: literature review method; experts interview methods; comparison and analysis method

Results and Discussion:

1. The training models of youth tennis players in China include national professional team training, tennis school, tennis club and home training. In the process of youth tennis player training in China, more attentions are paid in tennis techniques practicing, whereas, the knowledge studying is ignored. Mostly, youth tennis players in China are short of competition experiences and training funds compare to American youth tennis players.

2. The training models of teenage tennis players in America mainly include tennis club, home training, tennis school and tennis star finance plan. The aim of the youth tennis sport training in America was "athletes first, competition second". The mental development, interest inspiration and physical health are the most important thing in training. Relevant education laws and regulations play important role in keeping the balance between study and training of American youth tennis players.

3. Youth tennis player training in China is government-oriented and lack relevant guarantee system, Whereas American youth tennis training is guaranteed by sound laws and regulations. Sound laws and regulations, parent's participation and fund support ensured youth tennis sport participation and simultaneous improvement in school achievement and sport performance.

Conclusion:

1. With the further development of tennis professionalism in China, training models of Chinese youth tennis training tend to diversity.

2. Abandon "sport performance first", learning from "athletes first, competition second". In the process of training, youth players' mental development and training interest inspiration should be paid more attention to youth tennis athletes.

3. Establishing and perfecting current laws and policies plays an important role in youth tennis sport and match participation and resolving conflicts between "studying" and "practicing".

Key words: *tennis, China, America*

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MAIN MEASURES OF YOUTH SPORTS ORGANIZATION AND DEVELOPMENT ON TABLE TENNIS

Abstract

Reserve talents are the foundation of a sports project maintaining enduring, while youth table tennis organizations at all levels is the important carrier of table tennis development, the basic support of table tennis reserve personnel training and the vital guarantee of forming a system of training table tennis reserve personnel scientifically and effectively.

The aim of this essay is to provide reference for relevant departments in order to promote a healthy and orderly development of table tennis reserve personnel training, to make the table tennis competitive level of our country lead the world in the long term and the table tennis movement in schools as well as among the masses develop vigorously so that it can bring into full play the social value in the process of constructing a harmonious society.

Research methods such as document literature, expert interviews and logical analysis will be carried out in this essay to discuss the main measures of youth sports organization and development on table tennis projects.

It is considered that the main measures are as follows:

1. to strengthen management of organizations and promote three-in-one harmonious all-round development of "group, competition, learning" of table tennis in China.

2. to consolidate foundation, improve youth table tennis sports organization service network, train table tennis reserve personnel in multi-channels.

3. to enhance institutional construction and intensify standardized management.

4. to deepen reform and transform functions, to reinforce construction of associations, to accelerate process of association substantiation.

5. to strengthen propaganda and create atmosphere.

6. to unearth table tennis cultural connotation deeply and increase influence of table tennis sports by using the power of culture.

7. to improve communication of departments and promote the win-win situation of training talented people of physical and cultural dual-system.

In short we must keep pace with the times and explore in depth, enhance youth table tennis organization and construction to be suitable to actual circumstances, fully guarantee a scientific and effective personal training system. In the meanwhile, we must improve communication between physical and cultural education departments and promote the win-win situation of training talented people of physical and cultural dual-system to achieve a healthy and sustainable development of reserve personnel cultivation.

Key words: *table tennis, reserve talents, organization and development*

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THE FORECASTING ANALYSES OF OPPORTUNITIES OF LONG TERM PREPARATION IN TABLE TENNIS

Abstract

This essay aims to investigate and summarize the table tennis fitness and entertainment market actuality and existing problems comprehensively and systemically from different angles such as main dual-parts of market supply and demand, and object of market, as well as propose developing train of thought and countermeasures. In the meanwhile, it intends to provide theoretical and factual basis of rapid and healthy development of table tennis fitness and entertainment market in China, to expand the 'national ball sport' market and achieve sustainable development of it, at the same time expects to provide a beneficial enlightenment for other projects' survival and development of fitness and entertainment market.

Research methods such as document literature, expert interviews, questionnaire surveys, mathematical statistics and logic analysis will be carried out to investigate the main table tennis business sites or amateur table tennis fitness clubs in three representative cities - Beijing, Guangzhou and Haerbin.

Main conclusions of this essay are the following:

1. The overall development of table tennis fitness and entertainment market supply main body --- operating table tennis clubs has begun to take shape, and the clubs are mainly small and medium sized ones. Economical natures of clubs are mostly state-owned, collective and private economy operating, which present a diversified developing tendency and show obvious features of regional economy. Modes of operation are various, but operation efficiency could be increased and chain business should be emphasized.

2. The main problems existing in the developing process of clubs are: business and development means could be innovated and market lacks of cultivation, strength of table tennis fitness guidance is weak, business and management personnel are in short and the level of internal administration is quite low, as well as cognition and sense problems exist.

3. Consumers of business sites are mainly concentrated in 21 to 40 years old from the perspective of age distribution, and the main consumer groups in order are education and science researchers, students, managers, civil servants, doctors, lawyers and so on from the perspective of occupation distribution. The main motivation of consumers participating in table tennis activities are listed as interest, hobby, fitness, entertainment and learning sports skills.

4. The train of thought of table tennis fitness and entertainment market development in China is to aim at the latest developing dynamic state of mass fitness and entertainment market to establish a fitness system whose main body is table tennis association, form and build amateur clubs of various levels gradually. What's more, it intends to update concepts on the basis of the existing venues of schools, sports bureau and enterprises to build multi-functional table tennis fitness and entertainment sites step by step.

5. Countermeasures of table tennis fitness and entertainment market development in China are strengthening the industry management functions of Table Tennis Association (Center), establishing and consummating amateur league system, expanding the investing channels of mass table tennis clubs, enhancing propaganda and guiding consumption, fighting for preferential policies of the country, operating table tennis venues carrying out experiencing marketing strategy and developing fitness and entertainment market comprehensively.

Key words: *table tennis, fitness and entertainment market, actuality and countermeasures*

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RESEARCH ON THE RECONSTRUCTION OF THE ITTF MUSEUM AND THE WORLD TABLE TENNIS CULTURE COMMUNICATION

Abstract

1. Research purpose

In order to construct The ITTF Museum better and disseminate the table tennis culture in the world widely, The ITTF museum reconstruction in Shanghai must fully consider the whole problems, of course make specific measures.

2. Research methods

(1)the method of literature;(2)the method of comparative analysis;(3)the expert interview law;(4)the on-the-spot investigation method;(5)case analysis;(6)the questionnaire survey method.

3. Results and discussion:

3.1 The ITTF museum construction level

Make it become the International Table Tennis Federation logo, undertake forum, the international table tennis competitions and technology research, the literature database, scientific interaction and international Coach Training exchanges and etc.

3.2 The ITTF Museum construction content

According to the development trend of the museum, meet the functional requirements, conform to the times and the region characteristic and the principle of sustainable development, the construction content including:

①The display area: comprehensively display of Table Tennis Museum functions, and leave enough space to meet the I future need and development;

②The education experience area: fully embodies the Olympic spirit education, carry out the juvenile table tennis exchange activities, exert modern museum interactive function;

③The international exchange area: build the International Table Tennis Federation training center, regularly held Table Tennis Federation forum, invite Europe and other countries of the adolescent students to exchange;

④The scientific literature area: built International Table Tennis Federation official documents centers, Chinese ping-pong data centers, publish related professional authority and the game data, provide a "think tank" service;

⑤The brand exhibition area (image): help sports products manufacturers, sports service operators, the news media to enhance the quality of table tennis, to provide its product development, brand operation, image display and other services.

3.3 The ITTF Museum exhibition concept

"International idea, do table tennis exhibition", through the international language display of table tennis's past, present and future, including the table tennis history, spirit, major events, famous figures, technology and other content.

3.4 The ITTF museum management and operation system

The implementation of director responsibility system under the leadership of the Council, the implementation of the operation mechanism by the government and social forces supported by the academic committee about development planning mechanism.

4. Conclusions:

4.1 the accurate level function of The TT Museum.

4.2 highlights the strategic positioning of the construction of International.

4.3 reasonably planned construction scale and content.

Key words: *table tennis, the ITTF Museum, reconstruction, culture communication*

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EXAMINE THE CULTURAL DEVELOPMENT OF THE CHINESE TABLE TENNIS FROM A CULTURAL PERSPECTIVE

Abstract

The use of literature and logical analysis to differences in western culture as a starting point to find tennis cultural connotation. Tennis seek cultural development from a historical perspective, the social and cultural significance propagation generated again aim to stimulate the enthusiasm of the people, the idea of cultural values in table tennis, and cultural significance. On the basis of building cultural consciousness table tennis, table tennis and establish a culture of self-confidence, promote the balanced development of table tennis world, including hard and soft power table tennis, so as to achieve the purpose of building a sports power and cultural power, in order to get double harvest in the material and spiritual level, to achieve compliance with the healthy development of the construction of a new era of globalization, the country's image and sports and make contributions. Combination will be held in Suzhou 53rd World Table Tennis Championships, promote cultural development in Suzhou City Sports. With an excellent opportunity for the World Championships, the integration of tennis cultural resources to enable the people to understand, table tennis and cultural inheritance, and ultimately into the sport in an effort to establish a new image of Suzhou sports; tennis transcend cultural, sporting and cultural formation of the new Suzhou image.

Key words: *table tennis culture, in western culture, development, spread, image*

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GAME THEORETIC ANALYSES OF THE TACTICS IN TABLE TENNIS MATCHES

Abstract

The research, mainly by means of principles of the game theory, the thinking methodology and analytic methodology, probes into the microcosmic tactics in table tennis matches from the viewpoint of a totally new macroscopic angle so that the table tennis coaches, athletes and research specialist staff in our country can widen their thoughts, improve their tactical attainment, reduce their decision-making misplays in important matches, increase their winning probability, further enrich their analytic means in table tennis matches. The conclusions of the research are as follows:

(1) From the angle of the game theory, the table tennis competitive game theory is “zero-sum game”. The table tennis competitive process can be divided into dynamic game theory and static game theory; the game theory in the course of the exertion of table tennis tactics can be defined as complete information dynamic game theory and incomplete information static game theory and complete but imperfect dynamic game theory.

(2) After analysing the game theory, the thesis reveals the natural characteristics of technical choice and technical exertion in table tennis competitive game theory, in which there are successive game theory and spontaneous game theory and the mixed game theory that include both of them. In the course of successive game theory, every player can take advantage of the reverse induction of “expecting forward, reasoning backward” to achieve balance. Balance is both a description and a process, but not a guide line.

(3) The purpose of game theory analysis is to find out how to achieve balance. As a result, the thesis introduced three comparatively simple mathematical techniques that are often used in the game theory. They are reflective function technique, minimum and maximum technique and straight line interior extrapolation technique, which is quite maneuverable in the tactical theoretical research. However, the task has not been completed when the balance is achieved theoretically until it is put into practice.

(4) The thesis, from the viewpoint of players’ rationality, subjective initiative and individual psychological features, uses the game theoretical analysis to analyse the players’ venture favour and their ability to undertake the ventures, which is a new trial.

(5) The problem of dependence naturally exists everywhere in society, which is seldom realized in competitive sports, especially in table tennis tactics. In this thesis, the writer puts forward the principles and solution as to how to break through the problem of dependence.

Key words: *tactics in table tennis matches, game theory, zero-sum games, venture favour, path-dependence*

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BRIEF ANALYSIS ON REASONABLE DIETARY NUTRITION OF TABLE TENNIS PLAYERS

Abstract

1 Research Objective

Dietary nutrition is the foundation of sports training, and it's the fundamental guarantee to accelerate the recovery of a variety of consumed nutrients in sports after exercise. Only on the basis of reasonable dietary nutrition ingestion, scientific training methods can promote athletes' sports ability to improve. Based on energy consumption and supplement features of table tennis, this paper discusses how to make reasonable nutrition supplement for table tennis players, and provides reasonable dietary nutrition recommendations for table tennis players, in order to improve athletes' training level as well as their sports ability.

2 Research methods

By applying the method of literature research, expert interview, and the methods of theoretical analysis, this paper briefly analyses the reasonable dietary nutrition issue of table tennis players.

3 Research results

(1) The quantity of player's food should satisfy the consumption of sports training and competition, in terms of quality, it should ensure comprehensive nutrition needs and appropriate proportion.

(2) Dietary food should have balanced nutrition and diversified varieties. Adhere to the principle "four more three less": eating more staple food, vegetables, fruits, dairy or soy products; eating less fat, meat, fried foods.

(3) The food heat distribution of players' three meals a day should be arranged according to actual situation of training or competition.

(4) Players eating time should consider players' digestive function and habits.

(5) In the cooking and conserving process of player's food, it should avoid the loss of nutrients and have a good colour, aroma, taste and delicate shape so that enhance players appetite.

(6) Players under the condition of having a balanced diet with good quality, it's unnecessary to have additional supplements. While in preventing the effects of deficient nutrition on sports capacity, it should also pay attention to the bad effects of over nutrition.

(7) To strengthen the education of players' eating habits, and to develop a good habit of reasonable diet.

Key words: *table tennis player, reasonable diet, nutrition supplement*

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ANALYSIS ON TECHNIQUE AND TACTICS OF MA LONG AND ZHANG JIKE

Abstract

By the means of literature review, video analysis, elevating sectional indexes and inductive technique and tactics, this paper researched the technique and tactics through the recent matches between Ma Long and Zhang Jike and made innovation on research methods by relating Zhang Jike's service and attack after service rather than only studied on single technique. Among three section indexes, Ma Long has no advantage over Zhang Jike during rally, but Zhang Jike has significant shorter anticipation time. The key for winning the match is to take advantage during the first three strokes.

Key words: *table tennis, mental stress, flow injection analysis, salivary α-amyla*

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OPTIMIZATION OF LOOP DRIVE TECHNIQUES

Abstract

In this work, we illustrate the loop drive technique is the process of athlete changes the body's chemical energy into mechanical energy. In order to produce high quality loop drive, strong hip body strength and fast arm strength must be superposed to form a powerful resultant force, by which a stable and strong swing of racket can be formed. And then tangentially hit the ball with back-rotation-push track in the overlapping space. By this way, the maximum frictional normal load and the highest speed of racket can be reached.

Key words: *accelerated force, high-speed fit, back-rotation-push, fast conversion*

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THE RESEARCH ON THE APPLICATION OF DOUBLE MOVING AVERAGE IN TABLE TENNIS GAME ANALYSIS

Abstract

Introduction: Table tennis competition is a game sport that playing by single or double players, both players alternate shot through their rackets making the ball over or around the net assembly and touch opposite playing surface until one player score or error, Round terminated. This attribute demonstrates the result we usually observed is rather the emergent results of this interaction process than a full reflects of the strength of technical and tactical (e.g. 100 m throw, marathon, etc.), this reveals the interactive process is dynamic (Lames, 2006). All the methods we used now are all static analysis through data statistics and evaluation from the horizontal angle after the match. The results can only reflect one player's overall performance but ignoring time and score process. This study introduced into double moving average based on the dynamic attribute of table tennis competition, aiming to build a simple, intuitive competition dynamic analysis model which able to reflect player's momentary strength in chronological order.

Methods: The study took each rally result from the side of winning player as the observation unit based on double moving average. Namely, Scoring was 1 and losing was 0, the moving steps was 4, so we can get a new time-series of numbers from the score of a match, then analysed and evaluated their momentary strength through the dynamic analysis model and evaluation model. The evaluation criteria derived from 110 international table tennis competitions that played by 64 elite male players (world ranking in 50 before the competition) from 2011 to 2012.

Results: The dynamic analysis model built by double moving average are available for one or more players, one or more competitions, one or more technical indicators. This model can better reflect player's advantage, stalemate and disadvantage periods intuitively. It's great helpful for players, coaches and scientific workers to quickly identify the player's hot or cold hand periods, then give a further detailed analysis or better guidance in next competitions and training.

Conclusions: The dynamic analysis model based on double moving average can better reflect player's momentary strength in chronological order, this make the evaluation results more objective. The model is easy to calculate and the graph is direct viewing and easy understanding. Now this approach has been widely used in China table tennis male and female team. And it also applies for a number of technical and tactical analysis of net games due to it only relies on the score.

Key words: *table tennis, double moving average, game analysis*

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THEORETICAL MAXIMUM BALL TABLES INSIDE SPEED VALUES IN TABLE TENNIS COMEBACK

Abstract

Liu-tianyang in "space sports relativity principle" in the proposed sports in the state of motion and velocity of the object is relative. Table tennis, the same ball, because the distance between the different players, will show the relative size of different speed values, relative velocity value is inversely proportional to the distance between the two sides, which is a weak defensive players close to the table, far defence good theoretical basis. Speed of the ball hit back in the station for each additional 1 m / sec, will be a tremendous pressure on the other side, previous studies concluded that the fastest reaction time of about table tennis players between 0.14-0.15 seconds, if coupled with athletes technology choice, displacement, swing and other time-consuming, and effective response when athletes between about 0.25-0.3 seconds. In view of the above theoretical foundation and athlete reaction time limits, we first proposed in 2008 a table tennis »the explosive punch Loop technology of the ball tables inside« concept, and theoretical research in this article is based on this idea and carried out.

According to the foregoing, we assume an effective response when athletes for 0.2 seconds, the distance between the athletes on the basis of two meters, has been calculated, as long as the ball hit back ball tables inside to reach more than 10 meters per second, the speed, we can break through the other side of the effective When the reaction, so as to achieve the effect of the so-called explosive punch. Currently, the majority of table tennis in the community that sets maximum speed of the ball is about 6-7 meters per second, there is no possibility to make the ball reach the station within 10 meters per second or more, whether in theory established, which is the focus of this study.

In this paper, based on the characteristics of the ball forces within the ball tables inside on a different location and height, to build three-dimensional coordinate system in the station of the ball, using the three-dimensional kinetic equation F=ma and Matlab mathematical simulation to solve the three-dimensional dynamics. Focuses on the flat screen, the network sets the ball in the low three different locations at different heights to six different trajectory force between 5 points tables end line situations, time and speed.

Research shows that one-third of the net portrait in high levels located in the ultra-low with a maximum speed of the ball at third and a half units can reach 12 meters per second, about the shortest time is about 0.2 seconds; vertical in the net two thirds of the high level at the maximum times of low net speed of the ball in the station at the third and a half units can reach 16 meters per second, the shortest time is about 0.15 seconds, and the average low and parallel to the ball and the net is faster, shorter, it is worth noting that the speed of the ball's flight station within its own rotational strength is closely related to the flight path. Thus, »the explosive punch Loop technology of the ball tables inside« in theory is totally set up, how to achieve; it is the future direction of table tennis community efforts.

Key words: *table tennis, ball tables inside, maximum speed, mathematical modelling*

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THE RESEARCH ON THE CHARACTERISTICS AND RULES OF EMERGING SPORTS ITEMS THE FLOORPINGPANG

Abstract

The floorpingpang movement is a set of tennis, table tennis, two sports features and advantages as one of the new class of combat sports across the network, which is made by Professor Liu Tianyang Guangzhou Institute was founded in 2008 on the eve of the Olympic Games. As the name suggests, the floorpingpang movement is on the ground (wood floor) of table tennis, it enriches and develops the sport of table tennis. Relative to table tennis, it has five characteristics: First, inherited the most entertaining of the two table tennis class technology (forehand and backhand loop the ball with forehand and backhand slice technology); two, to adopt the floorpingpang The ball is directly over the network technology, there is no three panels directly into a stalemate, turn more; three, technical system the floorpingpang movement more concise, pro-competitive countries in the world between a country's dominance of the phenomenon is difficult to occur; four, the floorpingpang venue than the tennis ball and racket, is conducive to television; five, the floorpingpang movement can solve the problem of uneven development of a campaign to enable all countries to have more talented athletes to compete in the world the opportunity to champion.

In this paper, the floorpingpang movement for the study, by means of the use of the survey visit, documentation, surveys, comparative experiments, mathematical statistics and logical analysis of the characteristics of the floorpingpang analysed and studied.

Through the Guangzhou Sports University Table Tennis Students research shows that they believe the floorpingpang venue size, relatively modest net higher; relative to table tennis, most students think t the floorpingpang of sports equipment should be improved; competition test found significantly higher than the number of rounds of table tennis, double table tennis; the experiments showed that the race the floorpingpang average maximum heart rate and heart rate were higher than table tennis, is greater intensity sports.

Key words: *emerging sport, the floorpingpang, features, rule,*

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THE APPLICATION OF AUGMENTED FEEDBACK IN TABLE TENNIS COACHING

Abstract

This paper serves as a guide to help table tennis coaches understand augmented feedback applications based on the following categories: a) types, b) content, c) timing, d) frequency, and e) strategies. This paper presents different perspectives of feedback application related to motor skills learning in the context of competitive youth table tennis. The traditional view is that the greater the feedback provided to athletes, the better is the quality of coaching and learning. However, this approach only enhances short-term performance in practice rather than true learning demonstrated in competition. It is important to understanding the benefits of reduced feedback frequency since skilled athletes rely more on internal feedback for learning outcomes. Coaches need to reflect on and become aware of their previous strategies in providing feedback that were contradictory to the research findings. This paper will enable coaches to actively overcome the past mistakes with a thorough thought process as well as to ensure optimal physical and psychological learning outcomes of table tennis athletes.

Key words: *feedback, motor learning, coaching, competitive table tennis*

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NOTATIONAL ANALYSIS OF FEMALE´S SINGLES BADMINTON MATCHES IN OLYMPIC GAMES IN BEIJING

Abstract

The aim of this study was to determine the gestural structure of female´s singles badminton matches in Olympic Games. 36 single´s badminton matches in Olympic Games were selected (76.59% of total matches in competition). Nine matches were deleted (two withdrawal, seven for more than 20 points of different). Matches were played with the current "rally point scoring" system, where the one who wins the best of 3 games of 21 points is the winner. Given the category of the tournament, all participants were the best players in the world at that time. Official videos recorded by the organizations of the Beijing 2008 Olympic Games were used to carry out the analysis of the matches. Matches were analysed with Kinovea 8.15 software and analysis of all games was done following the methods of Anguera (2003). For gestural structure the classification proposed by Spanish Badminton Federation was taken as a reference, although badminton strokes were grouped into seven categories because of simplifying: a) underhand; b) under back; c) half hand; d) half back; e) high hand; f) high back; g) high rectified. The results had shown a total of 17225 strokes analysed. In turn, strokes volumes were: a) 3362 (19.6%); b) 3469 (20.1); c) 1570 (9%); d) 961 (5.5%); e) 5472 (31.8%); f) 191 (1.2%); g) 2200 (12.7%). No studies so far have analysed gestural characteristics of elite badminton, a sport whose practice has spectacularly increased over the last few years. These studies are necessary for the planning and specific training female badminton.

Key words: *elite performances, notational analysis, competition, female*

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MATCH ANALYSIS OF PADDLE TENNIS COMPETITION IN FEMALE PLAYERS

Abstract

The aim of this study was to determine the temporal and gestural structure in female paddle tennis. Eight female paddle tennis match play (semi-final and final) of Padel Pro Tour were selected. All matches were played on outside hard paddle tennis courts and began with new paddle tennis balls. The matches were best of three tiebreaks sets. Matches were recorded (Panasonic HC-700; Japan) and analysed with Kinovea 8.15 software. Analysis of all games was done following the methods of Anguera (2003). The description of the variables according to previous studies shown below (Mendez-Villanueva et al., 2007; Torres-Luque et al., 2011). Total play time (from the beginning of the game when the first player serves until the last point ends), real play time (from the moment the player begins the technical motion until the line judge determines that the ball passes the limit of the court or the ball does not pass to the other court and touches the net), and resting time (from the end of the point until the player begins the next serve) were determined. Point duration, resting duration (rest time between points), number of stroke per rally, and number of points during the competition were also registered. For gestural structure the classification proposed by González Carvajal (2006) was taken as a reference (service, forehand return, forehand return after the wall, backhand return, backhand return after the wall, forehand, forehand after the wall, backhand, backhand after the wall, forehand volley, backhand volley, forehand lob, forehand lob after the wall, backhand lob, backhand lob after the wall, smash, smash after the wall, drop shot). The results shown a total time play of 60 min, real time play was 39% with a work-to-rest ratio of 1:2.51. The duration of rally was 9.67 s and strokes per rally were 9.46. The most frequent type of strokes were: smash (16.30%), back volley (12.8%) and forehand volley (12.00%). These studies are necessary to know a paddle tennis that is a sport in period of full development.

Key words: *paddle tennis, notational analysis, competition, female*

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TENNIS VS WHEELCHAIR TENNIS. DIFFERENCES IN MATCH STATISTICS IN GRAND SLAM TOURNAMENTS

Abstract

Wheelchair Tennis (WT) has been one of the most adapted sports and has developed significantly in recent years, but there is little information regarding to the statistics of the competition to help training system. The aim of the present study was to analyse the differences in match statistics between WT and Conventional Tennis (CT). The data from 48 matches (24 matches in WT and 24 in CT) from three Grand Slams (Australia Open, Roland Garros and US Open) were analysed. The variables studied were grouped in two groups (variables related to serve (a) and variables related to return (b)), and studied in relation to the modality of the match (WT or CT). Data was recollected from official website of each tournament. A univariate (Mann Whitney U) analysis of data was done to analyse the differences between modalities. CT had significantly higher average number of point won on first serve (%) and lower of receiving points won (%) than WT in all tournaments. Of the 16 variables analysed, in Australia Open and Roland Garros there were significant differences in 11 of them. In US Open just 8 variables showed significant differences. The result showed that: a) CT players win more points serving than WT; b) in the return games, the WT players win more receiving points than CT players; and c) WT players have more break point opportunity and win more break point than CT. The value presented could be used as a reference for practice and competition in peak performance players.

Key words: *notational analysis, match analysis, racket sports*

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A COMPARISON OF CHOSEN HEALTH INDICATORS DETERMINED DURING ROUTINE MEDICAL EXAMINATIONS BETWEEN TABLE TENNIS, BADMINTON AND SQUASH PLAYERS

Abstract

The main goal is comparison of chosen health indicators determined during routine medical examinations between table tennis, badminton and squash players. The second goal of this study was to determine whether there are taxa in respect of which athletes in these three sports could be grouped, according to their characteristics, collected during routine medical examinations, in relation to their age group and type of sport. Routine medical examinations are particularly important to determine current health status of the athletes, to provide information about risk factors and still unknown critical congenital dysfunctions at individual players. However, the main purpose of routine medical examinations is to determine lately developed dysfunctions, influenced during the processes of growth, development and exhaustive trainings. These dysfunctions could cause sudden deaths, or appearance of chronically diseases, or injuries. We have used the data from Polyclinic for Occupational Health and Sport, from male athletes (66 badminton, 143 squash and 235 table tennis players), and then female athletes (5 badminton, 127 squash and 81 table tennis players), stratified by gender and by four age groups. Collected data included height, weight, body mass index, blood pressure (diastolic and systolic), pulse rate, vital capacity of the lungs, hemoglobin, hematocrit, leukocyte, thrombocyte, ECG and sedimentation. The results of Kruskal Wallis and Chi-square tests indicated very small number of differences among table tennis, badminton and squash players in chosen indicators, mainly in height, weight and body mass index in certain age groups. The results of K-means cluster analysis revealed that there are two taxa, by which athletes in these three sports could be grouped, in relation to their age group and type of sport. The results are described in terms of desirable morphological characteristics, as well as in terms of specific functional capacities and motor abilities, for each sport (badminton, squash and table tennis). The main shortcomings are small number of participants in certain age groups and small number of badminton players.

Key words: *age groups, functional capacities, morphological characteristics, racket sports*

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DIFFERENCES AMONG TABLE TENNIS AND TENNIS PLAYERS IN CHOSEN HEALTH INDICATORS DETERMINED DURING ROUTINE MEDICAL EXAMINATIONS

Abstract

Routine medical examinations are particularly important to determine not only current health status of the athletes, but also to determine previously undiscovered critical congenital dysfunctions or risk factors at the individuals as well. However, these routine examinations are especially important to determine lately developed dysfunctions, which could cause sudden deaths, or chronically diseases or injuries. In this article, the main goal is to determine the differences among table tennis and tennis players in chosen health indicators, collected during routine medical examinations. The other goal was to determine the taxa in which athletes in these two sports could be grouped, in relation to their age group and type of sport, according to their characteristics, using the data collected during routine medical examinations, performed by physicians from Polyclinic for Occupational Health and Sport in Zagreb, Croatia. This database, which consists the data from all medical examinations of the athletes in the City of Zagreb in years 2011 and 2002, provided information about medical records of male athletes (574 tennis and 224 table tennis players) and female athletes (290 tennis and 76 table tennis players), stratified by gender and by four age groups. Collected data included height, weight, body mass index, blood pressure (diastolic and systolic), pulse rate, vital capacity of the lungs, haemoglobin, haematocrit, leukocyte, thrombocyte, ECC and sedimentation. The results of Mann Whitney and Chi-square tests indicated relatively small number of differences among table tennis and tennis players in chosen health indicators. Moreover, the results of cluster analysis revealed that there are two taxa in which the athletes could be grouped, regarding their characteristics collected from medical records. Results are described in terms of desirable morphological characteristics, as well as in terms of specific functional capacities and motor abilities, for tennis and table tennis.

Key words: *age groups, cluster analysis, gender, medical aspects*

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MOOD STATES IN PADDLE-TENNIS COMPETITION: DIFFERENCES BY PERFORMANCE LEVEL

Abstract

Paddle-tennis is a new sport a lot of people in some countries in the world gradually practice. Mood states are different in every racket sport. Authors have explained the importance of "Iceberg profile" attributed by Morgan (1985). However, there is a controversy because other authors explain that there are not any differences among performance levels. Sixty-two paddle-tennis players from different levels participated voluntarily in this study. Profile of Mood States questionnaire (POMS) from McNair, Lorr and Droppelman (1971) has been used to assess the mood states prior to the competition. The athletes completed POMS one hour before the match. One-way ANOVA test was performed to test significant differences in the six scales of mood states in three performance levels (C1, C2 and C3). The main result was that depression and anger states were higher in C1 (45.63 and 51.69) than C2 (40.44 and 45.67; $P<0.05$; respectively). There were no differences in other scales of POMS. Vigour score was higher than 50 points in C1 (50.63±6.73), C2 (50.89±6.94) and C3 (52.03±7.74). Each category had "Iceberg profile", however two states are altered. Some studies claim that different athletes do not show "Iceberg Profile" prior to the competition. Nevertheless, there are no studies reporting what state explains performance when the vigour state is high in all cases. We conclude, therefore, paddle-tennis players have adequate psychological conditions prior to the competition (Iceberg Profile), whereas that other negative states increase.

Key words: *mood states, paddle-tennis, POMS, performance level*

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BLOOD LACTATE, RATE OF PERCEIVED EXERTION AND MEAN HEART RATE CAN PREDICT SUCCESS IN SQUASH PLAYERS

Abstract

Squash is a popular racket sport that requires intermittent activity near maximal- intensity exercise. The aim of this study is to analyse the sensitivity (Sens) and specificity (Spec) of the physiological response variables to predict the outcome in competition.

Thirteen regional and national male Spanish squash players (mean (SD) age 34.3 (10.1); weight 74.6 (5.1) and height 173.9 (7.2) were participants in the study. Mean heart rate (MHR), blood lactate (BLa) concentrations and rate of perceived exertion (RPE) were measured as physiological parameters in 22 official squash sets. Received operating characteristics (ROC) analyses were performed.

Differences were found between winners and losers in blood lactate levels (3.41 ± 1.58 vs 6.54 ± 2.86 mMol/L, P<0.002, respectively) and Borg Scale (5.5 ± 2.3 vs 7.6 ± 2.43, P<0.03) and no differences was found in mean heart rate (167 ± 12 vs 175 ± 9.5 bpm, P>0.05). Areas under curve (AUC) of BLa were 0.93 ± 0.05, 95% CI 0,741 to 0.995, (P<0.0001), RPE 0.754 ± 0.113, 95% CI 0.526 to 0.910, (P=0.02) and MHR 0.729 ± 0.112, 95% CI 0.500 to 0.894 (P=0.04).

Optimal cut-off points for BL were 4.67 mMol/L, (Sens 91.67%and Spec 90.00%), for RPE 7 (Sens 83.33% and Spec 70.00%) and MHR 172 bpm (Sens 66.6% and Spec 80.00%).

Blood lactate and rate of perceived exertion cut-off points can be used as specific-training physiological parameters

Key words: *squash, winners, losers, ROC curves*

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EXTERNAL METRIC CHARACTERISTICS OF THE SPORT-SPECIFIC AGILITY TENNIS TESTS

Abstract

The main objective of this study was to evaluate extern metrics characteristics of the specific agility tests in tennis, with regard to factor and concurrent validity of the tests. A total of 13 male and 20 female competitive tennis players (age, 19.13±1.15 years; body height, 161.00±13.77 cm; body mass, 48.68±12.33 kg) were evaluated for a four standard agility tests (20 yard, Illinois, T-test, and T-test with crossover steps) which were executed with and without tennis racket. Results showed appropriate validity of the tests. Future studies are needed in order to establish the applicability of the tests in tennis sport, mainly with regard to predictive validity.

Key words: *sport specific index, factor analysis, concurrent validity*

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SPORT-SPECIFIC AGILITY IN TENNIS (INTERNAL METRIC CHARACTERISTICS OF TESTS)

Abstract

The aim of this study was to construct four sport-specific tennis agility tests and to determine its' reliability. The sample of subjects comprised 33 young tennis players (18-20 year of age). The variables included four standard agility tests (20 yard, Illinois, T-test, and T-test with crossover steps), which were done with and without the tennis racket. The reliability analyses suggested a high consistency for the applied tests. For test with tennis racket interclass correlation coefficient was [ICC] = 0.89 and 0.96; with Crombach's alpha of 0.94 and 0.98, for men and women, respectively. And for agility without tennis racket interclass correlation coefficient was [ICC] = 0.83 and 0.95; with Crombach's alpha of 0.93 and 0.98, for men and women, respectively. Results showed appropriate reliability of the sport-specific tennis agility tests which in some cases overreached the reliability parameters observed for standard tests. Future studies should evaluate the applicability of the proposed procedures in other samples of tennis players.

Key words: *reliability, stability, familiarization*

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A STUDY ON SPORT ENJOYMENT OF TABLE TENNIS

Abstract

The aim of the present study was to explore the variances in personality and sport enjoyment of students who took the physical class. The Mini-Markers scale of personality and the revised Physical Activity Enjoyment Scale (PACES), which was originally designed to measure college students' involvement in physical activities, were employed. The responses were obtained from 281 students who took the course participated in the date collection. Consequently, analysis of variance technique (ANOVA) test was conducted for each dimension to discover if there is any difference, followed by a Post Hoc test to determine which groups were different. The results of the ANOVA test indicated that there were statistically significant differences between colleges for personality and sport enjoyment. Implications are drawn for physical class management and course design.

Key words: *physical education, personality, sport curriculum*

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PSYCHOPHYSIOLOGICAL RESPONSE TO MEN DOUBLES COMPETITION IN ELITE BADMINTON PLAYERS

Abstract

The effects of human competition on testosterone (T) and cortisol (C) levels have been studied for several researchers. On the whole, while high T levels encourage human social-seeking behaviours, C plays an important role in response to a physical and psychological challenge mobilizing glucose reserves into skeletal muscle. The biosocial model is one of the most important hypotheses to interpret the relationship between T and social competition. According to this model, face to face competitions elicit important outcome dependent hormonal changes; victor men increase T levels and consequently enhance their trend to facing new social status threats. In contrast, defeated men drop significantly after losing and inhibit their status-seeking beside negative moods and high postgame C levels. To our knowledge, in rackets sports many few papers has been published analysing the hormonal response patterns; foreground two studies in men doubles tennis and men singles badminton players that results fit to biosocial hypotheses of status. Here, we present a study in 18 elite men double players (from Europe, Oceania and Asia) randomly chosen from the XXIII Spanish International Badminton Tournament with following characteristics (mean ± SD): age 21.51 ± 3,22 years; BMI 22.80 ±1.49 kg/m2 and 9.83 ±2.79 years in official competitions. Participants were not talking drugs, medication, no endocrine disorders before or during the process and they were familiarized with sampling. Saliva samples (2-4 ml) were taken in plastics tubes 45 minutes before player was called to the court and 45 minutes after the match. CSAI-2 (Martens et al., 1990) was also used to estimate pregame cognitive and somatic anxiety and self-confidence. Lactate blood concentrations in the first 60 s. postgame and rating of perceived exertion (RPE; Borg, 1982) was also taken to estimate the effort to win or lose the match. Pregame and postgame testosterone levels are shown in Fig. 1A. According to biosocial model, results (Wilcoxon signed rank test) showed that testosterone levels increase after winning ($z = -2.366$, $p = .018$) and drop after losing ($z = -2.934$, $p = .003$) in doubles men badminton players. The mean C salivary concentrations before and after the contents are shown in Fig. 1B. In contrast, C decrease after win a match (-23.90 %, $z = -2.366$, $p = .018$) and were significantly higher in defeated men (128.28%, $z = -2.934$, $p = .003$). Pregame psychological measures (CSAI-2 factors) and postgame lactate concentrations showed no differences between groups, nevertheless RPE was higher in losers ($z = -3.303$, $p = .001$). In conclusion, T response patterns to men doubles badminton competition are congruent with the outcome, according to the biosocial hypotheses of status. Postgame C levels were also related with outcome, although the literature suggest a relationship between physical effort and C rises, the present study showed no differences between victor and defeated men in postgame lactate concentrations, but RPE (highly modulated by psychological factors) showed greater score after losing, probably in response to frustration (as argued Jimenez et al., 2012).

Key words: *testosterone, cortisol, anxiety & psychophysiological response to competition*

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A STUDY OF MOTIVATIONS AND SUSTAINED INVOLVEMENT OF STUDENTS WHO PLAYED TABLE TENNIS AFTER SCHOOL WHILE THEY ENROLLED IN TABLE TENNIS CLASS AS THEIR P.E. ELECTIVE: A CASE STUDY AT NATIONAL FORMOSA UNIVERSITY

Abstract

The purpose of this study was to understand the motivation and sustained involvement of students who played table tennis after school while they enrolled in table tennis class as their P.E. Elective. The objects were the students studied at National Formosa University who took table tennis as their P.E elective in the academic year of 2013. Our research instrument was the University Student Motivation and Sustained Involvement Factor Questionnaire. Descriptive statistics, T-test, one-way ANOVA and discriminate analysis were utilized for statistical analysis. The conclusions of this study were:

1. After school more male students played table tennis than female students did.
2. The students who had taken part in campus cups of table tennis had higher motivation to participate after-school table tennis activities.
3. The students who had taken part in campus cups of table tennis had more sustained involvement for after-school table tennis activities.

Key words: *motivation, P.E. elective, sustained involvement*

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A COMPARISON OF MUSKULOSKELETAL INJURIES AMONG JUNIOR AND SENIOR PADDEL-TENNIS PLAYERS

Abstract

Objective: To describe the incidence of musculoskeletal injuries in senior and junior recreational Spanish paddle-tennis players.

Methods and subjects: The sample was composed of 60 active paddle-tennis players. Two groups (50%) were made – Junior and Senior – to compare the main determinants of injury in each group, with a mean 60.46±3.5 (55–67 years), practice time 10.33 ± 6.42 years and BMI 25.54 ± 5.15 for the Senior group; and 17.5±2.16 (14–20 years), practice time 4.96 ± 4.27 years and BMI 22.65 ± 2.63 for the Junior group. The 43.3% of them usually playing in the right position, 36.7% upside position and the rest were not defined. Participants were asked about the injuries they had suffered during their paddle-tennis career and completed the International Physical Activity Questionnaire (IPAQ). Age, play position and sport level are hypothesized as injury risk factors.

Results: The results showed that specific joint lesions due to paddle-tennis (86.7% seniors / 60% juniors) are located mainly in the elbow (36.7 % seniors / 10% juniors), shoulder (10% seniors / 6.7% juniors), lower back (13.3% seniors / 23.3% juniors), hamstrings muscles (13.3% seniors / 0% juniors), knee (20% seniors / 10% juniors) and sprained ankle (6.7% seniors and juniors). The level of play that caused more injuries was the intermediate level (70% seniors / 40% juniors).

Conclusions: The elbow has been shown as the most common region of injury (Epicondylitis) in the Senior group; in the Junior group, it was the lower back region (Chronic Low Back Pain) which showed a higher incidence. The main injury risk factors observed were age (p=0.011), body mass index (p=0.09), and laterality (p=0.034), although the relationships were not sufficiently strong to have a high predictive value. These findings could help physiotherapists to create preventive programmes focused mainly on the scapulohumeral joint, lumbar and/or pelvic motor control and lower limb strength.

Key words: *athletic injury, injury, prevention, paddle-tennis, physiotherapy*

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A STUDY OF TABLE TENNIS ATHLETES' COHESION, PATIENCE, AND PERFORMANCE

Abstract

Objective: This study is to discuss the relationship among table tennis athletes' cohesion, patience, and performance. **Method:** College table tennis athletes were selected to participate in the study. Convenient sampling was used in the selection of subjects. Canonical correlation and multiple regression analysis were used to analyse data. **Results:** Through the canonical correlation and multiple regression analysis, the results displayed that there were positive correlation among "team cooperation" and "team adaptation" in the dimension of team cohesion and "great effort" and "endure pain" in the dimension of "patience." Besides, "great effort" and "resistance to pressure" were the most important factor to predict performance. Therefore, improving table tennis athletes' cohesion will increase athletes' patience, and then enhance sport performance. Combining each other can enhance the performance of table tennis.

Key words: *resistance to pressure, great effort*

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EPIDEMIOLOGY OF MUSCULOSKELETAL INJURY IN THE PADDEL-TENNIS PLAYERS IN COMPARISON WITH TENNIS PLAYERS

Abstract

The paddle-tennis is a very popular sport, which has become in recent decades in a sport of great global projection. This increased volume of play, combined with the physical demands of racquet sports, leading to injuries of the musculoskeletal system, both excessive and repetitive use of gestures as direct trauma. In this study we have surveyed 404 active paddle-tennis players of all levels; 310 men and 94 women with mean age 38 ±9.8 years (14-66 years). 67.8% of the participants have suffered an injury ever: 40% in the upper extremity, 40% in the lower extremities and 20% in the back. 53.5% of participants were federated, 81.2% were rights and 23.5% were considered novice, 53% in medium level, 20.8% in high level and 2.7% in professional level. Finally, according to the IPAQ questionnaire, 82.5% of the sample performed severe activity during the week; 15% moderate and the slight rest.

The main predictors were injured: players older than 34 years, with more than 69 kg, more than 26.17 kg/m2 of BMI, to play backhand and be right; at an intermediate level and an experience of 20 years or less. The results affirm us that there are not as marked differences between injuries that occur on the paddle-tennis players, regarding tennis players, since specific demands on the musculoskeletal system generate own racquet sport pathologies, emphasizing the Achilles tendon injury and knee sprain main acute injuries; with epicondylitis, the sub acromial syndrome and low back pain and chronic injuries.

Key words: *injury, prevention, paddle-tennis, physiotherapy, tennis*

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A STUDY OF TABLE TENNIS SOURCES OF SPORT ENJOYMENT EFFECT MODE

Abstract

Objective: This study is to explore the Table Tennis Sources of Sport enjoyment Effect Mode. **Method:** With the Literature review, the questionnaire of Sport Passion Effect Mode, item analysis and exploratory factor analysis were used to examine the CR value and structure of the factors. Finally, the confirmatory factor analysis was used to examine the hypothetical measurement model, and furthermore examine the scale's difference validity. **Results:** Through the statistical verification of structural equation modelling, the overall model fit well $\chi 2=283.63$, df=175, $\chi 2/df=1.62$, RMSEA=0.051, CFI=0.93. **Conclusion:** The Sources of Sport enjoyment Effect Mode is a measuring tool with the empirical study, and the follow-up researchers can use the scale that in built in this study for the further related research.

Key words: *confirmatory factor, measurement model*

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A STUDY OF TABLE TENNIS PLAYER SPORT PASSION EFFECT MODE

Abstract

Objective: This study is to explore the Table Tennis Sport Passion Effect Mode. **Method:** With the Literature review, the questionnaire of Sport Passion Effect Mode, item analysis and exploratory factor analysis were used to examine the CR value and structure of the factors. Finally, the confirmatory factor analysis was used to examine the hypothetical measurement model, and furthermore examine the scale's difference validity. **Results:** Through the statistical verification of structural equation modelling, the overall model fit well $\chi 2=94.67$, df=62, $\chi 2/df=1.53$, RMSEA=0.047, CFI=0.98. **Conclusion:** The Sport Passion Effect Mode is a measuring tool with the empirical study, and the follow-up researchers can use the scale that in built in this study for the further related research.

Key words: *difference validity, confirmatory factor analysis*

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EFFECT OF REACTION TIME OF UNIVERSITY TABLE TENNIS PLAYERS ON DIFFERENT VELOCITIES AND DIRECTIONS

Abstract

The purpose of this study was to discuss the effect of the reaction time on velocities, ball coming directions to intercollegiate players. The subjects were table tennis school team players from National Kaohsiung University of Hospitality and Tourism, male 13, female 7, total 20 persons in the aggregate of 20 people. Subjects' average age 21.9 ± 2 years, length of playing table tennis 10.1 ±3 year. To investigate the effect of the winging back reaction time from velocities (independent variable A) and ball coming direction (independent variable B) to the subjects by taking the imitation of real games serving from real players. Analyse by 2-way ANOVA, the result shows that: 1.Velocities to swing back reaction time had a significant pact. 2. Ball coming direction to receiving reaction time had a significant pact. 3. Velocities and ball coming direction to receiving back reaction time did not exert an influence of interaction. The study concluded: Different velocities and directions were a main effect individual receive and confront faster velocity and ball directions from left result faster reaction time.

Key words: *table tennis training, stimulus response, total response time*

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EFFECT OF THE TIMING OF PRESENTATION OF BALL COURSE INFORMATION ON KINEMATICS OF TABLE TENNIS FOREHAND AND BACKHAND DRIVES

Abstract

Table tennis players generally have a limited amount of time for making strokes owing to high stroke frequencies. In a match, it is of advantage for a player to make his opponent perceive the course of his own hitting ball as late as possible. The purpose of this study was to determine the effect of the timing when the course information of an approaching ball is provided on the kinematics of table tennis forehand and backhand drives in male collegiate players.

Seven Division I and seven division III collegiate players performed the forehand and backhand drives against topspin balls under the two conditions 1) that ball course information was provided for a player before balls were projected by a ball machine (pre) and 2) that ball course was not apparent until balls were projected (late). A motion capture system with 7cameras (Mac3D) was used to collect the 3D coordinate of the markers attached to the participants at 200Hz. In Late condition, participants were asked not to predict ball courses. One stroke which recorded the highest racket speed at impact was selected for each condition. Variables examined were the racket speed at impact, the angles of trunk and pelvis axial rotations, and the timing of beginning of pelvis axial rotation. Two-way repeated measures ANOVA was used to test the effect of the timing (pre vs. late) and the performance level (advanced vs. intermediate) on the variables.

There was no interaction of the timing and performance level. There were also no significant differences between the advanced and intermediate players. The racket speed at ball impact was not significantly different between the two conditions for the forehand and backhand drives. For the forehand drive, the pelvis rotation angle at the time of ball projection (about 0.47 s before impact) and the pelvis angle at the completion of the backswing were smaller in the “late” condition than in the “pre” condition, whereas the pelvis rotation angles were not significantly different between the two conditions for the backhand drive. The change in pelvis rotation angle from the backswing completion to ball impact was smaller in the “late” condition than in the “pre” condition for the forehand drive, whereas the change in pelvis rotation angle was similar between the two conditions for the backhand drives. The timing of beginning of pelvis axial rotation was significantly later in the “late” condition than in the “pre” condition for the forehand drive, whereas the timing similar between the two conditions for the backhand drives.

The timing of beginning of pelvis rotation and the angles of pelvis axial rotation were significantly affected by the timing of presentation of ball course information for the forehand drive, but not for the backhand drive. This result is seemingly due to that a relatively long time is required for the swing (0.17-0.20 sec for pelvis forward rotation) in the forehand drives.

Key words: *biomechanics, kinematics, trunk rotation*

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EFFECTS OF WEIGHT TRAINING ON BODY COMPOSITION OF UNIVERSITY BADMINTON CLASS STUDENTS

Abstract

The purpose of this study was to investigate the effect of weight training on body composition in the university badminton class students. Sixty-five students with mean age of 20.14±1.46 yrs; height 169.8±7.41cm; weight 63.31±10.73kg (44 males, 21 females) attended weight training courses, once a week, 20 minutes per class for 12 consecutive weeks. They were tested before and after the training in body composition by the body composition analyser (Inbody 3.0). The body composition test included weight, muscle mass, body fat mass, percent body fat, waist-hip ratio(WHR), arm strength, leg strength, trunk strength. The data was processed by SPSS for windows 12.0 software system and the t-test was used to analyse the comparison of before and after training in all tested subjects. The significant level was set at α=.05. The results were as followed: 1. The male samples reached significant level in weight, body fat mass, percent body fat, WHR, arm strength and trunk strength except muscle mass and left leg strength. 2. The female samples reached significant level in body fat mass; percent body fat, WHR, right-leg strength while there was no difference in rest of tests. 3. The female samples gained one-time more than male samples did in soft lean mass and lean body mass. 4. All samples improved significantly in upper muscular strength and trunk strength while there was no significant improvement and difference in lower muscular strength. We concluded that the 12 weeks weight training courses actually improve the body composition percentage of students.

Key words: *body composition analyser, body fat mass, WHR*

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EFFECTS OF EIGHT-WEEK PROGRESSIVE FUNCTIONAL AGILITY TRAINING ON SPORTS FITNESS IN TABLE TENNIS ATHLETES

Abstract

Background: Agility and speed are key elements of table tennis. The main factors affecting the agility include strength, response, power and movement coordination. Therefore, functional agility training should be able to improve the performance of table tennis.

Purpose: The purpose of this study was to investigate whether progressive functional agility training can improve the performance of athletes of table tennis in eight weeks.

Methods: 14 college table tennis players were recruited as subjects. Wireless shutter device was used in a simulation game for functional agility training. Subjects were requested to block the light gate as quickly as possible to simulate the table tennis competition. Training protocol consisted of 30 seconds and followed by 10 seconds rest for twice a week. The outcome measures included anaerobic capacity, agility, power, reaction and other athletic fitness testing.

Results: After 8-week progressive functional agility training, we found that agility (13.62±1.55 vs. 13.09±1.51 sec, $p<0.05$, paired t-test), anaerobic capacity (7.03±1.84 vs. 6.74±1.94 W/kg, $p<0.05$) and explosive acceleration (5.14±0.57 vs. 4.96±0.48 sec, $p<0.05$) increased significantly after training in our table tennis athletes.

Discussion: The article suggests that 8-week progressive functional agility training benefits our table tennis athletes in sports performance including agility, anaerobic capacity and power.

Key words: *anaerobic capacity, sports fitness, functional training*

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WHEELCHAIR DOUBLES PAIR AND TACTICS TO THE STUDY OF MEN'S TABLE TENNIS

Abstract

All disabled table tennis team events adopt Corbillon game system (four singles one doubles), in which the third point is doubles. When the two sides' singles have well-matched strength, doubles are the key to decide the outcome of team competition. Besides, doubles rules of wheelchair table tennis are unlike the doubles rules of abled group. Just like in the tennis, badminton, single person can continues to hit ball. You must play on your own independently, greatly different from doubles tactics of abled group. The gist of this study is to investigate the importance of the wheelchair men's table tennis doubles. By way of literature data, video observation, mathematical statistics, targeting wheelchair athletes' doubles pairing fashion and the different types of tactical play in wheelchair table tennis player doubles match, compile technical and tactical statistics. For the wheelchair table tennis athlete training and competition, provide theoretical and practical reference. This study concludes that:

1.Men's wheelchair doubles pairing is close table fast attack combined with loop play based, of which tactical characteristics are wheelchair seat close to the table, and speed-oriented.

2. Adopt different ways of wheelchair seats, respectively, pairing by parallel, close, and open mixing ways.

3. Adopt different types of play match. The play of athletes use racket of different function on two sides that make greatly difference in spin and speed.

4. Regarding technical and tactical play (serve, return of serve, stalemate playing), usage of backhand technique and tactic is higher.

Key words: *table tennis, doubles, wheelchair, tactics*

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USING RASCH MEASUREMENT TO ANALYZE THE COMPETITION TECHNIQUES OF FIVE STAGES FOR WOMEN'S SINGLES IN TABLE TENNIS

Abstract

The purpose of the study was using Rasch measurement to analyse the competition techniques of five stages for women's singles in Table Tennis. The method is as the following. Four raters aim at three competition of player A, using the five stages of Techniques to observe and measure. Use the many-facet Rasch model in Facets software to estimate the three facets of players, raters and techniques. Use the host and road team resistance model (Model =?,-?,?,#,R,0.5) to preserve the relative value of resistant athletics. The consequences are as the following. First, to the players, the Rasch reliability is .90. The homogeneity tests reject raters' measurement is homogeneous, it shows that the measured players have discrimination. Norm test is fit to Normal distribution; it reveals the samples of players themselves are representative. The data-model fitness test is all between 0.5~1.5, it shows that the data fit for the mode. Second, the Rasch reliability of rater facet is .00, since raters are consistent and there are not differences at rating score. The homogeneity test accepts raters' measurement is homogeneous, it means there are not rating severity differences between the four raters of this study. The third one is the technique facet. First, the Rasch reliability is .95 and the reliability is excellent. The chi-square value of homogeneity test is 123.6 (probability is .00). Reject null hypothesis, it is that the difficulty of five competition techniques category is not equal. It represents the difficulty of the five techniques have discrimination. The chi-square value of normality test is 3.8(probability is .28). It accepts null hypothesis and it means the null hypothesis of techniques conform to normal distribution. It is that the techniques are representative. The second one is frequency distribution. The 'front of receiving is 391 times, it possesses 33.02% and it is the most. The remaining sequence is 'front of service' which is 311.5and it possesses 26.31%, the 'back of service' is 205.5 times and it possesses 17.36%. The 'back end of receiving' is 146 times and it possesses 12.33%. The 'rally-stage' is 130 times and possesses 10.98%. The data distribution is approximately equal; it is beneficial to scatter the hidden part of rally-stage skill message. The conclusion is that five-stage competition analysis is a better way to analyse table tennis competition skills. And use the Rasch measurement analysis can quantify the performance of singles table tennis game and obtain the measurement information on each facet.

Key words: *many-facet Rasch model, Rasch separation reliability, rater consistency reliability*

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DEVELOPMENT OF A COMPUTER ANALYTIC SYSTEM FOR THE TABLE TENNIS IN DOUBLE MATCH

Abstract

The purpose of this study is to develop a technical and tactical analysis system, through this system to analyse the players' performance at all levels and then produce the valuable data for reference. The system uses Microsoft Visual Studio 2013 development tools to write, based on the NET Framework 4.5 platform, with C # programming language, writing issued by Windows-style Windows applications. The developed system functions as follows: 1. User-friendly interface for operator to record the complete process of the game, providing dual-screen mode of operation, as well as touch mode, simplifying the procedure. 2. By Analysis module producing players' technical and tactical data, it can analyse both advantages and disadvantages of the combination mode, the best scoring model, the main mode of losing, zones of personal advantage scoring points, zones of final scoring points, game situation analysis and the score chart in double match. 3. Then easily exported results with an Excel file through report module. Through actual test found: this analytic system actually proves its efficiency and practicality. The data analysis results helped to present academic analysis, to examine training results and to make critical decisions of technical and tactical strategy in double match for defeating the opponent to win.

Key words: *technical and tactical, competition strategy, windows program*

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THE EFFECTS OF DIFFERENT TEACHING METHODS ON UNIVERSITY STUDENTS' LEARNING OF FOREHAND LOOP DRIVE IN TABLE TENNIS

Abstract

This study aimed to analyse the effects of different teaching methods on university students' learning of forehand loop drive in table tennis. The object of the study was a group of 59 students with upper intermediate level in an elective ping pong course. Among these students, 28 were assigned to the experimental group and applied with the flipped classroom method and the remaining 31 to the control group and applied with the traditional teaching method. In the accomplishment test, both groups go through the experimental procedures, including a pre-test, an experiment, and a post-test. Besides, they had to take an online cognition test. Finally, a "Learning Satisfaction Survey" was taken by the experimental group so that we can know the students' learning condition in the flipped classroom. The collected data was analysed by the statistical methods of paired samples t-test, independent samples t-test, and one-way ANCOVA. The result showed that, first, both groups of students have significant improvement on their scoring with the forehand loop. However, the experimental group was apparently better than the control group. Secondly, in the aspect of cognition, there were no significant differences between the two groups. Finally, in the case of the flipped classroom, what the students were most satisfied was that they can learn by themselves through e-learning and that they can accomplish learning projects together with their peers. In conclusion, the flipped classroom method can effectively enhance university students' skill of forehand loop drive. Moreover, it is greatly accepted by the students and conforms to the trend of self-regulated learning in teaching and learning.

Key words: *flipped classroom, e-learning, self-regulated learning*

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ANALYSIS ON TACTICS OF WHEELCHAIR TABLE TENNIS MEN'S SINGLES MATCH

Abstract

In this study, I envisage four outstanding wheelchair table tennis male players at class 5 as the research object. Through the videos observation method, gather statistics on and analyse four international game events. Analyse and compare from aspects of basic technical and tactical requirements regarding wheelchair table tennis, coming by some rules and characteristics in wheelchair table tennis men's singles match:

1. Wheelchair table tennis is predominantly based on handshake grip, which hits the ball in a wide range, and is easy to easily to force. Wheelchair control method is mainly the open type, help to handle short ball near net and limit ball of diagonals. Wheelchair player will adjust the wheelchair seat type with the difference of tactics.

2. In terms of wheelchair table tennis game service tactics, usage of backhand serve technique is higher. For placement the center has the highest use rate predominantly, followed by usage of placement of short near net. Usage of 3rd ball attack tactic is not high, attack is not effectively. As to means of 3rd, 5th ball attack, attack techniques of backhand flip drive have the highest, followed by usage of forehand drive (attack) technique.

3. In wheelchair table tennis receiving tactics, backhand chop, flip drive, push have the highest usage. As to placement, the center beyond table has the highest use rate, followed by placement of the forehand and backhand limit ball of diagonals.

4. In wheelchair table tennis stalemate tactics, the active stalemate usage is higher than passive stalemate. In active stalemate techniques, forehand and backhand fast- attack has the highest rate.

Key words: *table tennis, wheelchair, tactics*

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STRUCTURE OF TECHNICAL-TACTICAL ACTIVITIES IN TABLE TENNIS

Abstract

For the purpose of determining the overall structure of technical-tactical elements in table tennis and evaluating their role in different playing zones on and around the table, a new measuring instrument (a questionnaire) was formulated that takes advantage of the expert knowledge of top, world class table tennis coaches. The results have showed that the overall structure of the technical-tactical elements forming the table tennis technique can be divided into three basic groups; a group of technical-tactical elements (A) used in the phase of preparing one's own and disabling the opponent's attack; a group of technical-tactical elements (B) used in the phase of attack and counterattack; and a group of technical-tactical elements (C) used in the phase of defence. The differences among the obtained groups of table tennis elements were determined by applying the Kruskal-Wallis test, while relations between the groups and their role in different playing zones on and around the table were analysed by comparing the average values of the experts' scores

Key words: *table tennis, structure, expert knowledge, Kruskal-Wallis test*

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ANTHROPOMETRIC CHARACTERISTICS OF ELITE PADEL PLAYERS

Abstract

The aim of this study was to analyse the anthropometric profile, body composition and somatotype in top-level female padel players ranked 50 on World Padel Tour 2014 classification. Sixteen elite female players (EFP) participated in this study. A total of fifteen anthropometric variables were recorded. Mean (SD) somatotype of EFP was defined as endomesomorphic 3.8 (0.8), 4.0 (0.7), 2.6 (0.7). This study provides the biotype data that represents a suitable reference for EFP. New studies focused on the importance of anthropometric parameters in padel performance are needed to clarify their inclusion in talent identification programs.

Key words: *padel, anthropometry, body composition, somatotype*

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BIOCHEMICAL CHANGES DURING PADEL COMPETITION

Abstract

This study monitored the changes in biochemical markers before and after competition in elite male padel players. Fourteen elite male padel players aged 27.5 ± 7.9, (78.1 ± 8.8 kg body mass and a 177.7 ± 4 height) participated in this study. Blood samples were taken before and after competition and saved for posterior analysis. Twenty biochemical markers were included. Creatinine, aspartate aminotransferase, urea, uric acid, creatine kinase, glucose, lactate dehydrogenase and phosphorus shown increased levels after competition ($p<0.05$). Significant decrease ($p<0.05$) in sodium, potassium, chloride and magnesium levels after the competition were found.

Key words: *metabolism, serum electrolytes, serum enzymes, padel*

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ANALYSIS OF THE CHARACTERISTICS OF COMPETITIVE PADEL

Abstract

The aim of this study was to determine and compare temporal and notational structures during competition in both, female and male elite padel players. A total of 30 players (14 male and 16 female) participated in the study. 15 simulated padel matches (7 women's and 8 men's) were recorded and saved in a hard disk for posterior analysis. Temporal structure and game actions (i.e. match duration, real time played, rally time, rest times and number of rally shots) were analysed. Significant differences ($p<0.05$) were found for all variables analysed. Temporal and game structure showed significant differences ($p<0.05$) between female and male elite padel players.

Key words: *padel, temporal structure, rallies, shots, gender*

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PHYSIOLOGIC DEMANDS OF PADEL MATCH PLAY

Abstract

The aim of this study was to determine the physiological demand of padel during simulated competition. Sixteen international elite female players (EFP) participated in this study. Two phases were performed: i. First phase measured maximal oxygen uptake, maximal heart rate and maximal blood lactate concentration of EFP during an incremental treadmill test; ii. Second phase measured the physiological responses and distances covered during ten simulated padel matches. EFP values for incremental treadmill test were 46.76±4.5 ml.k.min-1 14.5±1.09 k.h-1, 186±9.3 HR and 11.6±2.1 mMol.L-1, respectively. Simulated competition values were 177 ± 10.3 HRmax, 155±10.6 average HRavg, 2.04±0.4 mMol.L-1, and 2.26±0.6 k.h-1. These data suggest a predominant aerobic demands in EFP with short anaerobic bursts during simulated competition.

Key words: *competition, heart rate, lactate, oxygen uptake, padel*

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ARE THERE DIFFERENCES IN THE PHYSIOLOGICAL RESPONSES OF ELITE TABLE TENNIS PLAYERS DEPENDING ON THE GAME RESULT?

Abstract

The aim of this study was compare the physiological response and match results during simulated competition. 22 elite male players (age= 25 ± 4 years) with offensive style performed simulated competitions in order to measure cardiac response and lactate levels. No significant differences were found for cardiac and lactate levels taking match result as main variable. Results suggest that technique and tactic skills mainly influenced match results when comparing offensive elite players.

Key words: *racket sports, simulated match, heart rate, lactate, performance*

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DIFFERENCES IN GAME STATISTICS BETWEEN MEN AND JUNIOR BOYS IN DIFFERENT SURFACES

Abstract

The aim of this paper was to analyse the differences in match statistics between Men´s singles and Junior Boys Singles in two surfaces, clay court and hard court. Data from 122 matches (60 Men´s Single matches and 62 Junior Boys Single matches) from two Grand Slams (Australia Open and Roland Garros) were analysed. The 11 variables considered in the paper were sorted in three groups (variables related to serve (a), variables related to return (b) and variables related to winners-unforced errors(c)), and studied in relation to the surface. Data were drawn from each tournament official website. A univariate (Mann Whitney W) analysis of data was undertaken to compare the differences between categories in both surfaces.

In hard court, 10 out of 11 variables studied presented significant differences. Men had significantly higher average number of points won on first serve (%), second serve (%), aces per set, winners per set and unforced errors per set than juniors, while juniors had significantly higher average break points won (%), return points won (%), double faults per set, number of break points per set and breaks per set.

In clay court, only 5 out of 11 variables studied presented significant differences. Men had significantly higher average number of points won on first serve (%), aces per set, winners per set and unforced errors per set than juniors, while juniors had significantly higher average of return points won (%). The results showed that:

a) Men win more points serving than juniors and get more aces; b) Juniors win more return points than men; c) Juniors have more break point opportunities and win more break points than men; d) Men get more winners and commit more unforced errors than juniors. These results could be used as a reference by coaches to improve training programs for competition players.

Key words: *tennis, notational analysis, competition, male*

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RELATIONSHIP BETWEEN USA TABLE TENNIS RATING AND TECHNICAL FEATURES AMONG INTERMEDIATE PLAYERS

Abstract

The skill level of table tennis players in the United States (US) are represented by standardized USA Table Tennis (USATT) ratings. A player may increase or decrease their rating after winning or losing matches respectively at sanctioned tournaments. However, a lack of research on USATT ratings in relation to technical features makes it difficult to prioritize specific training across levels. The primary purpose of this study was to examine the relationship between skill levels and technique features, categorized into types of serve, receive, third ball attack and rally. Their techniques during the first 30 points (15 serves and 15 receives) of a match were observed and analysed. A one-way ANOVA and post-hoc comparisons were conducted to investigate any significant difference ($p < .01$) among the six rating levels. The results showed that for serve and receive, there were significant differences in the frequency of short serve, receive with push, receive with loop overall, and receive with forehand loop. For third-ball attack, there were significant differences in the frequency of forehand loop, backhand loop, loop overall, forehand overall, backhand overall, and the total number of attacks. For rally, there were significant differences in the frequency of forehand drive, forehand block, backhand push, and push overall. Particularly, higher level players used these attacking techniques more frequently. Moreover, lower level players need to focus on receive and third-ball attack with loop by having individualized training plans that fit their level.

Key words: *USATT rating, skill analysis, match analysis, coaching*

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AN ANALYSIS OF U.S. TABLE TENNIS CLUBS

Abstract

As the primary instrument promoting table tennis in the United States, the club system is largely responsible for the future of the sport. Currently there are 264 clubs registered with USA Table Tennis (USATT). However, the scarce and scattered nature of club data hinders our ability to understand the current state of U.S. table tennis clubs. With the strong support of the USATT, we conducted a comprehensive club survey covering business, facility, and other details in order to understand how current clubs operate and make meaningful observations from the data. Based on the 48 complete survey responses we've received so far, the average club is a 20-year-old non-profit entity that gets its revenue primarily from tournament hosting, walk-in players, and membership fees. This average club operates a mean of less than 20 hours per week with a median of only 7.75 hours. This limited schedule hinders access to the sport for the general public. Also, formal coaching and youth programs are only available at 52% and 38% of clubs, respectively, with other programs having similarly low adoption rates. The lack of these programs limits club promotion and shows a lack of investment in the future of the sport. The data showed a dramatic distinction in many club metrics depending on factors such as the presence of employees. For example, clubs with employees operate an average of 40 hours per week, 100% offer formal coaching and 92% offer junior programs. Purely volunteer-run clubs operate only 12 hours per week, 36% offer formal coaching, and 19% offer junior programs. The lack of professional staff to promote and manage club business limits the revenue-generating activities clubs can provide. This analysis revealed hidden meaning in the data and improved our understanding of U.S. table tennis clubs.

Key words: *United States, table tennis club, club management, survey*

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THE RELATIONSHIP BETWEEN QUALITATIVE AND QUANTITATIVE FACTORS AFFECTING PERFORMANCE DURING TABLE TENNIS COMPETITIONS-A STUDY OF TOP JUNIOR MALE TABLE TENNIS PLAYERS

Abstract

The purpose of this study is to empirically examine relationships among self-observations of table tennis competitors, and observations by others (coaches), and an objective analysis of the players' performance. The participants were two junior male players who were winners in age-tiered divisions of the most prominent domestic tournament in Japan (All Japan Table Tennis Championships) and two coaches with experience as a in coach or a manager at international competitions (such as the Olympics or the World Championship). The matches that players themselves played were used as objects of the analysis. Interview appointments were made for self-observations as well as for the observations of others during the matches, and topics such as the objective of the survey, time and place of interviews, and recordings were discussed with players and coaches. Next, players were interviewed directly after their matches, which had been determined as the objects of the analysis. As for coaches, they were interviewed immediately after watching the recorded matches. Subsequently, three aspects were compared: interviews with the players, interviews with the coaches, and objective values from an analysis of players' performance.

The results revealed that the self-observation of the players, the observations of the coaches, and each objective performance analysis offers a unique perspective. It has been indicated that it is important for the players and coaches to communicate regarding techniques and strategies in daily practice, while taking advantage of the useful perspective offered by the objective performance analysis.

Key words: *coaching, qualitative factor, quantitative factor*

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IS OUTCOME THE MOST IMPORTANT MODULATOR OF RATING OF PERCEIVED EFFORT IN MALE AND FEMALE BADMINTON PLAYERS?

Abstract

Measures such blood lactate (BLa), mean heart rate (mHR) and ratings of perceived exertion (RPE) have been used as an index of physical effort in racket sports. The present study estimated the relationship between RPE and outcome in a sample of thirty-five single badminton players (fifteen women) from the Spanish National Clubs League (mean±SD): Age 22.67±4.35 and 22.70±5.55 years; weight 58.92±4.90 and 71.96±2.42 kg.; Height 1.65±2.05 and 1.79±0.68 m.; and BMI 21.58±2.05 and 22.39±1.41 kg/m2, for females and males respectively).

Results showed no differences in mHR and BLa after winning or losing their games. Nonetheless, the RPE showed a significant outcome dependence (females $t(13)= 4.489$, $p < 0.017$ and males $t(18)= 2.580$, $p < 0.019$). Pearson´s correlation coefficients showed positive correlations between HR and BLa ($r = 0.48$, $p < 0.01$) and LT and RPE ($r = 0.45$, $p < 0.05$), as was expected. In conclusion, RPE could be strongly influenced by the outcome, suggesting that not only physiological, also psychological aspects such defeat frustration or victory euphoria, could be important RPE modulators to be considered to study the winner effect in sports.

Key words: *physical effort, badminton, RPE, winner effect*

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THE EFFECTIVENESS OF SHADOW PRACTICE IN LEARNING THE TABLE TENNIS BASIC SKILLS

Abstract

The study was conducted to determine if shadow practice is effective in learning the table tennis basic skills in an actual classroom setting. In the study two PE 2 Classes, Section JX 3:00 – 4:00 pm and section JY 4:00 – 5:00 pm Tuesdays and Thursdays were designated as the experimental and control group respectively. Three basic skills namely; the standard forehand drive, the standard backhand drive and the forehand topspin were tested. Section JX (Experimental Group n = 16) performed the shadow practice while waiting for their turn to practice with multi-balls. Section JY (Control Group n = 16) practiced with a single ball for each pair of students while waiting for their turn to practice with multi-balls. Both groups were analysed in three testing stages with one student subject at a time using the consistency and accuracy skills test. Each student subject was instructed to hit the fed ball to a designated target area at the opposite court. The number of balls that hit the specified target area became the subject's score. The pre-test was conducted after giving instructions on how each skill is executed. Second, a post test was conducted on the sixth meeting or after three weeks of twice a week (Tuesday & Thursday) practice for the forehand and backhand drive. The forehand topspin post test was conducted at the eighth meeting or after a month of twice a week practice. The retention test was conducted four calendar days after the post test that coincides on a Tuesday. There was a significant improvement in the mean and the standard deviation scores from the pre-test to the post test in all three skills in both the Experimental and the Control Groups. The Experimental Group went from a mean score of 51.8125 ± 8.92352 to 72.4375±7.50972 in the forehand drive, from 75.8125 ± 7.18534 to 93.9375 ± 6.39238 in the backhand drive and from 29.0625 ± 9.49715 to 58.6875 ± 11.85872 in the forehand topspin. The Control Group went from a mean score of 57.7500 ±13.68454 to 84.5000 ± 4.04969 in the forehand drive, from 72.5000 ± 13.79372 to 85.7500 ± 5.77927 in the backhand drive and from 30.2500 ± 4.05791 to 64.3750 ± 8.03223 in the forehand topspin. Although the control group had a higher mean score than the experimental group in the post test in the forehand drive, they were not able to retained their scores as it was lower in retention 80.3750 ± 5.52419 compared to their post-test scores whilst the experimental group gained a higher mean score 73.8750 ± 9.10586 compared to their post test scores. The experimental group had a higher mean score in the backhand drive but both groups were able to improve in their retention test; Experimental Group = 94.4375±4.71832; Control Group 88.7500 ± 5.13160. The control group had also a higher mean score in the post test of the forehand topspin. However, both groups scored lower in their retention test with the control group having a higher difference; Experimental Group 57.6875± 12.40279; Control Group 60.8750±8.35763. The study revealed that both the Experimental and Control Group had significant change in their scores in the post test of all three skills. Both groups were also able to improve their scores in the backhand drive retention test but only the Experimental Group was able to improve in the forehand drive test phase of testing. The two groups were not able to retain their scores in the forehand topspin test phase of testing.

Key words: *shadow practice, table tennis basic skills*

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THE EFFECTS OF THE TABLE TENNIS FOREHAND DRIVES LEARNING ON BALL SIZE

Abstract

The Purpose of this study is to explore the university students learning table tennis forehand drives on ball size. Methods: This study is quasi-experimental research and focus on two to four years university students of table tennis elective course. According to different ball size, it was randomly divided into "40mm ball group" and "44mm ball group "in two groups. After post-test, the effective sample is 49 students on 40mm ball group, 47 students on 44mm ball group, totally are 96 students for the study. Two groups were accepted pre-test, experimental processing, post-test and other experimental procedures. It was test by Paired-Samples T Test and ANCOVA. Result: two group's students learning forehand drives were significant progress; 44mm ball group was significant progress then 40mm ball group on table tennis forehand drives learning. Conclusion: On the elective courses of table tennis in university, it is significant progress on 40mm ball group and 44mm ball group, but 44mm ball group is better than 40mm ball group on the table tennis forehand drives learning. According this, it is recommended teachers use the 44mm ball to enhance elective course student in university on the table tennis forehand drives learning.

Key words: *44mm ball, motor learning, progress rate*

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METHOD OF ESTIMATING WHERE THE BALL WILL LAND BY AE MEASUREMENT OF TABLE TENNIS TABLE

Abstract

The ball route of the player hitting for get a point is the data necessary to make a tactical plan. And the coaches need those objective data when give the player some advice in the table tennis game.

The previous research was shown following. The information data that analysed the falling area of the ball by score were pointed advice to win the game. Also, the analysed result data that added falling area of the ball to trajectory time was shown ball spin and swing method. These previous researches showed the profitable way of giving advice for player to coaches. However, the researches that used the video camera need time to analysis. It can quick analyse these data and give advice for the player if it can gather intelligence of the ball falling area in real time.

The purpose of this study was to find the method for estimation the fall area of the ball that the player hit.

These research results will be reported in detail in the congress hold in Suzhou.

Key words: *falling area, oscillation, coaching*

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PHYSICAL PERFORMANCE ASSESSMENT OF UNIVERSITY OF THE PHILIPPINES' TABLE TENNIS VARSITY ATHLETES FOR 2014: BASIS FOR A COMPREHENSIVE PHYSICAL TRAINING PROGRAM

Abstract

The difference between success and failure in sports comes from a clear understanding and application of Sport Science. Physical fitness and motor ability tests are designed to measure the physiological attributes of athletes consisting of battery of tests that closely represents the various physiological demands the athlete needs for performance enhancement. This is an integral part in the total development of the athlete. This study determined a "baseline data", which served as a basis for talent identification and improved intervention program which will eventually result to optimum performance. Twenty-two table tennis athletes (Male-12; Female-10) from the University of the Philippines were tested using a one-shot pre-experimental design. The following components and instruments were used: 1) Height and Weight 2) Body fat percentage using Bio-Impedance Analysis Machine 3) Joint Mobility and Stability Functional Movement Screen 4) Lower body strength using Standing Long Jump 5) Agility using Agility Run Test 6) Balance using Stork Test 7) Hand and Eye Coordination using Wall Bounce 8) Upper Arm Strength using Kneeling Ball Throw, Push Up and Sit Up Test 9) Speed using the 50-Meter Dash and 10) Cardiovascular Endurance using 2.2 Km Run and 11) Hand Strength using Grip Test. Descriptive Statistics were used to analyse the data. The results were used as a basis to determine the athlete's initial baseline as a basis for designing a comprehensive training program to develop their weak points. A pre and post-test, pre-experimental or pre and post-test control group true-experimental design are recommended if there will be significant changes in their pre-test or post test results.

Key words: *physical fitness test, motor ability test, pre-experimental design, performance enhancement*

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THE EFFECT ON THE BALL AFTER HITTING BY THE DIFFERENCE IN THE KIND OF RUBBER IN TABLE TENNIS

Abstract

In this study, velocity of the ball, rotation amount of the ball, and reflection angle were measured after the ball in collision with the rubber. 4 types of rubbers were selected, two types are pimples-in rubber, and the rest of the two types were pimples-out rubber. They are generally has a high frequency of use in the table tennis competition. The characteristics of them are shown in Table 1. The collision tests were carried out in some conditions that were two stages of incident ball velocity, the incident rotation amount of the two stages, and combining the conditions of the three kinds of racket angles. The conditions are shown in Table 2.

As a result, in the comparison of the pimples-in rubbers, Rubber A was found to be higher reflection velocity than Rubber B. Furthermore, Rubber B has been found that often the rotation amount of the ball of reflection from Rubber A. And, reflection angle was found to be more of Rubber B is greater than Rubber A. Otherwise, in the comparison of the pimples-out rubbers, for Rubber D, the ball velocity and rotation amount of the ball and reflection angles, both of which were found to be higher results than rubber C.

Table1 Characteristics of rubbers

A	Tenergy05	Pimples-in
B	Kyohyo NEO3	
C	Spectol	Pimples-out
D	Booster EV	

Table2 Experimental conditions

Incident velocity		Incident rotation amount		Racket angle
9m/s	×	2000rpm	×	90deg
				60deg
13m/s		4000rpm		30deg

Examining the four kinds of rubbers in this study, the most effect on the reflective rotation amount of the ball was the racket angle. Therefore, players can be set to use any rubber adjustment angle of the racket is considered to be the most important.

Key words: *rubber reflection-velocity ball-spin reflection-angle*

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NOTATIONAL ANALYSIS OF WOMEN SINGLES BADMINTON MATCHES IN RELATION AT STRESS AREA

Abstract

The aim of this study was to determine the gestural structure of women singles badminton matches in relation at stress area in Olympic Games. 36 single´s badminton matches in Olympic Games were selected (76.59% of total matches in competition). Nine matches were deleted (two withdrawal, seven for more than 20 points of different). Given the category of the tournament, all participants were the best players in the world at that time. Official videos recorded by the organizations of the Beijing 2008 Olympic Games were used to carry out the analysis of the matches. Matches were analysed with Kinovea 8.15 software and analysis of all games was done following the methods of Anguera (2003). Three-stress zone were selected (Fesba, 2008): stress zone; moderate stress; zone without stress. The results showed a total of 17225 strokes analysed. The results shown that predominant stroke that generated stress zone: drop underhand (22.7%); drop under back (22.4%); drop high hand (19.3%). Strokes that generated moderate stress were: drop underhand (12.1%); drop under back (13.4%); clear high hand (13.8%); drop high hand (13.3%). Strokes that generated zone without stress was: lob underhand (13.4%); lob under back (14.1%); clear high hand (15.8%); smash high hand (18.2%). These studies are necessary for the technical and tactical planning and specific training in women female badminton matches.

Key words: *elite performances, notational analysis, competition, female*

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NOVEL TESTING TOOLS FOR EVALUATING SPEED AND ENDURANCE CAPACITIES IN BADMINTON PLAYERS

Abstract

This presentation describes the development and reproducibility of two novel badminton specific tests. 1) B-SPEED used for assessment of players' maximum movement speed in game-like conditions and 2) B-END evaluating endurance capacity during intermittent exercise with a movement pattern resembling single match play. ***Methods***: The B-SPEED test is initiated in the center of the court and consists of five maximal actions to sensors located in each of the four corners of the court. The 20 actions are performed in randomized order as dictated by computer screen shots displayed one second following completion of the previous action. Day-to-day variation was assessed and specificity of the test evaluated by comparing 30 meter sprint and B-SPEED performance for elite, skilled players and age-matched physical active subjects (non-badminton players). Similarly, specificity and reproducibility was investigated for the B-END, which consists of exercise intervals including eight actions in each bout, interspaced by 10 s recovery and with the prescribed pace in each exercise period gradually increasing as the test progresses. Each interval is initiated in the center of the court and consists of two actions toward each of the four corners performed in randomized order as dictated by a computer via audio-visual input. ***Results:*** The elite players were significantly (*P<0.05*) faster in the B-SPEED (total test time (32.3 ± 1.1) s; average 1.6 s per action) than the skilled (34.1 ± 2.0) s and non-badminton players (35.7 ± 1.7) s., whereas sprint performance was similar across groups. Day-to-day coefficient of variation (CV) of the BST was 0.7 % for the elite players. B-END performance was also superior for elite compared to skilled players and non-badminton players (*P<0.05*). Furthermore, BEND performance was correlated to the elite player´s national single ranking position (r= -0.81; *P<0.05*). Test-retest CV was 7.9 % when the first two trials were compared (i.e. without a familiarization trial), but reduced to 2.5 % when trials two and three were compared. ***Conclusion:*** Both of the developed tests are reproducible when a familiarization trial is included and we suggest that the developed B-SPEED test is of high relevance for evaluating short-term maximal movement speed in badminton players while the B-END test is a useful testing tool for evaluation of badminton specific endurance.

Key words: *badminton*

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RESEARCH OF THE CAREER DEVELOPMENT OF TAIWAN ELITE FEMALE TABLE TENNIS PLAYERS

Abstract

This research aims to discuss some relevant issues regarding the career development of excellent female table tennis players. By understanding their career planning, development and transition of these professional players whose age, backgrounds and professions are different, we can discover what affects the career development on these table tennis players, such as the social atmosphere and different periods of time. The seven interviewees are all from different generations and have different jobs. This qualitative research adopts depth interviews to collect data. After analysing the collected data, the following are the conclusions. Regarding career development, the participants' early education, their support from important persons and experiences from many competitions all demonstrate the uniqueness of table tennis. These personal experiences mean a lot to the players and are valuable to their career development. As for the career planning, what affects their career planning is corporate companies' financial support, the college they go to and personal issues. The research finds out most interviewees didn't do any complete career planning during the days of their being professional players. As for career transition, the timing of change results from fatigue from competitions, economic problems, the age limit or graduation from school. Their adaptation to different jobs and lifestyles also show great differences. And a different period of time affects one's educational backgrounds and career development.

Key words: *career development, career planning, career transition*

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ANALYSIS OF RALLY LENGTH WHEN SCORING OR RECEIVING A POINT REGARDING RANKING POSITION IN ELITE PADEL PLAYERS

Abstract

Objective: The aim of this study was to identify differences on rally length when scoring or receiving a point regarding ranking position in elite padel players. **Methods:** The sample contained 1527 rallies from the 15 male matches of the 2013 Masters Finals World Padel Tour. Variables pertaining to rally length (in seconds), point outcome (scored or received), and players' ranking position (top-8 pairs) were analysed. Data were collected through systematic observation performed by two observers specialized in padel, including inter- and intra-observer evaluation through Cohen's Kappa, using the LINCE software. Statistical analysis included within- and between pairs comparisons through Student *t*-test and One-Way ANOVA respectively. **Results:** ANOVA yielded a significant main effect of ranking position on rally length ($F(7.1519)=2.49$; $p=0.015$). Post hoc comparisons revealed important but not significant length differences between pairs ranked #1 and #7 in the time took to score (diff±2.33"; $p=0.028$). Particularly, results from *t*-Student test only revealed significant differences between rally length and points scored/received in pair #1 ($T(650)=-1.96$; $p=0.049$), who lasted in average 9.26±6.98" (M±SD) to score and 10.45±8.46" (M±SD) to receive a point. **Discussion:** Main results showed differences in rally length regarding ranking position in elite padel players. Especially, scoring before and received after the first ten seconds of the point seems to be an effective tactic in padel. Therefore, applied to the game, there is a higher attack effectiveness and better rock-solid defensive performance in top ranking pairs. This information may be useful to determine an effective game style in elite padel players.

Key words: *racquet sports, performance analysis, match analysis, point length*

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DIFFERENCES ON RALLY LENGTH REGARDING ATTACK EFFECTIVENESS IN ELITE PADEL PLAYERS

Abstract

Objective: The aim of this study was to analyse the differences on rally length regarding attack effectiveness in elite padel players. **Methods:** The sample contained 1527 rallies from the 15 male matches of the 2013 Masters Finals World Padel Tour. Variables pertaining to rally length (in seconds) and attack effectiveness (points and errors) were analysed. Data were collected through systematic observation performed by two observers specialized in padel, including inter- and intra-observer evaluation through Cohen's Kappa, using the LINCE software. Statistical analysis included One-Way ANOVA. **Results:** Descriptive analysis showed an average rally length of 9.40±7.19" (M±SD). Regarding attack effectiveness, unforced errors length 7.49±6.10" (M±SD), points 10.12±7.18" (M±SD), and forced errors 10.71±8.05" (M±SD). ANOVA yielded a significant main effect of attack effectiveness ($F(2.1524)=27.654$, $p<0.01$). Post hoc comparisons revealed significant length differences between force and unforced errors (Diff±3.22", $p<0.01$), and points and unforced errors (Diff±2.64", $p<0.01$). Similar distribution was observed in each pair of players independently. **Discussion:** Main results showed a general trend of committing early unforced errors and late forced errors in elite padel players. This might suggest a lack of concentration or rhythm when the point starts, resulting in bad tactical decisions or technical executions. Besides, it seems that reaching and keeping the initiative in long points could increase winning options in padel by forcing an opponents' error. This information may be useful in the design of accurate training programs for improving players' performance.

Key words: *racquet sports, performance analysis, quality of opposition, situational variables*

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ACUTE BADMINTON INJURIES IN EUROPEAN JUNIOR PLAYERS PLAYING EUROPEAN BADMINTON JUNIOR CIRCUIT

Abstract

Badminton is a racquet sport which combines very fast specific movements that can cause pains and injuries that don't allow athletes to return on the field. The aim of this research was to determine most common injuries in junior badminton players. The research was conducted on a sample of 67 junior badminton players from 12 European countries, competing in tournaments of European Junior Circle; who were ages 14-18 years old (16.69±1.17), height between 101-193cm (164.10±25.3) and weight between 45-105kg (67.72±12.85). All participants fulfilled the questionnaire relating to their personal status and badminton injuries. Single simple t-test has shown statistically differences within the group in variables “Number of years in badminton”, “Number of trainings per week” and “Number of training hours per week” ($p<0.01$). Furthermore, the results showed that 23 players (34.32%) had problems with right ankle, 61 players (91%) were right-handed, 11 players (16.4%) had problems with right knee and 9 players (13.43%) had problems with right shoulder. In a research 26 players (38.8%) complained about lumbar region pain. Only 15 players (22.38%) had in their club a physiotherapist and only 11 players (16.41%) used their services. In conclusion, this pilot research indicates that badminton is highly intensive game where players must be well-prepared for the competitive conditions on the court even in the early ages where they experience different types of injuries. Continues study of this pilot project will be done in the near future (tournaments of Badminton Europe Junior Circuit).

Key words: *badminton, junior players, injuries*

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CORE SKILLS FOR WORLD-LEVEL TABLE TENNIS COMPETITION

Abstract

In the world-level competition, the coaching staff helps athletes develop the essential strengths to excel at the highest level. The strengths are acquired from systematic training to enable athletes with the skills to understand the competition from the physical, technical, and mental perspectives to gain advantages over his/her opponents. In this research, we analysed team China's coaching culture from 2002 to 2014 under the head coach Liu Guoliang. We aimed to derive the key elements of team China's training philosophy, learned from their own success and failure in Olympics and World Championships games. Significantly, our analysis led to ten core skills/abilities to focus on. They are: (1) the physical strength and durability, (2) fundamentally sound techniques for steady performance, (3) ability to adjust and execute in-game strategies, (4) right attitude while facing challenges in competition, (5) ability to control the flow/tempo in competition, (6) awareness of the in-game transitions and opponent's strategy, (7) mental strength to compete while trailing behind, (8) skill of in-game analysis, (9) big game experience, and (10) flexibility to integrate with team training/conditioning to peak for tournament. These ten points can serve as the training guidelines for coaches and athletes in preparation for the world-level competition.

Key words: *coaching, training strategy, world-level competition*

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MUSCLE FATIGUE ANALYSIS IN CASE OF A FOREHAND STROKE IN TABLE TENNIS ATTENTION TO STROKING BACKSPIN AND BRACHII MUSCLE

Abstract

We analyse muscle potential in order to find the brachial muscle fatigue of stroking backspin balls, and compare stroking it with topspin balls. The subjects belong to table tennis club of Niigata University. (n=10, average ± S.D., heght168.7±3.8cm, weight58.7±4.1kg, age19.7±1.3years, experience of table tennis 11.4±2.7years) They are all right-hander. The electrodes put on subject's biceps brachii muscle and triceps brachii muscle. The subjects wore goniometer to pick out a stroke from angle of elbow. They did a stroke for a second and it was continued for three minutes on trial. After taking a 15-minute break, they did a trial again. Then, we did Fourier transform by the program was made with MATLAB R2014a(produced by Math Works) on condition that sampling frequency 1000Hz, section length 500msec, shift length 20sec. We got Average Rectified Value (ARV) to estimate muscle active mass, and Mean Power Frequency (MPF) to know information about frequency of muscle discharges.

As to comparison of stroking backspin balls with stroking topspin balls, almost all the subjects' ARV were decreasing in stroking backspin, while the subjects' ARV were increasing in stroking topspin. This means difference between how to stroke them. For MPF, both cases were decreasing. 30-40seconds have passed after beginning the trial showed especially decrease. Fast-twitch fiber caused a low frequency of MPF.

This study showed clearly that tendency of muscle fatigue was difference on the direction of ball-spin. But, we use the legs when we stroke balls. We need to study muscle fatigue the legs too.

Key words: *muscle fatigue, brachial muscle, average rectified value, mean power frequency*

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THE EFFECT ON VIBRATION OF THE RACKET WITH VELOCITY AND SPIN AMOUNT IN TABLE TENNIS

Abstract

Selection of fit goods can be important factor in table tennis. So, it is need that estimate performance of rackets and rubbers. In this study, rackets and rubbers have a high frequency of use in table tennis competition were selected. The characteristics of them are shown in Table 1. We analyse vibration in changing velocity and spin amount of the ball, estimate performance of a combination of rackets and rubbers.

Ejected balls from ping-pong machine ware collided with the racket, did Analog/Digital Conversion through bridge box and strain amp. Collision of balls was continued until ten times hit the center of the racket. Condition of the collision tests were incident velocity 9m/s, 13m/s, racket angle 90deg, 60deg, 30deg, and incident spin amount 2000rpm, 4000rpm. We compared the information of vibration done Fourier transform. Data was extracted for 1.5 seconds including before and after the collision to find logarithmic decrement, and to understand easily in visual. The simplified diagram is shown figure 1.

Logarithmic decrement was smaller in much spin amount, and larger in much velocity. On rubber-b, it is think that rackets have angle degreases logarithmic decrement, and the rubber transmits power easily. So, it recommends a style of stroking to put spin on a ball to use rubber-b well.

Table 1 Characteristics of rubbers

A	Innrforce ZLC	Butterfly	Racket
a	Tenergy 05	Butterfly	Tention
b	Kyohyo 03	Nittaku	Adhesion

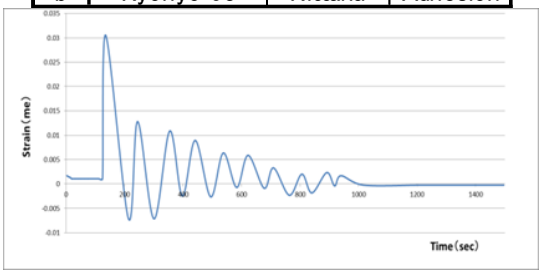

Figure 1 Simplified diagram of extracted data

Key words: *table tennis*

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MATCH ANALYSES OF FINAL GAME OF MEN'S TEAM EUROPEAN CHAMPIONSHIPS 2014 - PORTUGAL VS. GERMANY

Abstract

Aim of this study was performance analyses of Men's Team final European Champion ships 2014-Lisbon (Portugal vs. Germany). Strokes (stroke type, frequency, shot outcome. and placing area of winning shots) (n=1189) were analysed in 255 played points. Service (n=256) (outcome, placing area) and return of service (stroke type and return outcome) were analysed. Differences between variables of groups' Winner/Loser and Portuguese/German players were analysed with independent samples t-test ($p \geq .05$). Average number of strokes in point (without service) was 2.07±0.44, for winners 2.01±0.44, and losers 2.01±0.36. Statistically significant differences in result efficacy (winner/loser) were identified in service activities: return of service with forehand push ($p=0.010$) which is more common in play of winners, while losers made more return errors ($p=0.021$). Winners play more frequent forehand instead backhand strokes- 63.7/36.3%, instead losers 51.8/48.2%, and have higher percentage of ace and winning shots 21.1% (losers- 17%) which they place less in backhand zone. German players play more equally forehand/backhand (55.5/44.5%), and place shots less in backhand, while Portuguese are more oriented to forehand play (59.9/40.1%), and use more aggressive first attack with forehand topspin. In backhand play German players use more backhand flick, and control rally with backhand block, while Portuguese use more backhand drive to stay in point. This study gives a systematic description of technical and tactical characteristics in top-level European table tennis, providing important information for coaches.

Key words: *table tennis, stroke type, technique, tactic, playing style*

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MATCH ANALYSES OF FINAL GAME OF MEN'S WORLD CHAMPIONSHIPS 2014 - CHINA VS. GERMANY

Abstract

Aim of this study was performance analyses of Men's Team final of World Championships 2014 - Tokyo (China vs. Germany). Strokes (stroke type, frequency, shot outcome. and placing area of winning shots) (n=806) were analysed in 206 played points. Service (n=214) (service outcome, placing area) and return of service (stroke type and return outcome) were analysed. Differences between variables of groups' Winner/Loser and Chinese/German players were analysed with independent samples t-test ($p \geq .05$). Average number of strokes in point (without service) was 1.62±0.42, for winners 1.4±0.27, and losers 1.83±0.58. Statistically significant differences in result efficacy (winner/loser) were identified in service activities: in point won with first stroke after serving ($p=0.001$) which is more common in play of winners, while losers lost more point after service ($p=0.014$). In technical and tactical elements, differences were identified in quality of strokes: winners made more winning shots ($p=0.037$), and losers were more in situation to be overplayed ($p=0.004$), more use backhand block ($p=0.023$) and more often start offensive action with backhand top spin ($p=0.005$). Winners have played more frequent forehand instead backhand- 53.8/46.2%, instead losers 48.1/51.9%. Winners have higher percentage of ace and winning shots 31.8% (losers-18.1%) which they placed less in backhand zone, instead of losers. German players played less forehand instead backhand (46/54%), and placed more shots in backhand zone, while Chinese are more oriented to forehand play (55.9/44.1%), and use more aggressive first attack with forehand topspin, and place shots in middle of table. In backhand play German players used more often backhand topspin. Statistically significant differences in playing style (Chinese/German) were identified in service and return of serve activities: Chinese players were more oriented on forehand short serve ($p=0.034$), while German players used more forehand long serve. Chinese more often return opponent serve with forehand topspin ($p=0.023$) and place shots in middle forehand. This study gives a systematic description of technical and tactical characteristics in top-level World table tennis, providing important information for coaches.

Key words: *table tennis, stroke type, technique, tactic, playing style*

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HISTORY AND SOCIAL IMPACT OF PADDLE

Abstract

To study the origin of the paddle, evolution and social impact. Method: Literature review, search databases, selection and analysis articles. Results, Analysis and Discussion: Your story is based on two versions, racquet sports related (France, c. XIII) (Sánchez-Alcaraz, 2013). Distinguishes two types of games, some hitting the ball with bats and sticks, others with small tools or manually (Gillmeister, 2008; Jiménez, 2009). In the c. XIX assert the existence of another sport played in the basement of the English ships. Using paddles to hit the ball and allowed the rebound in the walls (Beard, 2013, Sánchez-Alcaraz, 2013, Lasaga, 2010). Beal (1924) uses it to teach children to play tennis reducing substituting another ball and racket foam with a wooden paddle (paddle tennis). Subsequently adapting to winter weather (Hernández, 1998; Sánchez-Alcaraz, 2013) and other possibilities (Platform Tennis) (Hernández, 1998; Beard, 2013). The second version says he was born in Mexico in 1969 through Corcuera. Accepted by the International Paddle Federation (González, 2003) coincides with the various targeted modalities. Conclusions: From questioned origin, is nowadays widely recognized.

Key words: *paddle, history, evolution, social impact*

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THE BOOM OF PADDLE IN SPAIN. A CASE ANALYSIS

Abstract

Objectives: The aim of this study was to obtain the feedback about Paddle in order to analyse practice patterns and social impact in Spain. **Method:** A discussion group (40 education teacher students and upper grade educational students), who participated in a course of UNIA in Baeza (Jaén) performed a free talk about why people play, learn and think about Paddle. **Results, Discussion** and **Conclusions:** Overall, participants felt good with the teaching techniques used and teacher skills, although, at the beginning, they were afraid of being unable to learn basic Paddle rules in 5 hours. In addition of moderate physical activity, they were motivated and developed cognitive aspects. They conclude that with motivation and teaching expertise is easy to learn. Physical condition is needed but not at high levels, depending on game rhythm and level. Finally, they concluded that playing Paddle is quite enjoyable.

Key words: *paddle, motivation, learning skills motivation, discussion group*

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THE INFLUENCE OF VOLLEY REACTION TIME AND MOVEMENT TIME OF SOFT TENNIS PLAYERS OF PRIMARY SCHOOL ON THE DIFFERENT VELOCITY AND STIMULUS-RESPONSE COMPATIBILITY

Abstract

The purposes of this study are to perceive the effect of volley reaction time and movement time of soft tennis players of primary school on the different velocity and stimulus-response compatibility. The training group contains 37 boys and girls from Grade 3 to Grade 6 in Gushan Elementary School in Kaohsiung County and Linluo Elementary School in Pingtung County between the ages 10.49±0.99, the heights 142.21±8.84cm, and the weights 37.74±7.71kg. The independent variables of this study are the different velocity and stimulus-response compatibility; the dependent variables are Reaction Time (RT), Premotor RT, Motor RT, and Movement Time. Through the Laboratory Virtual Instrument Workbench, Accelerometer, infrared-inductance and Electromyography (10000Hz) and so on, getting the information of PMT, Motor Time, RT and MT under different speeds of the balls of soft tennis volley. Using the calculating system SPSS.14 to have a 2 - way ANOVA to test, the results of the study were as follows:

1. The interaction doesn't exist between the influence of different velocity and stimulus-response compatibility on the RT, Premotor RT, Motor RT and MT.

2. The influence on the RT, premotor RT and Motor RT of different velocity is above the statistical significant level, and the RT, premotor RT and Motor RT of the participants volleying the ball at fast velocity is faster than those of the ones volleying the ball at slow velocity. However, the influence on the MT of different velocities is below the statistical significant level; in other words, there is no difference on the MT of different velocity.

3. The influence on the Premotor RT of stimulus-response compatibility is above the statistical significant level, and the Premotor RT of the participants volleying backhand volley without compatibility is faster than that of the ones volleying forehand volley with compatibility. However, the influence on the RT, Motor RT and MT of stimulus-response compatibility is below the statistical significant level; in other words, there are no differences on the RT, Motor RT and MT of stimulus-response compatibility.

Key words: *velocity, stimulus-response compatibility, soft tennis, reaction time, movement time*

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COMBINING SLOW-MOTION VIDEO AND STRUCTURAL MOVEMENT ANALYSIS TO PROMOTE THE LEARNING EFFICIENCY OF TENNIS

Abstract

Beginners of complex sports often have relatively poor performance. It may lead to low confidence and reduction of willingness. In this research, we combine teaching experience, literature review and tennis movement videos to assist our teaching. Our purposes are to simplify the movements of striking and build an integral teaching procedure. In this way, the learning disability could be reduced. It has been researched that when it comes to a complex athletic skills, the slower the information has been provided, the easier the learners absorb. Furthermore, if the knowledge can be applied more specific, the perception and memory trace of the skills will grow faster. On the other hand, visual feedback is another way to promote the learning efficiency. Using multimedia to attract learners' attention, and to reduce the cognitive difficulties. When learners' feedback is observed, it can tell that knowledge of performance (KP) can be distinguished from intrinsic feedback respectively. Amateur athletes' intrinsic feedback is more active than professional athletes'. Because amateur athletes have to make multi-decisions consciously which makes the brain more active. And at the same time, it distracts the attention

In this research, we use you tube apas system to analyse the movements of forehand swing and backhand swing taking by Roger Federer. The griping skills including west grip and top spinning in forehand swing and backhand top spinning in backhand swing. We have 80 subjects in this experiment. Half of them were assigning to be control group and others are in the experiment group. In the experiment group, we first divide the volley into parts according to the video. Then, we elaborate and demonstrate them to the subjects in detail. In the next step, we build a series of exercise including both hit the ball on the wall and across the net with forehand swings, backhand swings and alternatively. We require subjects to focus on the perception of pivot, movements and strength to keep the rhythm. While, in the control group, we explain the movements without videos and demonstration. Then, ask them to practice hitting the ball on the wall. All the subjects have no experience of tennis course before this experiment. We do the awareness of tennis volley test (a general idea of technological structural) once in a week. After 14 weeks, we take a total exam for all subjects. Each of them has to hit the ball on the wall for 20 times. The result shows that structural movement analysis using videos and demonstration in slow-motion is beneficial to the tennis beginners. The clarify awareness of tennis volley is able to promote the efficiency of learning forehand swings and backhand swings. Further experimental data; please refer to the full paper.

Key words: *tennis*

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A STUDY ON THE TECHNICAL ANALYSIS OF WOMEN'S TABLE TENNIS PLAYERS IN 2012 LONDON OLYMPIC

Abstract

The purpose of this study was to discuss the technique performance in the match of women's single players in 2012 Olympic Games. The subject was Li Xiao-xia who won the gold medal of women's singles. The analysis used Observation to analyse the scoring rate and using rate in the quarter-final, semi-final and final, the results shows the highest scoring rate was the skill of serve and attack stage, and then the skill of stalemate, the receive and attack stage was lowest. The highest using rate was the skill of stalemate, and then serve and attack stage, receive and attack stage using rate was lowest.

Key words: *London Olympic, technical analysis, Li Xiao-Xia*

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STUDY ON SKILL AND TACTIC IN THE TOP FOUR FROM MEN'S DOUBLES MATCH OF SOFT TENNIS IN ASIAN CHAMPIONSHIPS 2012

Abstract

The purpose of this study was to analyse the use of skill and tactic in the top four from men's doubles match of Soft Tennis in Asian Championships 2012. **Method:** The top four from men's doubles match of Soft Tennis in Asian Championships 2012 were observed from match live recording videos. Data were analysed by Chi-square goodness-of-fit test and the level of significance was set at α=.05. **Results:** This study showed that there was significant difference in serve percentage, serve placement, serve and approach, receive placement, receive and approach, technology, and formation. **Conclusion:** In the top four from men's doubles match of Soft Tennis in Asian Championships 2012, first serve percentage is about 65% in hard court matches. Players do not approach after service. Service placement is near right-hander's body and backhand position. Receive placement is located on diagonal baseline and players approach after receiving ball. Double net parallel formation is mostly used and volley is main skill. In order to attend international men's doubles match, coaches should focus on this tactic and ask players to receive certain trainings of volley and smash and sharpen the skill of passing shots. Strategies of three-stage hits should be designed.

Key words: *tactic, skill, double net parallel formation, hits*

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TABLE TENNIS ATHLETES FATIGUE RECOVERY AND DIETARY IMPROVEMENT

Abstract

1.Research Objective

Table tennis game is a non-cyclical sports item, with the characteristics of high intensity motion, high density, long time, fierce confrontation, asking players to have higher overall quality with the special speed, overall strength, stamina, bounce force, etc. The paper is explaining briefly that the significance that the athlete need fatigue recovery timely and rational dietary improvement and putting forward to the effective measures to promote the table tennis athletes fatigue recovery and a balanced diet.

2.Research Method

Observation method; Literature study; Description method; etc.

3.Result and Discussion

3.1.The nutritional supplement for healthy body

Nutrition refers to the substance that can go on with digestion and absorption in the body, supply heat, constitute the body's tissues and regulate physiological function, which is necessary for the normal metabolism of the body. The nutrients that the body need can be included seven categories: sugar, fat, protein, vitamins, minerals, water and dietary fiber, etc.

(1) Enough water. For physical fitness participants, water is the most important nutrient. Therefore, during the period of physical exercise or after the exercise, people must have enough water, which can guarantee the normal operation of the physiological function and promote the recovery of physical fatigue.

(2) The reasonable collection of three major nutrients. Sugar, fat and protein are known as the three major nutrients because of its special status and function. Thus the ratio of the three major nutrients should be appropriate during arranging the diet for the physical trainers to make better use of their exercise capacities and promote the rapid recovery after exercise.

(3) Adequate vitamin. Although the amount of vitamin that human body needed is a little, and excessive supplement will cause poisoning, but it still occupies an important position in sports nutrition. The aim of the supplement is to make the amount of vitamin in remaining saturated state; moreover, the comprehensive supplement is better than single supplement.

(4) Inorganic salts should have moderate supplement. Inorganic salts are chemical elements to maintain normal physiological function, which have played a great role in activities of human body if supplying moderate inorganic salts.

3.2. The physical fitness of super compensation. The table tennis athlete had a super compensation after high density training, promoting the physical fatigue recovery and increasing the body function.

3.3. Appropriate training load. According to the rule of athlete’s physical fitness and training determination. In order to a better super compensation and increasing the physical ability. Reasonable training load is important for achieving a high quality training and ideal performance in race.

3.4. Means for Recovering Fatigue Caused by Physical Fitness. Nutritional supplement is an important means for the fast recovery of the body, the key to recover the physical fatigue is the recovery of body's energy reserves, therefore, using nutrients can be fully supply the consumed substances caused by the motion, and repair the mechanism of body's injury, helping to eliminate the physical fatigue and promote the recovery of physical fatigue of the athletes, so as to improve the athletic performance.

4. Research Conclusion

4.1. There is some relationship between table tennis athlete fatigue recovery and nutrients supplement. The athletes and coaches should clarify their relationship and significance combing the eliminating fatigue and reasonable nutrients during the training and race.

4.2. Table tennis is a high strength and high physical consumption item. Having a scientific nutrient supplement can eliminate fatigue timely, restore the physical, promote the training effect and create excellent achievements.

Key words: *table tennis game, effective recovery means, physical exercise*

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ANALYSIS OF TECHNIQUES AND TACTICS OF TABLE TENNIS PEN-HOLD PLAY WITH PIMPS-IN BAT

Abstract

This paper aims to prove that pen-hold play with pimps-in rubber bat can be further developed and to provide solid materials for the development of the tactics of table tennis and the sport itself. By way of consulting relevant literature's, doing mathematical statistics, observing videotapes and analysing individual strength and weakness, and through conducting statistical analysis of the tactics of excellent pen-hold player using pimps-in rubber bat and visiting and consulting academic authorities and experts, I wishes to conclude in this paper the generality and regularity on the play and to have in-depth analysis and debate about the impact the new competition rules may have on the play so as to provide scientific basis and reference for development of pen-hold play tactics.

Key words: *table tennis, pen-hold play, tactics*

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SERVE TEACHING UNIVERSITY TENNIS ELECTIVE OPTIMIZATION

Abstract

Objective 1

This paper focuses on the student's college tennis elective serve technical features, style and technical ability of research and analysis, and general technical teaching tennis lessons serve points, difficulties, shortcomings and deficiencies discussed. One can effectively serve to improve the effectiveness and success rate for beginners, as well as their technical movements serve to generate the overall appearance of technical knowledge and personal experience serve to fully mobilize the enthusiasm of students to learn tennis and entertainment.

2 Research Methods

2.1 Literature

2.2 Mathematical statistics

2.3 Questionnaire

2.4 Teaching experiment

Experiment is divided into four areas: First: Before the experiment the objective differences in the experimental group and the control group students for effective integration exists to reduce the impact on the reliability and validity of the experiment, so the two groups of students before the experiment on the body basic quality situation and tennis serve as a basic test. The main test items include average weight, average height, throwing badminton, tennis courts, shuttle run, standing long jump and within; tennis serve technique to detect, mainly through an auxiliary practice law Shoupao Qiu Ping, markers exercises around "8" to practice law, parallel station bit practice, retreat more ball exercises, multi-point ball exercises, multimedia teaching and other means serve to detect research.

The second aspect: the experimental group and control group students serve basic action technology assessment results, and at the same time in the two groups of five randomly selected students in the overall quality of considerable detected serve, scoring criteria set: Students were flat partition and pre-emption area each send five balls into the field to score in the region, if not sent to the scene in the region would not score.

A third aspect of the main use of specific teaching methods to optimize the way the experimental group, while the control group continued to use traditional methods of teaching methods to teach ball movement techniques.

The fourth aspect is the effect of experimental testing and validation. The technical assessment of selected Wuhan Institute of Physical Institute of the lake tennis court, whether in the course after the end of the tee, make three experts to participate in the assessment of student technology assessment, technology assessment, including technical assessment of serving, and serve success rate. After the end of the experiment teaching for the test results were analysed to verify the tennis serve to optimize the design of teaching effectiveness.

3 Results and analysis

The study found Serve Teaching University Tennis Elective compared to traditional teaching more intuitive, easy to learn, simple and efficient, along with high manoeuvrability and some practical value. Serve optimization techniques based on the teaching methods, such as: parallel stations exercises, exercises markers around the "8" practice law, retreat more ball practice, pointing more ball exercises, assisted practice law Shoupao Qiu, multimedia teaching technology to optimize teaching and other activities means for teaching tennis serve to optimize the design helps improve teaching efficiency, reduce teaching time.

4 Conclusions

First, serve technology is key and difficult current technical teaching college tennis, while Serve Teaching optimization tools help improve students serve action coherent grasp and control. By optimizing the design of teaching allows students have a clear grasp of the goals and learning methods such as parallel stations set of standardized requirements for accurate drop location, reasonable batting position, swing timing and so on. So that students can quickly react to adjust the sweet spot, while the learning process becomes simple and clear definition, but also shorten the time for technical education. Second, college tennis serve to optimize the design of teaching methods will help improve the way students learn self-confidence and learning beliefs. Third, the tennis serve optimization tools can promote teaching stimulate students' enthusiasm to help improve learning efficiency. Fourth, the new forms of teaching to optimize the design with respect to the traditional teaching more intuitive, easy to learn, simple and efficient, along with high manoeuvrability and some practical value, fully embodies the concept of modern education students learn the meaning and objective law and Times value.

Key words: *tennis*

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THE RESEARCH ON THE POSSIBILITY OF THE FOREHAND WRING AND DRIVE OVER THE TABLE WITH THE RACKET WITH THE SIDELING HANDLE

Abstract

1. Research Purpose:

I present "the forehand wring and drive over the table with the racket with the sideling handle" in order to find an easier, more suitable and more effective technique of forehand wring and drive over the table, and it can also shorten the range of movement, shorten the gap made by backhand wring and drive in forehand position, faster the transfer between forehand and backhand, faster revivification, minish the behaviours. By this way, it can not only make sudden behaviours when hitting the ball, but also enrich the way of hitting the ball inside table by forehand.

2. Research Methods:

Carefully analysis and compare with open grip racket, pen-hold grip racket, as well as the racket with the sideling handle. The comparison includes the structure of the rackets, the ways to hold the rackets, preparation positions and the conditions for wring and drive。

4.Practice Methods:

Transfer the backhand pen-hold backhand attack with reverse surface over the table with pen-hold racket technique to the front of the forehand wring and drive over the table with the racket with the sideling handle , and with the little changes as well as the properly addition of the racket with the sideling handle elements, so that finally forms the way to practice the front of the forehand wring and drive over the table with the racket with the sideling handle technique. Three ways of practice are as follows: 1) using the force of wrist. 2) using the force of fingers. 3) combining the force of wrist and fingers.

4. Research Conclusions:

1) The technique of forehand wring and drive over the table with the racket with the sideling handle may rival with backhand wring and drive over the table with open grip racket and pen-hold grip racket.

2) The technique of the forehand wring and drive over the table with the racket with the sideling handle can be applied to return the ball in any part over the table.

3) The technique of the forehand wring and drive over the table with the racket with the sideling handle can make different spins and different placement of the ball during the different periods of the coming ball.

My conclusion is that the change of racket or equipment can create new technique; different ways to hold the racket will receive different effects; the way of wring and drive is in direct proportion to the effect.

In all, the new technique of the forehand wring and drive over the table with the racket with the sideling handle enriches the way of wring and drive over the table, increase the sudden of hitting the ball, and realize various placements, different spins. Of course, all these effects will benefit for athletes. Meanwhile, because of unique and modern design of the racket with the sideling handle, possible for four-side offensive and four-side chop, various changes and comprehensive techniques, make the sports of table tennis equipped with more ornamental value and entertainment. What's more, it will also benefit a lot for the spread of the table tennis all around the world.

Key words: *sidling handle racket, forehand wing and drive, over the table*

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THE APPLICATION OF GAME TEACHING METHOD IN BADMINTON TEACHING IN MIDDLE SCHOOL

Abstract

1 Objective

With the continuous popularization of badminton sport, badminton has entered the middle school sports class, students' physical education become the preferred one of sports projects, loved by the majority of middle school students. Badminton technical strong, exquisite technical requirements change, field mobile speed, tactics and competition fierce competition, to achieve a better master the basic technology and improve the level of sports, badminton requires systematic learning and training. So the badminton middle school physical education teaching method is necessary. According to the students to master badminton technology present situation and the teaching outline requirements, semester teaching plan. Game teaching method can make the transformation of teachers' teaching idea and the teaching methods, to adapt to the development of modern education, happy learning, according to their aptitude, complete the teaching goal, the purpose of provide the basis for creative teaching.

2 Research methods

Based on the application of game teaching method in middle school badminton teaching more comprehensive and systematic investigation, objective and in-depth analysis and research in badminton middle school physical education teaching methods, find out the feasibility in the development of game teaching method in badminton teaching in college.

3 Results and Conclusions

(1) Introduce the game teaching method scientifically badminton class for middle school students, to improve the comprehensive quality of students has significant role in promoting, at the same time can meet the practical needs and desires of the students, arouse students' learning enthusiasm, helps to cultivate lifelong sports consciousness and physical exercise habits, to lay a good foundation for the lifelong sports.

(2) Game teaching method applied in the badminton teaching, can better in accordance with the requirements of teaching outline, the student not only in learning badminton knowledge but also feel the joy of learning, make classroom atmosphere more harmonious, can effectively improve the teaching effect.

(3) Game teaching method applied in the teaching, students can learn the tactics of repeated practice, promote the students to master the basic technical and tactical, in the game better and faster to complete the teaching goal.

(4) Teaching method applied in the teaching of the badminton can cultivate the students' competitive consciousness and psychology to bear ability, cultivate correct outlook on life and values.

Key words: *game teaching method, college, badminton teaching*

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THE INFLUENCE OF TABLE TENNIS EQUIPMENT TO TECHNICAL PLAY OF TABLE TENNIS

Abstract

In this paper, the table tennis equipment as the research object, using literature data method, expert interview method and logical analysis method, analysed the influence of table tennis equipment to technical play of table tennis, expecting to be able to better promote the innovation of the table tennis technology play, promote the development of table tennis. Conclusions of the study are as follows:

(1) The racket has great influence on the table tennis technology play, with a rectangular racket, ball and a greater range of motion, rotation radius can extend the shoulder or elbow as the center, with the same angular velocity motion, can lead to shoot end strike force to increase, is conducive to the fierce technical style of play; with elliptical racket, and with a small amplitude of hitting the ball, can maintain close table turn the wrist flexibility and accuracy of pushing and hitting the backhand.

(2) particle rubber racket rotation age brought table tennis, granular rubber racket invention brought the golden age of "backspin" technology mainly chop.

(3) plastic sponge particles outward take big rebound, is conducive to speed based fast break attack. Style Chinese table tennis team in practice successfully summed up the "fast, accurate and relentless, change" technology, make full use of the characteristics of plastic sponge racket ball, formed its own unique "rhythm speed" dominant near break time.

(4) the popularization of reverse micelles sponge bat make quick attack table tennis and strong rotation has entered a new stage of development, so that the table tennis athletes from nearly the confrontation of small range, single oriented to the rapid development of multi azimuth range.

(5) the influence of table tennis ball skill is mainly manifested in the spin down, big ball era ball, in the service, control the serve arc length increases the difficulty, easy introduction. After the ball is changed to a bigger speed slows down, the spin down, making the middle area of the chopping athletes have more time to have enough time to judgment, reaction, make the countermeasure; at the same time reduced speed, rotation will inevitably lead to the ball after the rebound distance decreases, more conducive to counterattack cut cutting.

Key words: *table tennis equipment, technical play, innovation*

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COGNITION PROJECT INVESTIGATION AND ANALYSIS BEFORE AND AFTER THE SPECIAL LEARNING - TAKE STUDENTS ARE FROM SHANGHAI UNIVERSITY OF SPORT MAJORING IN PHYSICAL EDUCATION BADMINTON AS AN EXAMPLE

Abstract

With Shanghai University of Sport Physical Education Specialty Badminton Talents curtain opened, in the training process, there have been some bad phenomena such as the practice of re-thinking of the students, the theory of light, which is output for future training and have a greater impact. In this paper, literature, questionnaire, mathematical statistics and logical analysis of cognitive, emotional and subjective expectations of learning before and after investigation and analysis to identify factors influencing their special learning to Badminton Training students for the future provide a theoretical basis and reference value and the whole culture of physical education professional development.

Key words: *before and after, physical education major, badminton, learning, cognitive*

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A CASE STUDY ON SUZHOU'S TABLE TENNIS PROJECT DEVELOPMENT

Abstract

Table tennis is our national sport. Since being introduced into China in 1904, the table tennis project has gradually formed unique Chinese table tennis culture with a set of sports system and the humanities culture combined. In terms of the development of table tennis in China, Suzhou is a classic case which not only attaches importance to the cultivation of the backup echelon, but also pays attention to the mining of the mass sports. Therefore, the paper investigated, studied the developing situation of Suzhou table tennis project, and finally put forward relevant suggestions and countermeasures for its future development.

Key words: *table tennis, table tennis culture, mass sport*

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ANALYSIS ABOUT TECHNOLOGIES AND TACTICS OF MA LONG AND MIZUTANI JUN

Abstract

Rio de Janeiro Olympics of 2016 will be around the corner. Though our national table tennis team achieved 4 gold medals during No.29 London Olympics, we can't forget that Wang Hao lost the most important men's single title at Athens Olympics. From Table Tennis came into the big Olympic Family in 1988. The foreign male table tennis players only have one golden medal less than ours. We take advantage over other countries, but the level between us is much closer. Whether our elder players maintain their condition and the young players take the tough task, the result of 2016 Rio de Janeiro Olympics will be the answer.

By the means of literature review, elevating sectional indexes and inductive technologies and tactics, researched on technologies and tactics through the recent international three matches between Ma Long and Mizutani Jun. Innovated the research methods by relating Mizutani Jun's service and attack after service rather than only studied on single technology.

Conclusion:

Among three section indexes, Ma Long has an advantage over Mizutani Jun during rally. Most of the right-side spin services of Mizutani Jun were to Ma Long's middle placement and the most of the left-side spin services of Mizutani Jun were to Ma Long's right and middle placement, and after service Mizutani Jun often used forehand attack. The service of Mizutani caused Malone a great threat, making Malone lost points directly. Mizutani often took positive ways on the third stroke. When Mizutani received, he used fast backhand stroke to Ma Long's forehand placement after he taking his backhand Ning, which was his most threatening tactic among his receiving ones.

The key for winning the match is to take advantage during the first three strokes.

Key words: *sports training, table tennis, technology and tactic, Ma Long, Mizutani Jun*

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EXPLORE THE THEORY TRAINING OF CHINESE NATIONAL TABLE TENNIS TEAM

Abstract

Through documentary, expert interview methods to explore the closing training details, the magic weapon of Chinese national table tennis team's success. Revealed the rhythm of training arrangement, the main contents and forms of technical training, the competition arrangement, as well as how to combine the training and competitions. On one hand, expected to reserve precious training data; on the other hand to extract nutrients from these data. Wish to provide theoretical reference on high training level of table tennis players and how to prepare for contests.

Conclusion:

1. Chinese national table tennis team has hold 15 times closing training before competitions during past 10 years. The load arrangements, training content and methods to be maintained a high consistency, training systems mature and complete.

2. Normally, the period of closing training before competitions kept 5-6 weeks. The average number of days is 37.9 days, a standard deviation of 4.71 days.

3. On the technical and tactical training content, every closing training content is different. However, the basic technical training content is essential; all personalized training content is centered on the main players of different technical and tactical system. Different stages have different training content, methods and focus. The training content is much more important than training forms.

4. Team emphasized the value of warm-up match and the matches between players, and the simulation degree of the formal competitions. The coaching staff set up different match formats in accordance with the current situation.

5. Physical training did not change over the time, every time 40 minutes. However, the addition of personalization features and of the recovery combined with sports injuries.

Key words: *time arrangement, load, technique and tactics, simulated training*

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COMPARATIVE STUDY OF CROSS- OLYMPIC TABLE TENNIS TECHNICAL AND TACTICAL DEVELOPMENT CYCLE CHARACTERISTIC OF MAN

Abstract

The purpose of the study: Since 2010, table tennis movement into inorganic era, during the London 2012 Olympic Games baptism, the inorganic glue water brings to the table tennis what kind of change? Through the comparative study of nearly five years of four excellent players technical and tactical development characteristics, to explore the influence of. In view of influence of both new material and inorganic glue ball on the table tennis is similar, and provides appropriate reference effect on the next step.

Research methods: 1.video statistics using the "three sections evaluation" of the four athletes in recent five years of 131 matches for the related data statistics. 2. The logic analysis method combined with the movement rule of table tennis ball and changes the rules of the impact, the technical and tactical characteristics of four world champion is analysed. 3. Comparative analysis of the statistical results of the four world champion 3, comparative law and tactical and technical characteristics of the overall variation characteristics and evaluation standards, draw a conclusion.

Results and discussion: Separately from the hair rob segment tactical index, then grab the period of technical and tactical index and the three aspects of the technical and tactical stalemate segment index, individual technical and tactical development characteristics of men's table tennis of China's overall technical and tactical development characteristics and four outstanding athletes to compare and analyse the similarities and differences between the object of study, a profound analysis in these three aspects.

The research conclusion: The overall level of competitive development of complementary features, more stable; attack section technique and tactics level in good range, has a larger promotion space; then grab the most prominent section of technical and tactical level, no significant difference between the two kinds of style, a means of diagnosis based on three segment index need further improvement; stalemate weak link segment still need to strengthen technical and tactical level.

Key words: *cycle, tennis, technical and tactics, inorganic times*

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THE BREAKTHROUGH OF TABLE TENNIS INDUSTRY UNDER THE BACKGROUND OF BIG DEVELOPMENT OF OUR COUNTRY SPORTS INDUSTRY

Abstract

During the period of rapid development of sports industry in our country, the development of table tennis industry is relatively backward. By using the literature material method, expert interview and field investigation, this research sums up the main factors which restrict the development of the Chinese table tennis industry. The research suggests that the development of table tennis industry should take the table tennis further integration with the national fitness, with the help of new media to expand public participation and reform the will commence to lead a social and professional road. Accelerate the development of market-oriented operation and to enrich the diversification of table tennis industry.

Key words: *table tennis industry, sports industry, development*

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STUDY ON THE FUNCTION AND THE MANAGEMENT MECHANISM OF UNIVERSITIES' TABLE TENNIS CLUB — XIAMEN UNIVERSITY FOR EXAMPLE

Abstract

1 Research purpose

Participating in the school sports club is one of the important forms of practice of students' extracurricular sports activities. The understanding of the function and value of social sports, helps to improve students' enthusiasm to participate in sports activities, and plays the main role of sports associations in the school sports work, and provides the reference to organization and management for colleges and universities. Based on the table tennis association of Xiamen University as an example to study and analysis, in order to provide the guide to understand the college social function, and make the community can be better in developing their own advantages, the school innovate management mechanism, better service in the university sports work.

2 research methods

By literature material law, questionnaire investigation, logical analysis of research methods, the paper analysed the main functions of the college table tennis club and the management mechanism of college to associations.

3 research and conclusions

College table tennis club is one of the major practical forms of school sports activity; and it is also the important way of the transmission of sports spirit and culture; By actively develop table tennis sports clubs, we can reserve talented person for college's sports team, at the same time also provide reasonable Suggestions for the arrangement of the school physical education curriculum. Colleges' table tennis club provides a good platform for the internal and external college communication. Compared with conventional management mechanism in universities, Xiamen University innovates the management mechanism in the organization and management process; this plays a positive role in promoting the development of the university community.

Key words: *university, tennis club, function, management mechanism*

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THE CONSTRUCTION OF "STRENGTH DIFFERENCE EVALUATION METHOD" FOR TABLE TENNIS MATCH

Abstract

1. With the development of table tennis equipment, rule changes and player techniques, the classical "Three Phase Evaluation Theory" has not completely suitable for modern games analysis, which is always the main method in table tennis technique and tactics analysis in China. So in order to improve some shortcomings of this method and further improve the system of table tennis technique and tactics analysis, this study built a new method that is named "Strength Difference Evaluation Method"; 2.By using the method of logical analysis, videotape observation and mathematical statistics, this study constructed the theoretical framework of the "Strength Difference Evaluation Method" and demonstrated the method with the example of MA Long and BOLL Timo in The 2012 World Cup. All indicators collected and calculated by using Excel software; 3.Rusults and Discussion: This method divided a game into four phases: the attack after serve phase, the attack after receive phase, the rally in serving round phase and the rally in reserving round phase. It also made the data of one player correspond with the other through applying the division of fifth stroke method. The three phase strength difference, the round strength difference and the total strength difference were included. The nature of the strength difference is the difference value between the two players' ratio that is calculated between the scores of one phase or a round or a whole game and the sum of scores and loss in the game. The example shows that the total strength difference is 29.41%. Ma Long won 23.53% in the attack after serve phase, won 7.35% in the attack after receive phase, won 5.88% in the rally in serving round phase and lost 7.35% in the rally in reserving round phase, all the rally phase lost 1.47%. 4. Conclusions: "Strength Difference Evaluation Method" analysis the match as a whole, it can directly reflect the strength of two athletes in the detail phase. The example indicated that this method can reveal the objective laws of table tennis match from another angle, and it will help for improving the system of table tennis technique and tactics analysis.

Key words: *table tennis, strength difference, evaluation method*

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THEORETICAL EXPLORATION AND EMPIRICAL STUDY ON FUN TABLE TENNIS PROCEDURAL TRAINING METHOD

Abstract

Fun table tennis training method is that in the process of learning table tennis technique, we follow the principle of teaching step by step, the rules of forming table tennis technique, the procedure of table tennis training process and the systematic characteristic of the content. A variety of ordered and logical training content has been worked out. Training equipment including soft table tennis balls, standard table tennis balls, single table tennis table, standard table tennis table, table tennis bats and so on are used. The scientific organization control and evaluation methods are implemented in the process of training in accordance with the scheduled training activities. ("fun method" for short hereinafter). Its remarkable characteristic is simple, convenient, practical, efficient and magic.

Objective: In order to innovate table tennis training method, to change the passive embarrassing situation in which students like sports but don't like to take PE lessons, to enhance table tennis initial learning interest, to improve the effect of teaching quality and training, to improve the utilization rate of the table tennis stadium and gymnasium.

Methods: literature; logical analysis; teaching experiment; tracking survey method; mathematical statistics; interview; questionnaire survey.

Results and discussion: Through teaching practice and exploration in recent years, the research group has developed a series of table tennis training auxiliary equipment, five of which have got patents of China. On this basis, a set of "fun table tennis procedural training method" has been summarized. This method enables learners to master the basic skills of playing table tennis in a short period of time, stimulates learning interest, activates the learning motion, fundamentally solves the problem of learning to play table tennis, simplifies complex problems and helps students do more with less. It makes students learn quickly, happily, well and diligently. It also makes teachers teach creatively, precisely, normally and skilfully. So "fun method" not only has a significant effect in the establishment of the sense of achievement of students, in the development of initiative, in the cultivation of creativeness and in the pursuit of exploratory, but also improves the utilization rate of the table tennis stadium and gymnasium.

The concept, characteristics and training methods of fun method are summarized by using logical analysis and literature to test its scientificalness. The results of the experiment are contrasted and sorted to verify the effectiveness of fun method by applying the method of teaching experiment, tracking survey method and mathematical statistics method. The public evaluation is collected and analysed to verify the feasibility of fun method by using interviews and questionnaires.

Fun method has been introduced in teaching in more than 40 schools across the country, some of which have used it as the feature of the campus project. The application has received very good effect in the teaching and training (the efficiency can be increased to 50% compared with the traditional method). The research group has also participated in two national social science projects and continued training users constantly to break through the bottleneck in promotion.

Conclusion and suggestion: Fun method can not only improve the efficiency of learning, but also cultivate interest quickly, activate learning motives. Cramming teaching method is changed into inquiry teaching. Boring learning becomes happy learning. The interest of learning table tennis is improved. The difficulty of learning table tennis is reduced. The training cycle is shortened. "Want me to learn" is changed into "I want to learn". The manoeuvrability of Fun method is strong. It is easy to popularize and spread and suitable for all types of schools at all levels, the community and the family. Education and sports administrative departments should pay attention to it, propagate it and spread it and give it strong support.

Key words: *table tennis*

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CAUSES OF URBAN PUBLIC TABLE TENNIS FITNESS CONSUMPTION, STAGE CHARACTERISTICS AND DEVELOPMENT TREND

Abstract

The main purpose of this research is through eight cities nationwide table tennis fitness survey participants, a comprehensive and systematic study, summarize the causes of the consumer market, phase characteristics and possible future trends for the further development of China's Ping Pong the global market to provide a more scientific basis and reference program, provide the basis for government and sports administration department to modify, develop mass market table tennis development planning; provide relatively reliable information for the operation of China's table tennis related industries, management, business development, achieve "national sport" of sustainable development. The research is about public fitness consumption of table tennis in urban areas of China. The results showed that, on the number of participation and consumer input male is more than female, mostly 20-50 years old; individual consumer level is much lower, the amount of annual consumption of less than 1,000 yuan accounted for more than 60%; consumer motivation followed by health, interest and entertainment; age, education, sports consumer attitudes and the level of economic development in the region affect the public consumption behaviour. Then we propose that policy and public opinion should play an active advocacy role to guide public to enhance health investment and to develop table tennis entertainment properties to attract public participation in table tennis fitness consumer to enhance the service level table tennis.

Key words: *urban, public, table tennis, fitness, consumption, stage characteristics, development, trend*

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ANALYSIS OF THE FUNCTION OF METACOGNITION IN ADOLESCENT TABLE TENNIS CONSCIOUSNESS

Abstract

Table tennis consciousness refers to the target-oriented mental activity of table tennis players during training and competition. It refers to the table tennis player's advanced acquisition in intellectual expertise and an abstract concept formed on the basis of competing experience. As the core of this activity, table tennis consciousness has always been attached great importance in training table tennis players. Adolescence is an important period when consciousness is developing. While carrying out consciousness development resembling psychological interference is very difficult when the athletes are during their hard time of the psychological growth at 13-17. If we only focus our effort on external control, i.e. offering traditional training to players, then it would be difficult to obtain high efficiency; because players aged 13-17 are suffering from difficulties in mental growth at their age. Therefore, we need to study the training model from different perspectives and help young athletes involve themselves more actively in this abstract learning. The psychological term *meta-cognition* refers to people's self-awareness and self-control of cognitive activities. Since it was first published by psychologists in 1970s, this term has been applied frequently in different teaching practices and research literatures on teaching theories in both China and abroad. In recent years, the concept of meta-cognition has witnessed wider application in athletics research, including applied research on developing athletic expertise in a range of sports such as track and field, aerobics, and tennis. These researches proved that people's metacognition is associated with their development of consciousness in athletic expertise. Among all the existing theories on table tennis trainings, there still lacks discussions on metacognition, which to some extent has an adverse effect on the psychological training of young athletes, making it difficult to resolve the bottleneck that impedes their internal growth at their best training stage and leading to a long period of stagnation in expertise development. This could block the progress of training. Therefore, together with my experience of teenager-targeted teaching for more than ten years with consulting more than 50 copies of the literature related to the metacognition teaching from domestic and foreign researchers, this paper analyses the situation from the perspective of the metacognition in psychology.

This paper analyses the reflection of metacognition in the training practice of table tennis players according to the definition of metacognition theories in athletic acquisition developed by predecessors and the reflection of the metacognition in the training practice of table tennis players. The author hopes to enrich the theories of athletic psychology of adolescent players in order to help them deal with their inherent problems during different stages of the growth.

Key words: *table tennis*

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THE CORE TECHNIQUE STEP OF TABLE TENNIS IN TEACHING AND ITS EFFECT OF RACQUET SPORTS

Abstract

There are 5 major categories, 12 kinds of tactics in table tennis playing, the techniques of it are more. Teaching the technique of table tennis is very important in college education. This paper is to discuss the core technique of table tennis and the racquet sports. The main object of study is the table tennis class in CUC and the associate research object is the tennis, badminton, softball class in CUC. Using the logic analysis method, experimental method, text analysis method to carry on the research, through the constantly teaching practice and the image text analysis of high level athletes to sum up and refine it, we can find that the table tennis technique is consist of three core steps: support, twist and force. The constructing of core table tennis technology is beneficial to build the tactics, help evaluate the level of table tennis technique and conductive to the technical and tactical migration between racquet sports, so as to improve the teaching level and teaching quality of table tennis. The migration between table tennis and racquet sports can help promote the popularization of racquet sports.

Although there are many kinds of table tennis techniques and the details of it have a large gap, the racquet sports have a common technology. The primary goal of this research is to find the core technique step. If our body is a whip, the trunk is top of the whip and the wrist and fingers are the tail of the whip. That's contract the whipping action. The technical core move and the core strength exercise have the common sense, so there is a large research space. I use three simple symbols to give the definition of core technique steps: support, twist, force. Through the shortest and simple definition, we can make students have a clear concept of table tennis, and the definition change with the students' technique level. The broad definition of it is: support, twist, force; the differentiation stage is: support, exert force; the automation stage is: support body to twist and exert force. And to destroy opponents' support, twist and force in tactics level is also very important.

There are five aspects to show the results and analysis: the link between table tennis core technique step and core strength, the analysis and evaluation function of table tennis technique, the promotion of teaching quality, the migration in the technique and tactics and the effect on the racquet sports.

Key words: *table tennis, core technique step, racquet sports*

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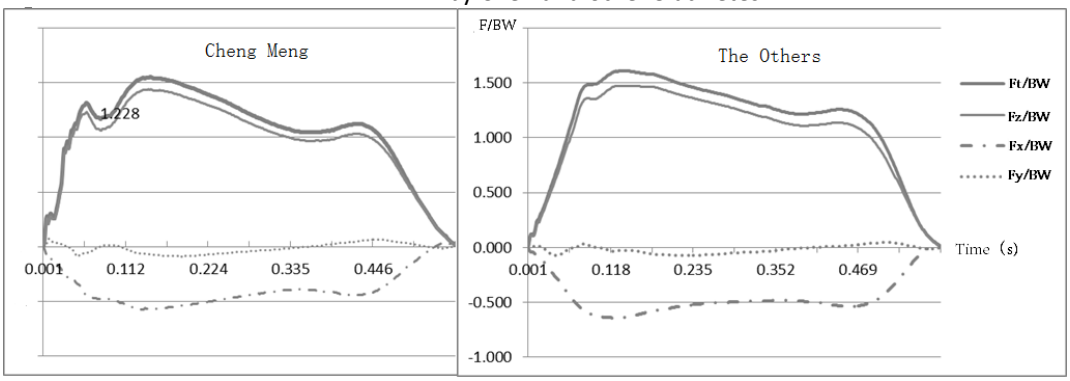
THE BIOMECHANICS ANALYSIS ON SKILL OF CHEN MENG'S "RUSH AT THE FOREHAND"

Abstract

Introduction: The coach of the national youth sports teams raised that the motion of rush-at-the-forehand by Chen Meng had some problem, but he can't find the key of problem and the way to correct. The purpose of this study was to find out her problem and the way to improve.

Method: With Kistler 9281C force plate and Casio F1 high speed camera, we tested the motion of rush-at-the-forehand by Chen and other 3 athletes, whose skill are proper. The frequency for testing the ground counterforce by forward leg on force plate was 1000 Hz. Each athlete repeated 5 times. And then normalized the original data and analysed the averaged value. At the same time for testing force, we made the synchronous video of 240frames/sec. by Casio F1 camera and analysed the duration of each step of the motion.

Figure 1 The ground reaction force (GRF) of forward leg on skill of rush-at-the-forehand by Chen and other 3 athletes



Fx- Horizontal force (N); Fy-Shear force (N); Fz-Vertical force (N); Ft- ; BW-Body weight (N)

Results: The results are summarized in Figure 1.The duration time of Chen is 0.556 sec. and shorter than that of others (0.601 sec., 0.583 sec., 0.572 sec.). Fx/BW and Fy/BW Curves are similar, but vertical force is different. There are three peaks in the curve of Chen, while 2 in others. The first peak of Chen is only 0.017 sec., the second and third are similar to others. The up and down movement of body can be observed by high speed camera on 240 frames/sec., there are 3~4 pictures.

Conclusion: The movement of rush-at-the-forehand of Chen was more quickly than the 3 others, but the small movement of foot impacted her profit from the skill of hand. The study found this problem with the force plate and showed her to correct with high speed camera.

Key words: *rush-at-the-forehand, force plate, biomechanics*

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FEASIBILITY OF CHINA-TT TABLE TENNIS RATING PROCESSING TOURNAMENTS IN UNIVERSITIES

Abstract

Universities' physical education as an important part of school physical education, which plays a very important role in school sports. It is still the important stage for people to accept the most systematic and standardized physical education, and develops their self-learning lifelong sports consciousness and self-training ability. But for some reason, Universities' physical education has never reached its setting goals. Neither did the Universities' physical education cultivated students' lifelong sports interests nor improved students' physical healthiness, whose strength, endurance and explosiveness are keep declining, while the middle school students' physical healthiness is stop declining. So how to promote students extracurricular exercise passion though physical education class, and then improving students' physical health and lifelong exercise awareness becomes a social focus. In addition, the survey showed that during a whole semester's table tennis curriculum, students' favourite part was the class teaching competition near final exam. Students pointed out that the competition could make them know their technological advances and shortcomings, while experienced the playing fun and make new friends. Therefore, students hope that the university could organize similar game competition regularly in university, and provide more opportunities and better platform for them to take part in extracurricular exercise. Moreover, the Chinese Table Tennis Association introduced the table tennis rating processing system from USA in 2006, which provided a great platform for recording race results and promote amateur table tennis players' enthusiasm in taking part in amateur tournaments. Base on the above background, the author take the chance of universities promotion on students participation in exercise, introduced the China-TT table tennis rating tournaments for the first time, and using literature, expert interviews, questionnaires methods analyse Tsinghua universities' 4 times of China-TT table tennis rating tournaments, to investigate the feasibility of table tennis rating tournaments in universities and then provide some reference for universities holding students' extracurricular competition. Conclusions: 1) Most students support holing rating torments regularly, but universities should pay more attention to evacuate channels to publicize China-TT rating torments among students to stimulate more students participate in rating torments. 2) For signing up, organizers need actively guide students from original text messaging we chat, telephone and e-mails to formerly register on kaiqiu.com to enhance students' understanding of the points race; 3) Universities should consider its equipment, places, students and so on, set a reasonable way and race ranking methods to promote students participation in extracurricular exercise. Recommendation: Universities need to further provide the venue, facilities and other hardware guarantee, and then expand to other popular sports competitions, developing appropriate policies to encourage student's participation in sporting events, finally promoting student participation in extracurricular physical exercise enthusiasm.

Key words: *colleges and universities, table tennis point's race, China-TT,*

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ANALYSIS OF TECHNIQUE AND TACTIC FEATURE OF CHINESE EXCELLENT FEMALE TABLE TENNIS PLAYER - DING NING

Abstract

Introduction

With the rapid development of the competitive level of table tennis, the research on Technique and Tactic features have been developed in a more innovative and broader way. Only by doing research and knowing the discipline of table tennis can female table tennis player's rank at the top of the world. Among all the Chinese female table tennis players at present, Ding Ning is the only one with left hand-shake grip. Due to her comprehensive technique, the paper took her as the example. This paper analysed the scoring rate and usage on her stage of attack after service, attack after receive and stalemate in her competitions. It summarized the advantages and disadvantages of her in competition in order to provide some reference for training and competition in the future.

Methods

Logical analysis, video observation, mathematical statistics were used in this paper. Three matches were analysed of Ding Ning: versus Hu Melek in the eight final, versus Ishikawa Kasumi in the semi-final and versus Li Xiaoxia in the final of the 2014 Woman's Table Tennis World Cup.

Results

In the phase of attack after service, Ding Ning's main service was forehand standing service and most in middle short, supplementing with cross half long and down straight quick shot. Backhand attack was her main technique for the third stroke. In the phase of attack after receive, Ding Ning were for control especially forehand push linked with wonderful forth stroke that ensuring her high scoring rate and usage. In the stalemate phase, her backhand scoring rate always maintained at a high level due to her long rally attack and colourful placement. Because of her strong defence ability and good rhythm, Ding Ning could turn the disadvantage into advantage easily.

Conclusions and Suggestions

In the phase of attack after service, Ding Ning's service method was quite rare which should be expanded particularly on spin and placement. And her third stroke's quality should be improved, aiming to build a perfect service-attacking system. In the Receiving period, Ding Ning used control most but lower quality of her forth stroke which should be improved. In the stalemate phase, Ding Ning was mainly scored by rhythm and placement. Even she was good at defence but the scoring rate was not ideal. So Ding Ning should strengthen her initiative attacking and variety in this phase.

Key words: *table tennis, Ding Ning, technique and tactic*

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EXPLORATION AND RESEARCH ON PROMOTING INTERNATIONAL DEVELOPMENT OF TABLE TENNIS

Abstract

Among so many sports in the world, little changes have been taken in game rules, sports field and equipment for some sports since their existence. But there are still constant changes and improvement for some sports, in order to promote their entertainment, antagonism and equality in games, and to push their development and inheritance. Giving an example of table tennis, its rackets derived from the original parchment-made ones to the ones with carbon that we use today; and the ball, which was once made of cork, now turned to seamless plastic ones. Besides, the skills and techniques used in games also developed and differentiated comparing the old time when we used "bare rackets"(the one with no rubber-cover), to nowadays that different kinds of skills emerge along with all kinds of rubber-cover, and just as the saying goes, "all kinds of flowers blossom at the same time". All in all, table tennis has been changing and developing through time. However, giving the fact that the number of people who are in favour of this sport and those who work on this field are rapidly declining nowadays, together with the factor that a few countries are holding all the medals in hand in this field, it might lose its present status in the Olympic Games and even might be kicked out from Olympics family.

In order to prevent the above conditions from happening, contributions should be made for the development of table tennis from every "powerful country" (countries that are famous for and good at this sport). This is a responsibility as well as an obligation for these countries. China, as a member of them, has always been working on the promotion and development in this sport, such as sending high-level athletes to other countries, "wolf-raising" plan, the third-time entrepreneurship, and so on. But all these efforts still couldn't change the present situation that there's only one big power controlling this field.

If we get to change the present condition, on the one hand, those "powerful countries" should yield their core techniques and methods in training, in order to promote the globalization of table tennis; on the other hand, there should be a revolution on game rules, sports field and equipment. We should keep the consistency in the equipment, especially the consistency in all kinds of rubber-covers. Because of the deduction of number of table tennis lovers, there are even fewer professional trainers; thus, for those countries where few people get professional training, they often find it hard to take training dealing with all kinds of techniques and skills, and naturally feel nothing to do when competing with players using special skills and techniques in games. On the contrary, some countries where more people get professional training and those "powerful countries" in table tennis are usually equipped with all these different types of techniques and skills, and the athletes of different types or skills can often take training and have competitions together. In this way, they gain better familiarity and adaptation and thus have more possibility in winning medals. In the long run, only as athletes from more counties in the world getting medals can this sport gain more popularity and involvement, inspiring people's interest in training and taking competitions. For the prosperity and constant development in table tennis, we can take explorations and researches from the following aspects, which might help to work out this problem.

(1) The "powerful countries" in table tennis should take responsibility on yielding their core techniques and methods in training;

(2) To keep consistency in table tennis equipment and the rubber-covers;

(3) We can have games held specially and dividedly for different types of athletes, and then have the final game among different types, so as to differentiate gold, silver and bronze medal;

(4) We can also have games in which "almighty athletes" (athletes who are supposed to manage all these type and skills) compete with each other in every specific type and skill.

Key words: *promotion, table tennis, globalization, development*

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COMPARISON ANALYSIS OF CHINA, JAPAN, CHINESE TAIPEI AND GERMANY'S TABLE-TENNIS TECHNIQUE AND TACTICAL

Abstract

Technique and tactics plays a vital role in winning table tennis, and therefore predecessors have done lots of researches on that. But their research mainly focused on individual elite athletes, the rules change impact on tennis technique and tactics or the contrast of different country's elite athletes' tactic, few studies analysed the countries overall technique and tactical characteristics, strengths and weaknesses. In addition, the Chinese men's team un-doubtfully considered as the No 1. Chinese Taipei, which broke into the 2013 World Cup team finals, and achieved a breakthrough in 2014. They won the 2014 World Championships medals for the first time. The Japanese team entered into semi-finals for 4 consecutive times, becoming a major force in world table tennis. The Germany, which is the champion of European, they entered into the World Championships finals consecutively, showing superior strength. China, Japan, Chinese Taipei and Germany are considered to be the world's most powerful country in table tennis. So what's their difference in the use of technique and tactic, what their strengths and weaknesses? Based on this, the article using video and statistical methods analysed Tokyo 2014 World Table Tennis Team semi-finals and finals, exploring their technique and tactic differences, advantages and disadvantages, to provide reference for their further training. **Results**: 1) In general, four countries have shown to accelerate the pace of the game, the struggling focus concentrated on 1-5planks, and rally is dropping; Backhand techniques are improved but look for opportunities to use forehand and sideways is still the key to win; During serve and attack phase, based on serve and then connected serving with 3.5 planks for consecutive attack is the trend. For receive and attack phase, attack directly on the 2nd plank is the trend, but using attack and push reasonably is still key to win. For 7.8 planks rally, it is the ability of rally, not the tactic is the key to win. 2) China, Japan and Chinese Taipei are significantly better than German in serve and attack phase. Chinese 2nd plank's short pushing and forehand attack is better than Japan, Taiwan and Germany, the latter three are close. The Chinese team is not so strong in their backhand. During rally, China and Germany are close, which significantly better than Japanese and Chinese Taipei; 3) 3,5 and 4,6 plank, China, Japan and Chinese Taipei have a strong sense of sideway attacking in dealing with backhand balls, but Japan and Chinese Taipei is not good at scoring during sideway attacking. Germany is mainly backhand oriented. 4) On 7.8 plank rally, China and Germany is close, much better than Japan and Chinese Taipei. China is good at serving rally, but Germany is good at receiving rally.

Key words: *table tennis, technic and tactics, 2014 Tokyo world table tennis*

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TECHNICAL-TACTICS ANALYSIS OF FANG BO'S VS CUI QINGLEI IN SELECTION FINALS OF WORLD CUP 2015

Abstract

Through literature methods, video observation and three-phase method, technical-tactics analysis of Fang Bo's vs Cui Qinglei in selection finals of World Cup 2015 has been conducted. The analysis of characters in serve-then-aggress part, receive-then-aggress part and rally part provides suggestions for Fang Bo's future training and competition. Study reveals that Fang Bo is active but not stable in serve-then-aggress part. In receive-then-aggress part and rally part, his scoring rate reaches excellent level although the utilization rate is low (21.4%). Fang Bo's strengths are in slash pulling of backhand, hand-made and both while his weakness is in hand-made and backhand defence. It has been suggested that Fang Bo should improve his stability and threatening in serve-then-aggress part and defence ability should be enhanced.

Key words: *competitive sports, table tennis, technical-tactics, Fang Bo, Cui Qinglei*

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ANALYSIS ON TECHNOLOGY AND TACTICS OF CHINESE ELITE TABLE TENNIS CHOP PLAYER WU YANG

Abstract

1 Purpose

In order to improve the promotion level of table tennis in the world, the ITTF made some changes to the rules, which brought opportunities for the further development to the chop play. After years of hard work, Chinese Table Tennis Chop player Wu Yang won the gold medal at the 2013 World Cup group match, which created history of the first Chinese chop player took part in the world's group of final in 34 years. Through the study on technology and tactics of Wu Yang in the important match, to provide a reference for the development of the world women's chop play.

2 Methods

Video observation; three phases' statistics; mathematical statistics.

3 Results and discussion

3.1 Technology analysis

Table 1 Forehand and backhand technology use conditions Unit:%

Players	Forehand use rate	Forehand scoring rate	Back hand use rate	Backhand scoring rate
Feng Tianwei	54.8	51.3	45.2	58.7
Liu Shiwen	44.4	33.9	55.6	25.4
Zhu Yuling	52.6	37.4	47.4	80.6
Li Xiaoxia	40.6	55.5	59.4	29.8
Ding Ning	51.6	48.2	48.4	48.4
Mean	48.8	45.3	51.2	48.6

From table 1, forehand, backhand use rate (P=0.55) and scoring rate (P=0.77) are very close, and there is no significant difference.

3.2 Tactics analysis

3.2.1 Analysis on phases of attack after service

Table 2 Comparisons on winning and lost sets in attack after service phases

	Use rate of attack after service %		Scoring rate of attack after service %	
	Winning sets	Lost sets	Winning sets	Lost sets
Mean	9.9	13.8	51.9	63.9
Standard deviation	6.9	6.0	43.7	33.0
P	0.19		0.50	

From table 2, mean of use rate and scoring rate of attack after service in lost sets are both higher than in winning sets, but there is no significant difference.

3.2.2 Analysis on phases of attack after receive

Table 3 Comparisons on winning and lost sets in attack after receive phases

	Use rate of attack after receive %		Scoring rate of attack after receive %	
	Winning sets	Lost sets	Winning sets	Lost sets
Mean	16.4	17.0	58.7	52.9
Standard deviation	9.2	8.5	34.2	36.4
P	0.73		0.80	

From table 3, there is no significant difference between use rate and scoring rate of attack after receive, Wu Yang's attack after receive tactics and two-four connecting techniques play stably.

3.2.3 Analysis on phases of confrontations

Table 4 Comparisons on winning and lost sets in confrontations phases

	Use rate of confrontations %		Scoring rate of confrontations %	
	Winning sets	Lost sets	Winning sets	Lost sets
Mean	73.7	69.2	53.9	29.2
Standard deviation	12.2	11.2	11.1	12.1
P	0.88		0.00	

From table 4, the scoring rate of confrontations determines the outcome of the game largely.

4 Conclusions

(1) Wu Yang's forehand and backhand use rate are balanced, and both have a strong ability to attack, forehand loop and backhand strikes are main methods. In chop technology, Wu Yang's backhand chop technology is stable and spin change is plentiful, but forehand chop technology is weak, through backhand chop and attack of forehand and backhand, Wu Yang makes up for the lack of forehand chop.

(2) In the attack after service and attack after receive, Wu Yang's use rate is low and scoring rate is high, in the confrontations Wu Yang's use rate is high and scoring rate is low, Wu Yang not only has good ability of attack after service but also has good ability of attack after receive, abundant attack tactics in the pre three hit makes opponent larger psychological pressure. But in the confrontations, Wu Yang's chop is not so steady, at the same time, too much drive and attack make the opponent can adapt easily and reduce the scoring rate of counter attack in the chop.

Key words: *table tennis, chop, Wu Yang, technology and tactics*

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RESEARCH ON IMPROVING UMPIRES'OFFICIATING LEVEL

Abstract

Research purposes: Nowadays, sports fans have much more needs to be satisfied as they have better taste in sports. At the same time, they have much more choices in a much more competitive sports market. Therefore, to keep the fans of Table Tennis and further promote this sport, optimal management is urgently required. This paper, taking umpires as the research point of view, through the investigation, analyses the current deficiency of management in the competition of Table Tennis under the background of more intense competition, new competition rules, quick emergence of new technique and tactics, and increased fans requirements, as well as presents countermeasures to achieve optimal management with umpires' efforts on management.

Research methods: Literature review and Expert interview.

Results and discussion: The study found two aspects need to be improved. Firstly, the current problems in operation of Table Tennis competition: umpires' judgment on match facts may not be accurate; umpires' judgment on match facts lack of consistency; the competition continuity is not ideal. Secondly, the basic work requirements of umpires focus more on procedures than management effectiveness; Requirements on umpires' work ability focus on the accurate judgment to match facts, rather than emphasizing the function of the administration.

Countermeasures to achieve optimal management: Firstly, the umpires' self-management. With proper umpires' self-management before, during and after the match, the match can be more fair and attractive. Secondly, umpires' improved management on the environment. Umpires can use instruments for monitoring the match environment to create good atmosphere. Umpires can enhance management on the man-made factors which interfere with the match. Umpires can improve management on the time factor, which can improve continuity of the match. Thirdly, umpires' improvement of management on match order includes two aspects: before and after a match. Management can ensure the match start and progress smoothly without any delay and problems.

Conclusions: Umpires can make more efforts on self-management and management related to the aspects of time, space and events before, during and after match, which can improve the fairness and ornamental value of the Table Tennis competition. This paper researches on the umpires' responsibilities of management prescribed by 'Handbook for Match Officials', and proposes some extension of those responsibilities not definite in Handbook combining with the practical situation in competition. But these proposals have not been tested in competition, and satisfaction survey has not been made among players and coaches. Therefore, this study needs further investigation to confirm it.

Key words: *table tennis, umpires, optimization management*

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ANALYSIS OF TECHNICAL AND CULTURE RACQUET SPORTS TO CHINA

Abstract

1, the purpose of the study: This article analysed the racquet sports from the technical theory of culture angle. In this paper, based on the carding of technology and culture of the racquet sports, analysis the relationship between sports technology innovation, transfer and cultural innovation, friction, provide the inspiration and reference for other project success.

2, method of research:

2.1 Literature:

2.2 interviews:

3, results and discussion:

3.1 The relationship between the technology and culture: technology is a kind of culture, culture is also a kind of technology, technology and culture are not opposite to each other, but interact with each other.

3.2 The racquet sports technology and cultural development situation of china: table tennis as a case

3.2.1 Technology transfer and culture friction of table tennis:

Technology transfers advanced, system and idea transfer legged, and cultural friction was generated. Absorption of foreign technology cannot blindly overall introduction, must implement the localization or nationalization of foreign technology, to meet the requirement of this system. This is the key to the success of China's table tennis.

3.2.2 Table tennis technical innovation and cultural innovation:

Table tennis technology in development unifies our country system and awareness of the concept of innovation, a large number of unique technologies, which is the key to keep the lead.

4, the research conclusion:

The developments of technology and culture racquet sports are closely related. The transfer of technology and innovation should fully consider the cultural innovation and friction.

Key words: *racquet sports, technology and culture, analysis of technical culture*

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THE ANALYSIS OF THE CURRENT SITUATION AND RESEARCH ON DEVELOPMENT STRATEGY OF WORLDWIDE TABLE TENNIS PATTERN

Abstract

For a long time, worldwide table tennis pattern that "Asia is the center of gravity, East Asia is the axis, China is the core" has not changed. China, as the messenger of table tennis, has the responsibility and obligation to popularize it all over the world. We do an analysis of the current situation and research on development strategy of worldwide table tennis pattern by literature and logic analysis. The study came to that discuss: (1) Because China has always been the first in the world table tennis competition, resulting in lack of suspense in the table tennis. Table tennis has encountered a "red light" in the promotion all over the world. (2)to deal with the problem, China has taken a series of measures, such as "Olympic losing weight plan," "Raising wolves plan," "Overseas aid program" etc.(3)In 2013,it showed that a series of initiatives in China began to take effect when we got the top three in the men's World Team Championship in Egypt. The study came to the suggestions: (1) We need to continue increasing the breadth and depth of "Raising wolves plan," "Overseas aid program". (2) China needs to create Chinese table tennis "NBA". We need to strengthen ties with other countries in the world by the Chinese Table Tennis Club and League. (3)We should strengthen the study of table tennis culture and its promotion all over the world, treating China Table Tennis Academy as a platform.(4)All countries in the world should admit China with an open attitude, learn from China and surpass China eventually in order to continue to maintain competition and development of table tennis.

Key words: *table tennis, situation analysis, development strategy*

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TECHNICAL AND TACTICAL ANALYSIS ON YUTO MURAMATSU VS FAN ZHENGDONG IN FINAL MATCH AT 2014 YOUTH OLYMPIC GAMES

Abstract

17-years-old Yuto Muramatsu was runner-up at the 2014 Youth Olympic Games. Yuto Muramatsu won one game of Zhang Jike in the 2014 Asian Games team competition. He also has a good performance in the 2014 World Junior Table Tennis Championships. He is a chopper star in Japan. The technical and tactic of Yuto Muramatsu in the final match at 2014 Youth Olympic Games was analysed by the classic three-phase method and the Simi Scout technical and tactical analysis software. The purpose of this study was to provide a reference for Chinese table tennis players. The main results were shown in table 1.

Table 1 the data of three-phase

	Score	Lose points	Subtotal	Usage	Scoring rate
Serve and attack phase	12	6	18	16.5%	66.7%
Receive and attack phase	10	9	19	17.4%	52.6%
Rally phase	25	47	72	66.1%	34.7%
Subtotal	47	62	109	100.0%	43.1%

The main conclusions were as followings:

(1) Yuto Muramatsu's serve had high quality. The drop point and rotation of the ball had a lot of changes. His serve was mainly at the backhand half-length court and long serve, combined with forehand deviation centerline short serve. He had some ability to attack after serve.

(2)His Receive used backhand chopping technique more, chop long and short less. The drop point of receive was mainly in the opponent's backhand.

(3) Yuto Muramatsu had ability to change defensive to attack with huge threat of force in rally phase, which made him score directly, but error rate was high. His backhand chopping defensive was good, and forehand rally ability is poor.

Key words: *chop, technical and tactical analysis, Yuto Muramatsu, three phase method*

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TO INVESTIGATE THE IMPORTANCE OF THE "HAWK EYE" TECHNOLOGY FOR THE DEVELOPMENT OF TABLE TENNIS EVENT

Abstract

The competition is getting fierce sports, table tennis as well. On the one hand with the people to watch the level is rising, fair and equitable outcome of the game put forward higher requirements; On the other hand the athletes in the field of physical breakthrough, the speed of transcendence, the field of training had, desire for farness and impartiality of the award be more. Hawk technology eye early 2001 when it won the British invention of the scientific and technological revolution prize awarded, this equipment is very sophisticated, from sorting data to demonstrate the results of the whole process takes no longer than 10s, the resolution can be as high as 99.9 percent, so science the use of technology to better promote the development of table tennis. The research purpose of this paper is introducing hawk eye technology table tennis event, as auxiliary means of penalty, to ensure fair competition. Hawkeye technology, not only in the assistant referee of the cutting process to make clear, accurate decisions, and the development of table tennis will play a very active role in promoting, at the same time also is hard to be engaged in training of table tennis players a recognition and respect. This article mainly with literature method, interview method, investigation method, logic analysis and other research methods, respectively from the characteristics of table tennis itself needs and the needs of the athletes, referees work three aspects to discuss the table tennis the importance of using hawk eye technology in the big games. In 2008 Beijing Olympic Games, is the introduction of the first large-scale hawk eye technology, visible, hawk eye technology to the necessity of the fair and just competition. This paper, from the two aspects are discussed, the results prove that the introduction of hawk eye technology not only increases the fairness and impartiality of the table tennis competition, and improve the sport view and admire a gender, also let the audience from the microscopic details of table tennis competition, the television reached a new stage. However, there are some shortcomings: the introduction of Hawkeye technology not only hindered the game fluency, but also affected the movement of rhythm Referees authority and athletes, while Hawkeye equipment rental fee is very high. Findings prove that the introduction of Hawkeye technology has its rationality, will promote the development of table tennis. However, the use of technology for Hawk eye to avoid weaknesses, to make it more rational use of table tennis event.

Key words: *Hawk Eye technology, table tennis event, development*

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THE TABLE TENNIS MATCH USING THE LEFT AND RIGHT HAND EXCHANGE PLAY TECHNOLOGY FEASIBILITY ANALYSIS

Abstract

Objective to study the table tennis match use left hand to play in the existing technology exchange and the advantages of using this technology should pay attention to the problems in a comprehensive analysis, for the table tennis match using this technology to provide reference.

The research methods of literature and data method

Results and discussion of left and right hand exchange advantage and use tactics about who should pay attention to the problem in hand play technology exchange

Backhand attack advantage in the game using the left and right hand exchange play technology to solve the backhand attack ability weak problem, all for the forehand in the game, forehand and backhand compared than is powerful, strong rotation, speed advantage, is conducive to building a complete offense.

The advantage of using line game about hand in hand to fight technology, because the left and right hand fired back in turn, the left and the right line and placement has the very big difference, stroke with single hand lines and placement of athletes have a certain law, and the left and right hand exchange play players hit the ball with the right and left hand batting line of different characteristics, letting the opponent is not easy to adapt to.

Rotation advantage left and right because of range on the contrary, the right hand turn ball, the direction of rotation of the ball has the very big difference, let the match result does not adapt, and will let the opponents difficult to identify effective coping methods in a very short period of time.

The technical and tactical response to the advantage of the left hand and the right hand exchange play athletes less, according to the left and right hand exchange play aspects of science research is less, and make research on coping tactics more athletes technology on the traditional unilateral, left and right hand exchange hit the athletes from the existing research results with its technical and tactical characteristics of targeted training.

The psychological advantage of table tennis match that most athletes were reacted with the side of the hand, while the left and right hand in hand make athletes, followed by the right and left hand back, the left hand and the right hand to play in the game players exchange less, once met each other in the line, placement, rotation is not easy to adapt, while the right hand exchange play players often and with hand side for athletes in the race, so it can dominate in the psychological.

Should pay attention to the problem

Fast switching hand problems normal people usually the side of the hand is beneficial in the process of hitting the racket, from the side of the exchange is beneficial to non-handedness, than to exchange athletes spend long time to hit points back, ball in table tennis match faster, if may appear right hand not skilled and haven't had time to exchange this one is over.

The pace of running around in the stroke with single hand athletes often batting in the running process, because the hand is relatively fixed relative pace of circuit is relatively fixed, while the right hand in the ball when the mobile equivalent to also become familiar with the two pace and line.

Conclusion the game using the left and right hand exchange play technology to solve the backhand attack ability weak problem in, batting, hitting line direction of rotation, psychological and technical and tactical response advantages, through the analysis of the use of table tennis match of left and right hand exchange play technology theory and practice, that game using the left and right hand exchange play technology feasibility.

Key words: *table tennis*

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ANALYSIS OF THE PSYCHOLOGICAL CHANGES OF TABLE TENNIS ATHLETES IN THE COMPETITION OF KEY POINTS

Abstract

For studying the psychological change of the table tennis athletes in colleges and universities influence on key points, distinguishing the influence species, being expected to affect the outcome, and collecting control method, so that for future tennis table tennis athletes in colleges and universities facing big psychological regulation, normal to do even better play to the technical level, thus make the athletes improve the key points in the game score probability, strive for more opportunities to win. This paper uses three kinds of methods: methods of literature, questionnaire, and interview method. The results showed that most of the literature and expert interview shows: table tennis athlete's psychological change in the game is divided into three kinds, namely, stable, very excited, anxious, stable state of mind is a kind of most favourable psychological state of the game, the influence of the corresponding key points are normal play a spectacular work may exist at the same time; Key points of the excited state of mind is prone to the influence of the two unstable state of play photographed and disorders play coexist; The influence of the corresponding key points will be anxious is adverse to the game's most often make disorders play a game. Questionnaire survey: had professional table tennis match training experience of experienced amateur athletes, athletes and appearances in the game to better regulate the psychological state, make oneself technology can maintain normal play, most of the time technology play a relatively stable; Amateur athletes or played less experienced players, usually in the game show who is very excited or nervous or anxious, cannot make their own movement technical level in the key points of the game are fully play, big game technical level is relatively stable enough. Conclusion is peace of athletes and stable performance, can ensure the normal order of the technical level of play, and put up the highest wins. Very excited when athletes to the games, self-expression desire is very strong, although sometimes tempers, but is not stable, technology easy to ups and downs, have a chance to win the key points, but the risk is very high. Athletes mentality when nervous, leads to technique using mechanical and stiff movements, low reaction rate of errors, thus extremely easy to lead to big loss of marks.

Key words: *table tennis competition, psychological changes, key points, psychological control*

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CONSUMPTION RESEARCH OF TABLE TENNIS IN CITY PUBLIC - TAKE CHANGSHA CITY AS AN EXAMPLE

Abstract

Research purpose: Since Rong Guotuan won the first world table tennis champion for China in 1959, table tennis in our country explorates and innovates continuously in the development of 50 years, it also has made proud achievements. So table tennis has become Chinese "national ball". There is a very large mass base for table tennis under the development of the "whole nation system" in the past. However, table tennis consumption share in the whole sports market is unsatisfactory, table tennis consumption is mainly dominated by real consumption. Urbanization process has brought opportunities for the development of table tennis, Changsha City where rises gradually in China central city is very representative. The paper will take investigation of the second sports and relative industries from the Changsha Municipal Sports Bureau in 2013, and the State Council issued a document on speeding up the development of sports industry and the several opinions on promoting sports consumer in 2014 as an opportunity. The paper will research table tennis consumption in Changsha city public as well as explore the table tennis consumption level of the Changsha, and find questions in table tennis consumption. So then providing the reference for the government and table tennis enterprises.

Research methods: It investigates enthusiast consumers of table tennis in Changsha City through applying following methods in this survey: the methods of literature, questionnaire survey method, expert interview method, data statistics method.

Results and discussion: The results show that the current level of table tennis ball consumption in Changsha City is low; men consumers are more than women; it appears "polarization" in the consumer age; table tennis venue is less and its distribution is uneven in Changsha City, which lead to be unable to meet the growing demand of table tennis enthusiasts. Besides, it is not enough for functional departments to guide table tennis consumer. What`s more, the enterprise publicity and sales models of table tennis need to be improved.

Conclusion: The functional departments should strengthen the guidance, and cooperate with the enterprise actively, as well as held various events at all levels, thereby pushing forward influence of table tennis exercise. Also they should change consumption awareness of the table tennis enthusiasts, and increase the establishment of. Meanwhile, the layout should promote distribution of table tennis venues to be rationalization and meet the demands of majority of table tennis enthusiasts. What`s more, table tennis enterprises should strengthen their own construction and the power of propaganda, also they need to extend sales channels and improve the quality of service.

Key words: *table tennis, consumption, Changsha*

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THE ANALYSIS OF FAN ZHENDONG TACTICS AT THE SUZHOU WORLD CHAMPIONSHIPS IN 2015

Abstract

Research purposes: Fan Zhendong, the head men of Chinese table tennis team players, his method of Cenozoic horizontal position attack fighting is typical in the table tennis of world. He wins the first victory at Straight to Suzhou World Championships trials in 2015, and gets the first piece of tickets at Straight to Suzhou World Championships. It lets all the people praise him greatly. But the Chinese table tennis coach Liu Guoliang said that we cannot judge an athlete by virtue of one time or a certain stage performance after the game. There is a big gap between Fan Zhendong and "Kelong", mainly reflected in the big competition experience [1]. What`s more, the general competition is not equal to the world one. That all kinds of competition results and the different forms will influence athletes to exert their technologies. It provides the reference for the upcoming Suzhou world table tennis technical and tactical application in 2015 through the study of Fan Zhendong tactics application at Straight to Suzhou World Championships, summarizing and analysing the situation of grasping individual skills and tactics, understanding effective means of scoring and reasons of losing points by the use of technology.

Research methods: The paper make a statistical analysis toward Fan Zhendong`s technology and tact at Straight to Suzhou World Table Tennis Competition by using the following ways: video observation method, the literature data method, three sections of statistics.

Results: 1 Fan Zhendong serves a ball mainly through serving a short ball to the other side with reverse rotation, the power of rotation is not enough, change of placement is less. Receiving and serving a ball mainly rely on the technology of using backhand to screw ball, and he grad and attack actively as well as his placement control is nice. 2 His third plate about Assaults and Backhand Attacking skill are adept, so scoring rate is higher, but the forehand attack and control are not enough to cause a threat toward the opponent, as well as technology of serving and grabbing a ball has yet to be strengthened. 3 The fourth plate still uses more technology of using backhand to screw a ball along with the forehand attack and sideways attack under the good control of receiving and serving a ball. 4 The backhand attack is the most important means of assaulting in a stalemate, the pace is sensitive, place returns quickly, cohesion ability is strong, line control is better. It can control force and rotation well in stalemate process, but it is lack of stability.

Conclusions: 1 Fan Zhendong should rich his own methods and quality to serve a ball, strengthen the service and placement change as well as rotation strength. Also he should be ready for his own assaults the tactics of adjusting right and pressing left. 2 Fan Zhendong need to upgrade continuously the quality of receiving and serving a ball by using backhand to screw ball from inside, to improve and perfect forehand technology, to increase appropriately other technology of receiving and serving, such as: forehand and choose to fight, dazzle and skimming technology. 3 He should improve the stability of his offensive in stalemate stage and the stalemate ability at middle and far stage as well as conversion ability of attacking and defending. His tactics should be based on the forehand breakthrough and supplemented by using the backhand to screw as well as pull.

Key words: *table tennis, Fan Zhendong, tactics*

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PRIMING EFFECT IN PLACEMENT ANTICIPATION OF TABLE TENNIS SERVICE

Abstract

This paper used temporal occlusion paradigm and priming paradigm to investigate the priming differences between table tennis players and undergraduates in moderate amount of information for priming stimuli condition. The results showed that there was a significant priming difference between consistency in priming and target stimuli in players. The priming stimuli speeded up the players' reaction to target stimuli when two stimuli were concordant, otherwise it was not. There was no significant difference between two consistency conditions in common undergraduate participants. Moreover, the paper is designed to explore the differences of these two groups of subjects' priming effect between the consistency in priming and target stimuli when there were three kinds of information amount of priming stimuli. The results showed that in players there was no significant difference when the information was poor. While the information was moderate or rich, there was a significant difference. In undergraduates, only when the information was rich, there was a significant difference.

Key words: *table tennis player, placement anticipation, priming effect, automatic processing*

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THE EFFECT OF MATCH IMPORTANCE ON MENTAL STATE OF ELITE CHINESE TABLE TENNIS ATHLETES DURING COMPETITION

Abstract

Analysis of the high-level athletes' mental state during match is one of the important tasks of sport psychology research. However, because of the limit of competition rules, researchers can't give psychological tests during matches, but retrieve some questionnaires or interviews before or after matches, which can be very subjective. Positive mental state enable athletes to score consecutively or bring about a turnabout during the dynamic and changeable match, whereas negative one on the contrary. Studies have shown that score-based cubic spline interpolation function and fitting analysis validly reveal the mental state of table tennis athletes during competition. Real scores of four elite athletes in last three years' primary and secondary competitions have been applied to draw score curves for disclosing how match grade impact the mental state of elite athletes. The results show the importance of table tennis competitions (three world tournaments: Olympic Games, World Table Tennis Championships and World Cup) have varied effects on the mental state of different elite athletes. Some elite athletes were able to take use of the opportunity and have an extraordinary performance, while the others showed obvious fluctuation. In addition, athletes also showed differences of mental state among different phases. According to the present study, score-based curve-fitting analysis shows valid discriminability to athletes' mental state during matched; Case analysis can serve the purpose of providing specific guidance to researchers and coaches. In conclusion, specific mental training proposal based on score analysis will improve athletes' capacity to handle mental stress in major competitions.

Key words: *match importance, mental state, score, cubic spline interpolation function*

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EXCELLENT TABLE TENNIS ATHLETES DING, FENG IN THE GAME TACTICS RESEARCH

Abstract

There is a research for two outstanding table tennis woman players one is Ning Ding from China, the other is Tianwei Feng from Singapore, which applied "three-stage assessment method" and the double moving average probability of winning. the research involved the state of the technical and tactical game features of two players and the analysis results showed that: (1) Dinning is aggressive initially, which can help her quickly enter the competitive state in the beginning stages, and with the high stability of the game state determine her as a game-type player; (2) Feng Tianwei started attacking consciousness is strong, strong sense of oppression to the opponent will often at the beginning of the game, can achieve the best competitive state in the middle of the race, but the key stage of the game state is usually in a ball the reference line, this may be one of the main causes of her in the past few years not in the World Series in the excellent results achieved.

Key words: *table tennis, Ding Ning, Feng Tianwei, competitive state ups and downs*

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THE TECHNICAL AND TACTIAL ANALYSIS ABOUT JAPANESE EXCELLENT TABLE TENNIS PLAYER ISHIKAWA KASUMI

Abstract

1.1 The purpose of the study

Overview of the world women's table tennis, table tennis China hegemony still unmanned can shake the world table tennis, the pattern has been developed into a China as the center, in Asia as the center of gravity of the situation. While in the Asian table tennis, energy and Chinese team initiates contend includes the traditional strong teams of Japan.

The Japanese team in the process of historical development of table tennis is a huge contribution, once with sponge bat and COSCO director pumping type forehand dominated in the international table tennis game also be in fashion in one's time. So have a fine tradition of Japanese table tennis never lack of table tennis players in good. Also see, from the early Japanese table tennis is known as the star of hope Ai Fukuhara, and now Ishikawa Kasumi, by contrast, Ishikawa Kasumi's age is more obvious advantages, technical expertise is more comprehensive, more prominent. In 2015 a new world of women table tennis players ranked Ishikawa Kasumi fourth in the rankings to create the highest ranking Japanese women's table tennis.

I believe that with the growth of Ishikawa Kasumi, elite athletes in the technical stability of mature, she is bound to cause a strong impact on China female Ping-Pong. So the research on the video game Ishikawa Kasumi by the author, with a view to China's table tennis team to provide some pertinent materials.

1.2 Research method

This article uses the literature material, technical and tactical characteristics of Ishikawa Kasumi's video observation and mathematical analysis method research.

1.3 Results and discussion

Through the statistics of video of Ishikawa Kasumi in 2013-2015 world table tennis cup and the World Table Tennis Championships in the world championships 4 game analysis, obtains Ishikawa Kasumi's hair steals the scoring rate of discord rate is not ideal, then grab the scoring rate and utilization rate of fine, stalemate scoring rate was not high but very high utilization rate.

Through the analysis of Ishikawa Kasumi's serve and serve attack to improve the quality, which may be directly related to receive high quality and China team. Service need more spin and placement change; Ishikawa Kasumi on the service had positive, hard, dare to use, and is the main means of scoring, the team should pay more attention to this. Although Ishikawa in stalemate scoring rate is not high, but its capacity in stalemate cannot be overlooked, if in the future Ishikawa Kasumi in training to improve the ball back to the quality and stability of stalemate, certainly will become the main means of scoring.

1.4 Research conclusion

1.4.1 In the game with Ishikawa, then serve the overhand must segment, changes in the case of ensuring the quality of active pursuit of placement and the change of rhythm.

1.4.2 In our team serve must serve in the rotation, position, rhythm change constantly, let her not to use high quality, forced her to receive serve multipurpose rubbing connection or passive to use, in the reduction of connecting rob segment advantage. In our serve fully do "a third connection" preparations, assaults consciousness strengthen serve.

1.4.3 The stalemate Ishikawa in the process speed is its advantage, but the strength, and the line change is its weakness, stalemate in the forehand mistakes in the initiative, can choose the pressing backhand down the forehand tactics.

Key words: *Japan, table tennis, Ishikawa Kasumi, analysis of technical and tactical characteristics*

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AN EXPLORATION OF THE INTERNATIONAL POPULARIZATION OF THE TABLE TENNIS GRADING SYSTEM

Abstract

Research Objectives: Grading system, a hierarchical system used to evaluate the professional level of the sports players and learners, stimulates the upper level practice by setting up practice goals and standards for the players, and promotes the immediate popularization of the sports all over the world. Currently, China makes an exploration and practice in evaluating the sportsman technique level with the grading system, which achieves a good result. This paper tries to analyse the methods and strategies used in the international promotion of the table tennis grading system, expecting to provide help for the boom and development of the table tennis sport around the globe.

Research Approaches: This paper employs documentation, expert interview, comparison and contrast, logical analysis and some other methods. This paper proposes the international promotion channels and strategies of the table tennis grading system by analysing the current situation and significance of the grading system around the globe and demonstrating how to learn from the promotion experience of Chinese martial arts and Korean taekwondo.

Result and Discussion: (1) Table tennis grading system applies to the professional athletes as well as the amateur players. It is composed of 10 phases and divided into four grades; each grade from primary to advance having three phases, among which primary grade is of phase 1-3, intermediate grade is of phase 4-6, and advanced grade is of phase 7-9. Special grade phase 10 is of the honour rank, which is granted to the Olympic champions and winners of other worldwide competitions who make great contributions to the development of the table tennis cause. Candidates who enter any phase should pass the theory test and the basic technique test. To which phase the candidate should be upgraded is based on the group and the rank in which he/she takes the competition. (2) The significance of the international popularization of the table tennis includes the international publicity of the fitness value of the table tennis, increasing the Ping-Pang population, strengthening the development of the Ping-Pang talented people, and promoting the balanced and prosperous development of the sport of the table tennis. (3) The experience and enlightenment of the international popularization of the sports events include the following aspects: ① the strong support from the domestic policies; ② the important role of the international sports association and the establishment of the international popularization organization with sound structure; ③ the training of the talented personnel skilled at international popularization; ④ the set-up of the scientific and reasonable hierarchical evaluation system and the unified writing of the Chinese and English textbooks; ⑤ the utilization of the geographical advantage and the form of the “point to area” promotion situation; ⑥ paying attention to the publicity role of the communications and media.

Research Conclusion: The international popularization of the table tennis grading system requires the set-up of the macro strategy and the specific development goals, and based on that the formulation of a set of complete and concrete safeguard measures and promotion plans, ensuring the smooth implementation of the international popularization of the grading system. (1) Set up the international popularization organization. (2) Play the important role of the geographical advantage. The table tennis grading system should pay attention to and give play to the influence of the geo-advantage, promoting the gradual development from “point to area” meaning from a nation to a region, and then to a continent. (3) Cultivate actively the talented people skilled at international popularization. The skilled person should possess the professional knowledge and high ability and quality. The talented should not only have the strong athletic techniques, understand the Ping-Pang cultures, but also grasp the relevant international laws and regulations as well as the economic knowledge. (4) Pay attention to the writing of the international popularization textbooks. In the process of the writing, it should be noted that the operation procedures should be described and the requirements towards the operation procedures should be put forward. (5) Establish the standardized evaluating system. The influence of language, character and culture on the grading system test should be noted. (6) Put “celebrity effect” to good use and pay attention to the important roles of the media. We should learn from the experience that Ping-Pang star played an important role in popularizing Ping-Pang grading system in China and pay attention to the important role of the media, valuing the promotion and packaging of the international popularization of the table tennis grading system.

Key words: *table tennis, grading system, international popularization*

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RESEARCH ON MASS TABLE TENNIS LEVEL EVALUATION CRITERIA

Abstract

1. Research Objectives Sports Level Evaluation System encourages participants to continuously improve their skills and passion on exercise. It experienced trial and error, such as ranking system and continuously refined itself in a unique evaluating system. Table Tennis, an activity that has deep foundation in China, with simple equipment, quick-learning basic skills and easy rules, is an ideal choice for the representative of Sports Grading System establishment.

2. Research Approaches This paper applies literature review, Delphi method, experiments, mathematical statistics and other research method. Firstly, the primary evaluation criteria are proposed based on literature review and expert interviews. Next, the skill level evaluation system is determined by expert questionnaires, screening the primary evaluation criteria and empirically verifying the results, to determine the evaluation criteria and its weight factor, and establish the evaluation criteria system. The paper uses deviation method to assess sport level evaluation interval. Finally, it uses retrospective test within the system to empirically test the evaluation criteria.

3. Results and Discussions (1) 78% interviewed coaches and experts believe level evaluation system can be divided into three levels, namely low, moderate and high. 80% experts believe competitions are important reference index in level evaluation. (2) After three rounds of questionnaires from experts, with index optimization, the most important evaluation criteria in skill testing are, close table forehand attack the ball, block backhand, backhand chop, left push and right attack, block flutter sideways and competitions. (3) Index weight determination: Competition weight adopts the experts assign value method. By several rounds of experts' discussions and amendments, the weight is determined. Other index weight is set up by KMO value and Bartlett spherically tests to analyse out the results that are suitable for factor analysis. Then, it uses principle component analysis to obtain factor-loading matrix and determine every index weight. Among them, close table forehand attack the ball is 15%, block backhand is 14%, backhand chop is 12%, left push and right attack is19%, block flutter sideways is 20% and 20% the competitions. (4) Apply K-S test in statistics to test normal distribution situation, and method of percentile to establish the evaluation criteria. It uses two spacing deviation on representative index to establish singe index evaluation criteria. (5) Use deviation method to evaluate sport level. That is, low level from 64 to 75, moderate level from 76 to 87, high level from 88 to 100. (6) Apply in sample retrospective test method on test subject, the relevant coefficient $r=0.79(P<0.01)$, which shows the evaluation results from the experts and coaches agree with the standard evaluation results.

4. Research Conclusion (1) In this study, based on experts and coaches questionnaires, the level evaluation standard is set to three levels, which are low, moderate and high.(2) This study, using primary screening, questionnaires screening, experts index optimization, statistics screening and so on, screens out the overall comprehensive evaluation index system, including close table forehand attack the ball, block backhand, backhand chop, left push and right attack, block flutter sideways and competitions.(3) Applying in sample retrospective test method verifies that this study is consistent with the coaches' and experts' objective evaluations.(4) Table tennis has complex play skills. Due to the limitation of objective reasons, this study doesn't take special playing styles into consideration. In addition, empirical test is lack of out sample retrospective test, which is to be improved in the future.

Key words: *table tennis, mass, evaluation criteria*

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A SURVEY RESEARCH ON PLAYING STYLES OF CHINESE EXCELLENT MALE JUVENILE TABLE TENNIS PLAYERS

Abstract

Employing the method of literature, field survey, mathematical statistics and so on, this paper investigated and analysed 72 athletes' playing styles assembled at the 2014 national table tennis training camp to reveal the current status, advantages and disadvantages of the Chinese table tennis reserve forces, and provide data support for the cultivation of reserve forces' on its balanced portion of playing styles. Conclusions are as follows:

1. From the ratio between two racket hands, right-handed players are higher than that of the left-handed players. For balanced development and coping with changed Olympic competition system, to form doubles pairs with greater edges, to achieve top prize in the team events, more talented left-handed players should be fostered.
2. Among the players in this training camp, the number of knife-holders is way larger than that of the pen-holders, a phenomenon which shall arouse the attention of departments concerned. Cultivating reserving forces is a dialectical process and repetitive circulation of practice and theoretical guidance. Thus coaches need to start when players are very young, start from racket-holding, guiding young players with scientific thoughts, bearing in mind the demand of sustainable development.
3. Racket coverings of players in this camp are polarized: pimples-in rubbers take predominant role, only a few players use out-pimpled rubbers; traditional Chinese out-pimpled playing style players are rare. In order to have players using various rubbers, a planned, ratio based cultivating protocol should be followed to train more out-pimpled players and provide them with more chances to take part in high level competitions, testing the edges of their playing styles so as to raise the general level of table tennis effectively.
4. Among the 72 players in this training camp, players who use pimple-in rubbers of both sides to create loops combined with quick attack are the dominant types of playing styles; chopping players and pen-holders of quick attack only take a small number. Thus, measures should be taken actively, fostering more pen-holders and chopping players so that domestic table tennis playing styles can be maintained and even developed.
5. While enforcing the "Project of Olympic Gold Medals", more players of Chinese traditional playing styles should be cultivated, maintaining and boosting a good developmental environment of "Hundreds flowers blossoming" for playing styles, enhancing the entire competence of Chinese youth reserving players.

Key words: *excellent table tennis athletes, youth training camp team, playing style*

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THE TECHNICAL AND TACTIC ANALYSIS OF ZHANG JIKE'S PERFORMANCE IN PARIS WORLD TABLE TENNIS CHAMPIONSHIPS — ZHANG JIKE VS BAUM PATRICK

Abstract

1. **Purpose:** Zhang Jike, the famous Chinese table tennis player, won the grand slam, when he has got the champions in 2011 World Championships, 2011 World Cup and 2012 London Olympics. Zhang performed extraordinary well in 2013 Paris World Championships and won the champion for men single. The study analysed Zhang's performance, trying to provide some scientific basis for his future technical and tactic training.

2. **Methods:** The study selected Zhang's 1 important matches in the championships in Paris - the quarter finals Zhang Jike vs Baum with a 4-1 score. By calculating the scoring rate and the utility rate of Zhang's first/third strike and second/fourth strike, as well as the rate trend, the study tried to analyse his technical and tactic practice.

3. **Results and Discussion**

(1) Zhang owned a strong spirit of winning in the matches, combined with a long duration of excitement point and comprehensive strength. During the process, he played the style of violent attack as well as the reason and patience. All of them contributed to his success.

(2) Zhang adopted inside out service to fit the back-top spin, which created opportunities for the attack after service in the third strike. He received with backhand twist pulling the ball to the opponent's side, which easily won the advantage and score accordingly. During the topspin confrontation, he changed the playing by adjusting the forehand and pressing backhand, in addition to the changes of spin and rhythm, thus he produced great pressure on the opponent.

(3) When meeting with strong resistance, Zhang tended to responded slowly, this could create difficulty for himself.

Key words: *table tennis, Zhang Jike, World Table Tennis Championships, technical and tactic analysis*

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FATIGUE RESEARCH ON SQUASH AND RECOVERY

Abstract

(Objective): The reason this study squash produce movement to analyse fatigue, explore methods and prevention squash fatigue after exercise fatigue recovery tools for scientific and rational squash and sports injury prevention reference. (Methods): In this paper, bibliometric analysis, documentation, content analysis, network retrieval, expert interviews, to explore the mechanism of exercise-induced fatigue problem with the mechanism, recovery methods and other aspects. (Results and discussion):Mechanism of sports fatigue (1) motion consumes ATP, slowing relaxation rate of muscle fibres, muscle power output decrease (2) motion to produce lactic acid, H + concentration, pH value decreased role in the relevant tissues, cells, causing muscle fibres muscle power, activity, sarcoplasmic reticulum Ca2 + uptake decreased weight (3) improper exercise and strenuous exercise causes an imbalance between oxygen free radicals and antioxidant system, causing extensive damage to cells and tissues and cause a variety of pathological disorders (4) long high-intensity exercise-induced fatigue and energy content of the material fall sports are highly correlated. Mechanism of sports fatigue (1) the accumulation of metabolic waste fatigue (2) activities required depletion substances (3) the ability to regulate and coordinate the imbalance. Scientific organization can effectively control the movement of the load squash fatigue. To improve sports fatigue recovery by means of physiological indicators to monitor demand squash player, can reasonably and effectively select the appropriate method to eliminate sports fatigue.(Conclusions):Our research on the movement of a lot of fatigue, few studies of squash, squash fatigue research is sorely lacking. Squash easy to produce sports fatigue, medical supervision should be strengthened. Improve and enhance the biomechanical testing instruments and equipment, and provide support for the monitoring of physiological indicators squash actively use help prevent fatigue and recovery in sports.

Key words: *squash, sports fatigue, recovery*

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VISUALIZED ANALYSIS ON THE RESEARCH STATUS OF TABLE TENNIS

Abstract

Objective: This study aim at sorting out the research papers to discuss the research status of table tennis.

Methods: With the aid of CiteSpace© software, based on Web of Science in ISI, using the methods of document data investment, knowledge visualization and word frequency analysis, this study analysed 196 relevant articles from Web Of Science(WOS) database by the number of papers published of a year, the scale of academic community, the prolific authors, research situation of countries and institutions, major publications and research direction to visually analyze on the research status of table tennis. All the data that we use come from the database of Web Of Science (WOS) (http://apps.webofknowledge.com) in the Institute for Scientific Information. Date last updated in 2015.01.26 which with "Table Tennis" or "Ping-Pang" for the keywords from 2005 to 2015 we download all the record format of the data in the linguistic type of "English" and literature type of "Article".

Results: The trend of the number in published papers has increased year by year from 9 in 2005 to 45 in 2014.The trend of the new authors has also increased. There are 9 researchers that publishing at least 5 articles. The 196 articles distribute in 41 countries, with China, France and German ranking the top 3 on the frequency in published papers. They get a frequency surpassing 20 and become the hard core in this area. USA has the highest burst, showing his active and breakthrough in this area. There are 196 institutions involving in the research of table tennis, including the top 3 of university of Hong Kong, Vrije Universiteit Amsterdam and Chinese academy of sciences. All the articles published in 98 different types of magazines and the main magazines are [Journal of Sports Sciences], [Perceptual and Motor Skills], [Human Movement Science], [International Journal Of Sport Psychology] and [Psychology Of Sport And Exercise]. The research areas of table tennis mainly focus on sport sciences, psychology and social sciences and so on.

Conclusion: The rapid increase of number in published papers and new authors shows the booming development trend of table tennis. Professor Poizat from sport sciences department, Universite De Nantes publishing the most papers becomes the core author in this area. China, France and German rank the top 3 on the frequency in published papers, so do university of Hong Kong, Vrije Universiteit Amsterdam and Chinese academy of sciences, showing their academic influence on the research of table tennis. USA increase rapidly on the frequency in published papers in addition. As we can see from the publication types and the research areas of table tennis that, the research on table tennis develop in the direction of diversification. The multi-knowledge crossed research has become one of the most important parts in the research of table tennis.

Key words: *table tennis*

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SMALL AND MEDIUM-SIZED CITIES IN OUR COUNTRY PUBLIC TENNIS DEVELOPMENT AND PROMOTION STRATEGY RESEARCH

Abstract

Research Objectives: Deep analysis of the factors, which restrict the development of the small and medium-sized cities public tennis development and promotion of ideas to the public.

Research Methods: By hownet database search related topics of literature in China, and access to a variety of the culture, the school tennis, tennis coaches and so on related literature, and carries on the collection and analysis of the system, and to provide necessary theoretical support and reference study.

Results and discussion: Factors influencing the mass tennis development and promotion of small and medium-sized cities are:

1. The local government departments lack of emphasis on tennis.
2. The people lack the basic knowledge and understanding of tennis.
3. The extreme lack of tennis primary and secondary school teachers, venues and equipment.
4. Tennis club is small, the lack of professional tennis coach, a single training method.
5. College tennis sports consumption is high; most of the student's consumption level cannot reach.
6. All kinds of tennis match number is little, form a single organization.

Research conclusion: According to the above factors public tennis development and promote countermeasures are put forward:

1. Local authorities should be fully aware of tennis fitness function, increase investment in tennis, to strengthen the construction of the tennis venue, venue management mainly non-profit.

2. Add tennis culture festival, increase media promotion, as well as the requirement of school physical education at all levels to join the tennis culture courses, make all kinds of people can fully understand and meet the function and value of sport, enhance people's identity to tennis.

3. Recycling the resources of facilities, such as basketball court can be reasonable renovation, speed up the popularization of tennis court. School invited professional tennis coach unity of physical education teacher's professional training, improve the level of tennis teaching of PE teachers.

4. Club changing management idea, change the management way. Unified professional training of tennis coach, learn more training method is discussed in this paper.

5. Reduce the charging standard of college tennis court, tennis equipment can adopt the way of cheap rental, reduce the cost of student learning. Sports institute tennis special raw as interim head coach of the tennis court, enable more students to the correct practice under the guidance of coaches.

6. According to the local in tennis, reasonable adjustment of tennis tournament organization, and increase the competition bonus credits, to attract the most tennis team to participate in the competition, increase the communication opportunities tennis player, so as to promote tennis technology improvement.

Key words: *the mass of tennis, development, promotion*

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STUDY ON THE MANAGEMENT STRATEGY OF LIAOCHENG CITY BADMINTON CLUB

Abstract

With the acceleration of the development of China's socialization process, China initiates all people body building movement vigorously at this stage, China's sports industry is about to enter the stage of vigorous development. Badminton is easy to learn and it's a good way to tone up your body, it can effectively improve the condition of cervical vertebra disease, which disease is generated by long-term work in front of a computer. Badminton is also for all ages and there is no strict limitation of the site, it has so many high quality characteristics. Badminton will be a rising star in Chinese sports industry.

In this paper, I was taking a three-tier city's badminton club as an example. The main research approach include: method of documents, method of field observation, method of questionnaire and so on. The research uses these methods to study the operating status of Liaocheng badminton club. This paper is deployed its investigation and study in many ways: the geographical distribution, operating status, venues and other hardware facilities, coaches and members.

The results show that Liaocheng badminton club are mostly private business, they are mainly with small scale, located in urban areas, with a membership-based mode of operation, operating efficiency generally good. But did not form a distinctive feature of the large badminton club, the study found the lack of effective promotion, single marketing means, physical fitness market is not perfect, the out-of-date management philosophy, a single project, the use of the site is not reasonable, and many other reasons makes the local badminton club faced with many problems in the process of development, and even some clubs on the verge of non-operating income.

In this paper, the writer made some targeted recommendations for Liaocheng badminton club in the status quo. Including strengthening the network management awareness of the club, increasing government attention of badminton industry, to improve the effective use of venues through planning the use of time, optimize the service quality of the club, the club's formation of a unique culture, increase propaganda in the sports consumer attitudes, detailed management information for members, enhance the coaches' teaching level, enhance the business level of managers and coaches and so on.

Throughout the academic researches, the directions of the badminton club's business strategy research are so many. There are some researches about badminton club in the first-tier and second tier cities in China, but not much on this small city, like the three-city. Due to geographical and urban different levels of economic development, the development of the country's badminton club has in common, but not the same. Hope this article has a little inspiration to the development of sport for all in China.

Key words: *table tennis*

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THE ANALYSIS OF CHINESE ELITE YOUTH MALE TABLE TENNIS PLAYERS' COMPETITIVE ABILITY DURING THE ASSEMBLE-TRAINING

Abstract

Through literature, video observation, questionnaires and other methods on young people training physical fitness, tactics, psychological to explore table tennis athletes' ability, in order to better train outstanding young table tennis players. Study the following conclusions:

1. Pay more attention to the quality and strength, while taking into account the all-round development of quality. In speed and strength training, a good grasp of power and speed in close contact, not with special detachment principle. In speed, agility, coordination, and explosive depend on strict with effectiveness of training.

2.the training of technical and tactical ability training hardly, strictly follow, starting from the actual combat to the basic technology as the core content of training improve the technical and tactical ability. Multi ball Dalian mainly to strengthen the backhand strong ability, inverse conversion serve forehand consecutive ability and stalemate confrontation ability. Multi ball training is mainly to strengthen the players serve and receive technology. Also the main running training and blind spots in a wide range of conversion shot abilities are cultivated, using multi ball training and strengthen the ability of fast running Chong backspin and nearly out marker half rotating anti-pull

3. From the competition situation, the youth of our country serves assaults and then grab the links are not solid foreign players. We should improve the youth players technical and tactical ability, especially embodies the initiative sent rob in the front board, receiving the stability and variability, control the tightness and recrimination. Strengthen the forehand running ability and continuous attack ability; improve the offense and defence conversion backhand and strong resistance ability. At the same time, strengthen the technical and tactical training in basic training to focus on style in adolescents.

4. The training around the main thinking of psychological no dead ends to take the pressure of training and anti-stress competitions to train the athletes' psychological quality. The psychological analysis of the key ball game, "Nan ping" youth players psychological quality is still not perfect, not in the circumstances behind the score or the pressure of competition and competition under the calm response.

5. Carry out cultural quality education is an important part of culture of youth athletic ability. The reasonable arrangement of the training content of culture teaching players benefit English learning but also ruled out the heavy learning and training conflict phenomenon.

Key words: *table tennis, youth, training period, athletic ability training*

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PROTECTION AND IMPROVEMENT PATH ON PENHOLD OFFENSIVE PLAY FOR ELITE FEMALE TABLE TENNIS PLAYERS IN CHINA

Abstract

The characteristics of penhold offensive play is "near-court and dexterous, quick draw and fast pull". It has developed that Chinese male potholders achieved excellent performance because of penhold backhand technology. In contrast, there are more less penhold offensive athletes and their performances are passable of Chinese elite female table tennis players. It is an important topic that how to protect and improve to the technical for keeping technique and tactics style of table tennis in China. **Research purposes**: It analysis dilemma reasons of female's offensive style and explore into the path of protection, improvement and development due to female's penhold offensive faded reasons and to promote into woman's table tennis development healthy and sustainable in China. **Methods:** literature, interview, and logical analysis. **Results and discussion:** The "short plate" of penhold is that there are big holes in defensive at backhand. It is inferior to handshake grip that penhold offensive's backhand in attacking and defence especially in at the stalemate segment and middle-long area. Backhand half volley with push cannot cope with rotation loop, and variable line boosting difficultly and offensive continuously. "Short court, the first three ball to end the fighting" for the gist of tactical ideas need not suitable for television audience. It increases the psychological pressure in match and accelerates the consumption of fitness due to the ineffective. There are 5 elite female athletes with penhold, accounting for 10%. There are only 2 female penhold athletes' take parts in Olympic Games, world championships, world cup in past two decades. Chinese female's table tennis players are short at power, flexibility and coordination. It is a bottleneck of the development of that restricting the use of penhold backhand offensive style. **Conclusions:** 1.The plight of female's table tennis players and penhold offensive play is mainly due to technical defects of backhand offensive and defence, the big ball and the use of inorganic glue. It slowed down the rhythm and not suit for tournament spectators and broadcast. 2. To protect female's penhold offensive style, we should learn from the successful experience of male's penhold table tennis players. We can enhance female's "penhold backhand »skill and researching its related technology and apply to the competition. What are enrich table tennis technical and tactical style diversity and suit to the spectators. 3. In preparation for major competitions, we should focus on improving female athletes' strength, coordination, and the ability. In doubles pairing, we should make full use of penhold players' features of forehand hand convenient, flexible wrists, vicious offensive together with the horizontal position players to form a good complementary skills and tactics. 4. In the process of adolescent selection, we should encourage athletes to use penhold and penhold offensive play. We should strengthen the specialized training of penhold backhand and specific fitness at basic training phase.

Key words: *table tennis, penhold offensive play, technical and tactical style, female*

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RESEARCH ON THE SKILL AND TACTICS STYLE OF SOME OF THE EXCELLENT FOREIGN TABLE TENNIS PLAYERS' USING BACKHAND LONG-PIMPLES RUBBER

Abstract

The ITTF promulgated that the table tennis players should use the inorganic glue after the Beijing Olympic, 2008. According to the results of the international table tennis competitions during the last years, it is generally accepted in the table tennis circle that the using of inorganic glue can decrease ball's speed and spin, which benefits the defensive players. Our main players were beaten by the long-pimples rubber players several times in the important international table tennis competitions, and the long-pimples rubber playing method style appears to be much stronger as time goes on. It's a traditional table tennis skill in China, but after Deng Yaping's out of commission, there are less and less long-pimples rubber players in our table tennis team, especially the high-level players, which makes the condition that the long- pimples rubber play threats Chinese table tennis team especially the women team most. In consequent, deepening the research of its play style has become a task on hand in Chinese table tennis circle.

In the context we chose 28 videos of the important international competitions such as the World Table Tennis Championships, Open Tournament, the Olympic Games, the World Cup, etc. during 2010 to 2014, and use video recording method of inspection, mathematical method of average and so on to do some research on the skill and tactics style, including the technical style, main scoring methods, practice routine, disadvantages in technique and the methods to defeat them, of 4 foreign table tennis long-pimples rubber players' using of backhand long-pimples rubber, so as to help the Chinese players train pertinently and scientifically and provide references for the coaches to prepare for the competitions.

From the present long-pimples rubber mainstream fighting method's technology, the tactical characteristic, unify 4 top athletes instead to have lots of pull the rubber technology, the tactical characteristic analysis to obtain, Take Joo Se-Hyuk, Kim Kyung-ah as represent the long-pimples rubber defence fighting method, instead has lots of pull the rubber to cut defends and controls primarily, the revolving difference is big, instead has lots of pull the rubber to be locked in a stalemate ability, but attacks few and ability is bad, feared that truncates the high grade loop drive; Take Ai Fukuhara, Fukuoka spring the vegetable as representative's long-pimples rubber attack fighting method, instead has lots of pull the rubber to attack, to select sneaks in attacks primarily, threatens in a big way, but the long-pimples rubber surface attacks the loop drive ability to be weak.

Key words: *table tennis, backhand long-pimples rubber, skill and tactics style characteristics*

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THE ESTABLISHMENT OF THE THREE- PHASE TECHNIQUE AND TACTIC ANALYSIS MODEL FOR THE PLAYERS WITH THE PLAYING STYLE OF CHOP-AND-ATTACK

Abstract

1 Research Objective

There are lots of indicators in table tennis technique and tactic. Starting point of analysis and diagnosis in technique and tactic should be according to the actual situation: time, space, status, power and etc... Evaluation of each rally contains the technology, lines, placement, effect elements, the cohesion between the rally and rally, and the time of the ball in the whole period. Based on the classic three phases technique and tactics indicator system, according to the characteristic of the players with the playing style of chop-and-attack, the paper had chosen the analysis indicators to meet the requirements for the real situation in technique and tactic step by step, and built an indicator database. Straighten out the relationship between the indicators, forming a reticular structure, then set up three phases technique and tactic analysis model of the players with the playing style of chop-and-attack.

2 Research methods

Using Simi Scout technique and tactics video analysis software, combined with the classic three- phase technique and tactics analysis method.

3 Research results

(1) Five indicators, the first one was the number of the games, the second was three-phase, the third was per phase indicator, the fourth is the specific technology, and the fifth is score or not.

(2) Sub indicators in serve and attack phase included serve (short, half-long, long), control after serve (cut, split or push), attack after serve (over the table, long shot), chop after serve (forehand, backhand)

(3) Sub indicators in receive and attack phase included control in receive (cut, split and push), attack in receive (over the table, long shot), chop in receive (forehand, backhand), attack after receive (forehand, backhand), control or defence after receive (forehand, backhand), chop after receive (forehand, backhand).

(4) Sub indicators in the phase of sustained rally included turn to attack (forehand, backhand and pivot), passivity (forehand, backhand and pivot) and chop (forehand, backhand and pivot).

(5) This technology and tactics model has been successfully applied into the Chinese national table tennis team, and obtained a certain practical benefits.

Key words: *the playing style of chop-and-attack, three phase technique and tactic analysis method, model*

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ANALYSIS OF KINEMATICS CHARACTERISTICS ON THE BACKHAND TWIST TECHNIQUE FOR CHINA ELITE MALE HAND-SHAKE TABLE TENNIS PLAYERS

Abstract

1 Research Objective

The backhand twist technique of Zhang Jike and Fan Zhendong is the best and most reasonable in China national table tennis team. The other players with hand-shake should learn from them. The paper gave a 3-D kinematic test and analysis on the backhand twist technique of Zhang Jike and Fan Zhendong to reveal the kinematics characteristics and action technique principle of male hand-shake table tennis players, which would lay the foundation of technical movement monitoring and diagnosis system for the excellent table tennis athletes in our country for the future.

2 Research methods

The backhand twist techniques of Zhang Jike and Fan Zhendong were recorded synchronously by two high-speed cameras (100 frames per second) on three-dimension in Xiamen closed training base for national team, at April of 2014. During the test, the head coach of China Table Tennis Team serve multi ball to the short table of the backhand, the two players twisted the ball in diagonal with maximum force. At least 10 times techniques of each athlete were collected. Used by Simi Motion movement technical analysis software to analyse the data.

3 Research results and conclusion

(1) During the stage of racket backward, the wrist and trunk of Zhang Jike and Fan Zhendong turned round fully. Fan Zhendong's torsional amplitude of the wrist was about 270 degree, and that of Zhang Jike was about 180 degrees.

(2) During the hitting stage, right shoulders of two athletes were higher than the left shoulder. Right shoulder forced forward and gave the forearm and wrist with a stable support. The forward force was bigger than the right force. The center of the body weight pressed forward.

(3) The average time of Zhang Jike from the coming ball rebounded the table to hit the ball was 0.215 seconds, and that of Fan Zhendong was 0.213 seconds,

(4) Two athletes had a solid, focused power and a fast speed for swing of the racket at the moment of hitting the ball.

Key words: *Zhang Jike, Fan Zhendong, backhand twist, kinematics*

Acknowledgement

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RESEARCH ON THE PRESENT SITUATION OF HUMAN RESOURCE MANAGEMENT OF CHINESE TABLE TENNIS COACHES

Abstract

Under the circumstances of "talent achievement future", table tennis coaches' status and role in the development of table tennis have become increasingly prominent. A high level of table tennis coach team is the core essential factor for normal operation of the system of table tennis project and is irreplaceable in any other resources. In order to have a good and stable table tennis coach team and adequate coach resource reserves, it is necessary to have a successful operation of the coaches of human resources management system. For »the third time start up" put forward by Chinese table tennis team, we must think about the future of the Chinese sport and the development of competitive sports from a higher starting point, thus highly and deeply thinking about the management of table tennis coaches. Through the methods of literature review, expert interviews, the present situation of human resource management of Chinese table tennis coaches is researched. The main findings and conclusions are as follows: (1) Chinese table tennis coaches management organization form is relatively single, still mainly in the form of administrative management, less involved in the social organizations, and social forces have not yet played their value and functions. (2)The management of table tennis coaches is from the traditional personnel management, step by step towards the human resource management. Network platform has also been introduced by some provinces to talent management of table tennis coaches. (3)From the perspective of human resource management, modern management of table tennis coaches mainly includes the table tennis coaches' professional qualification authentication, registration, the selection and hiring, training and development, assessment and evaluation, flow, security, etc. Operation mechanism in the management of table tennis coaches in China still lags behind the development of competitive sports. (4)Linkage effect of the Chinese table tennis coaches' management link needs to be further promoted, and the human resources management mechanism in table tennis coaches should be further innovated.

Key words: *table tennis coaches, human resource, management*

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RESEARCH ON THE OPERATION MECHANISM INNOVATION OF HUMAN RESOURCE MANAGEMENT OF CHINESE TABLE TENNIS COACHES

Abstract

In the period of social transition, improving and changing the management of table tennis coaches should be through not only the innovation of organization, system construction and function division, but also the reasonable operation of all the elements, so that the ultimate goal can be achieved. Therefore, it is necessary to establish a set of coordinated, flexible, and efficient operation mechanism. Organizational structure, system specification and function division are relatively static, while operation mechanism is dynamic and is the means and methods to finally achieve the targets by performing a series of management activities.

This article applies the relevant theories of human resources management innovation, trying to build the operation mechanism of human resource management of table tennis coaches, in more accord with future development needs of Chinese table tennis.

This paper argues that table tennis coaches in the future will be mainly managed by coach qualifications management organizations, professional intermediary organizations and competitive sports training organizations, and etc.

Since table tennis coaches trained professional qualification management organization, grade exams, follow-up training, registration and management qualification management, access to vocational qualification certificate coaches entering the job market, through two-way selection worked sports training institutions, regulatory agencies and third party responsible for ensuring orderly management. In this management process, it is necessary to establish and continuously improve collaboration, competition, motivation, supervision and restraint, and evaluation mechanisms to ensure that the new tennis coach management system can be effective operations.

Table tennis coaches can enter the job market, which obtain the professional qualification certificate of coaches through the quality management such as the training, grade examination, follow-up training and registration management, and work in competitive sports training institutions after a two-way choice, while the third party regulatory agencies should be responsible for ensuring the orderly management. In the management process, it is necessary to establish and constantly improve collaboration, competition, incentive, supervision and restraint, evaluation mechanism, to ensure that the new management system of table tennis coaches work effectively.

Key words: *table tennis, coach, human resource, innovation*

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TRAINING FEATURES OF CHINESE WORLD-CLASS TABLE TENNIS PLAYERS IN THE COMPETITIVE PHASE OF THE HIGHEST LEVEL

Abstract

Experiences and rules in the training system of Chinese table tennis at the highest level is valuable asset of Chinese competitive table tennis. In order to give guide to Chinese table tennis, this essay analysed the training characteristics of some of the world-class table tennis players of China, and tried to sum up the rules and training system which China support the leadership of Chinese table tennis competitive sports.

The overall design, cycle division, training content, training load, training methods have shown a characteristics of specialization in the training between world-class table tennis players of China.

Follow Olympic Games period, the training plan of world-class table tennis players in China can be divided into several training ranges. And there are special links in the training program in each range.

Features of the training cycle of Chinese world-class table tennis players are: timing and specializing. In an Olympic cycle period, the training arrangement of odd-numbered years' multi-cycles with only one pea, the training arrangement of even-numbered years' multi-cycles but with double-peak. There are four modes, more specifically, conventional large-cycle mode, microfiche large cycle mode, multi-competition small-cycle mode, and the bi-weekly small cycle mode.

The structural features of training contents of Chinese world-class table tennis players are: technical and tactical training dominated, followed by physical training, mental skills and knowledge capabilities throughout the entire training, and special arrangements before competitions.

Training load of Chinese world-class table tennis athletes is in an above average to large level. Dynamic arrangements are mainly embodied in the different training stages.

The most effective methods in technical and tactical training of Chinese world-class table tennis athletes are: simulate competition, increase difficult index, monitor feedback, consultation and so on. Have obvious special feature, these training methods works well in practice and meet the needs of our world-class table tennis players.

The design, organization and implementation of the training of Chinese world-class table tennis players need further improvement and modification. With a view to sustainable development, the cycle arrangement, competition organization, skills and tactics improvement, physical training, psychological control, knowledge learning, load control, methods perfection need to be innovated.

Key words: *table tennis, cycle, contents, load, methods*

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THE BIOMECHANICS STUDY ON THE TABLE TENNIS TECHNIQUES OF THE FOREHAND ATTACK AND LOOP DRIVE

Abstract

Table Tennis is a preponderant sport and important Olympic sport in China. The attack and loop drive techniques of the positive hand are most important among all the techniques. It has an important significance for us to research on the attack, loop drive of table tennis techniques, in keeping ahead and developing Chinese Olympic stratagem.

10 excellent ping-pong athletes' attack and loop drive techniques of the positive hand were tested, using the measurement methods of the QUALISYS kinematics measurements system and the KISTLER force-plate system. Each technique was performed by two types of force, the middle strength and the full strength. The main conclusions were as followings:

(1) Racket's touching a ball was not at the moment the biggest speed of flicking racket. Moreover, it was mostly after the biggest speed of flicking racket.

(2)At the leading and flicking racket stage, the sequence of the biggest speed on each joint of arms was not the same. In addition, the difference among techniques, individuals was rather big.

(3)The difference of force characters between the attack and loop drive technique was that the ground reaction force (GRF) of loop drive technique was bigger than attack technique in perpendicular and level direction, which suggested that the fore in perpendicular and level direction should be strengthened when performing loop drive technique.

(4)The difference of force characters between the two force methods of performing attack technique was that the GRF of full strength was bigger than middle strength in perpendicular and frontal direction, which suggested that the fore in perpendicular and level frontal should be strengthened when performing the attack technique of the full strength.

(5) The difference of force characters between the two force methods of performing loop drive technique was that the GRF of full strength was bigger than the middle strength in three directions, which suggested that the fore should be added when performing the loop drive technique of the full strength.

Key words: *table tennis, attack technique, the loop drive technique, kinetics, ground reflection force*

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EFFECT OF PLASTIC TABLE-TENNIS ON THE COEFFICIENT OF FRICTION BETWEEN RACKET AND BALL

Abstract

1 Objective

For the growth of table-tennis program, ITTF has been modified the completion rules in recent years. On July 1th, 2014, there was a reform of table-tennis ball with its texture changed from celluloid into plastic and its diameter increased. After the implementation of every new rule, China ranked first in the world on the research of effects of new rules on table-tennis competition laws. This paper was aimed to discuss the impact of plastic table-tennis on the coefficient of friction between racket and ball on the basis of previous research results.

2 Research methods

The coefficient of friction between racket and ball was tested by UMT-2 multi-functional micro tribometer, and the roughness of any three of the five points on the two kinds of table-tennis balls were measured by white-light interfering profilomete in the State Key Laboratory at TsingHua University

3 Results

The main results were showed in table 1 and table 2.

Table 1 Coefficient of Friction of Different Rubber and Ball (n=15)

Type of rubber	Celluloid	40+Plastic	reduction
pimples in	1.717	1.669	0.038
raw pimples out	0.727	0.722	0.005
pimples out	0.551	0.547	0.004
long pimples	0.500	0.499	0.001

Table 2 Roughness of 15 Points on the same ball (n=15 unit : micrometer)

	Celluloid	40+Plastic
Average	3.677	2.834
Standard deviation	0.051	0.568

4 Conclusions

(1) The change of table-tennis texture exerts the most effect on pimples in ball while has nothing on pimples out, long pimples. The application of plastic table-tennis ball decreased force of friction and the coefficient of friction between pimples in and ball, thus the rotation of ball reduced by 3.25%.

(2) The roughness of plastic table-tennis ball is less than that of Celluloid table-tennis ball.

(3) The evenness of plastic table-tennis is not as good as Celluloid table-tennis ball, which decides the difference by biting different points of plastic table-tennis ball. In table-tennis, plastic ball will rotate better.

Key words: *plastic table tennis, celluloid table tennis, coefficient of Friction*

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A RESEARCH ON 2014 ASSEMBLED TRAINING ELEMENTS AND MODEL OF NATIONAL ELITE YOUTH TABLE TENNIS PLAYERS

Abstract

By the methods of literature, field survey, mathematical statistics and so on, this paper investigated and analysed the main works and the key elements of 2014 national elite table tennis players assembled training, the purpose is to provide data to support the completion of the training mission for more better and more reasonable construction of training mode, and provide strong reference of training to competitive table tennis reserve talents.. Conclusions are as follows:

1. Closely around the thought of "discover seeds, train the backbone, highlight the key points", developing young players' effect to build a reasonable age team, this assembled training has a comprehensive study of basic youth overall competitive ability and level, initially forming a personnel echelon of 95-96 years and after 97 years, building a variety of playing and strengthening the straight racket grip, left hand play and rubber.

2. By strengthening the sense of serving point, receiving stability and multi technology combination, positive and reasonable pace, a wide range of movement to improve players' concentration of striking and flexible combination in front and back play, and strengthening forehand and middle line change, improving attack and defence conversion.

3. Aiming at different age, technology, tactics, assembled training takes a combination of periodic arrangement and modular training. On the basis of reasonable periodic training, taking different measures about periodic load, technology, tactics according to every player's technology tactics character in order to improve every player's comprehensive competitive ability.

4. Taking different lottery to organize games to enhance competitive mechanism and improve players' competitive ability, paying more attention to train players' comprehensive use of technology tactics and psychological adjustment in key ball or key rounds to develop players' strong will.

5. Assembled training strictly implement the provisions of the detection of bone age in order to create a team with a good reputation and influence at home and abroad in the shortest time.

Key words: *table tennis, elite youth national assembled training, key elements and model of development*

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THE RESEARCH STATUS AND PROSPECT ON THE COMPETENCY OF TABLE TENNIS COACHES

Abstract

1 Research Objectives

From a long time, Chinese table tennis team has made brilliant achievements in the world, and it has already become the competitive team which made Chinese people feel proud. Chinese table tennis is the typical representative of developing and increasing national prestige and morale. Having a great coach team is one of the important factors for Chinese table tennis success. Coaches as conductors, instructors, organizers and managers of table tennis sports training, have influences on obtaining and improving athletes' competitive capacity in the process of training and competition. For the long term growth of Chinese table tennis and the international development of table tennis sport, it's necessary to make researches on the competency of table tennis coaches.

2 Research Method

With the method of literature study, this research looks up related articles which referred to competency, sports coaches' competency and table tennis coaches' competency in CNKI (China National Knowledge Infrastructure).

3 Research results and conclusions

(1) With the successful use of competency theory in the field of management, psychology and pedagogy, it becomes possible to use this theory in sports field. Using research experience and paradigm of other fields, researches on professional coaches' competency in sports field are gradually carrying out. Having a general view of domestic researches related to features of sports coaches' competency at present, it can be found that most domestic researches are mainly based on literature study, and empirical researches are rare. Researches on table tennis coaches' competency have not been found.

(2)Existing researches closed to table tennis coaches' competency are the researches of table tennis coaches' quality and ability, from the perspectives of psychology and training, these researches analyse the common quality features of qualified table tennis coaches which they should have; however, these research results are difficult to distinguish the performance between excellent group and general group.

(3)With the aid of mature and standardized methods and theories related to competency in management field, the development trend in table tennis field is to systematically and comprehensively build Chinese table tennis coaches' competency model, and discuss situations and levels of Chinese table tennis coaches' competency, in order to complete some practical activities such as Chinese table tennis coaches' selection, quality cultivation and development, qualification certification, performance evaluation. Researches on this aspect can satisfy the practical needs to improve human resource management and development level of Chinese table tennis coaches.

Key words: *table tennis coaches, competency, research status*

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THE PRELIMINARY RESEARCH ON THE INTERDISCIPLINARY TRAINING TEAM COOPERATION IN CHINA TABLE TENNIS TEAM

Abstract

1 Preface

For a long time, the Chinese table tennis team has made brilliant achievements in the world table tennis. It is a typical representative of the Chinese athletics team and a proud of Chinese people. Behind the gold medal are a scientific training, system management and integration of all resources creatively. Ahead of other sports, the Chinese table tennis team has already raised the concept of compound training team. In the continuous practice and constant innovation of this training mode, it has been proved as an effective organization form, and contains the profound connotation and speculative.

2 Method

Through the literature material method, interview method, logical analysis, case analysis and other research method, this article summarizes and refines the effect and experience of the using of compound training cooperation. The study was aimed to enrich table tennis theory system, as well as to provide practical reference to other competitive sports team.

3. Results and conclusions

（1） The goal of the Chinese table tennis team: maintaining the leading position of world table tennis, getting good mark in the Olympic Games and other international competition, and winning honour for our country.

（2） Agency branch and system: the manager responsibility system. It is made up of team committee, head coach, men's and women's head coach, the leader of a group, the coaching staff and scientific research personnel, medical personnel and the directors.

（3） The core and main body of compound training team cooperation of Chinese table tennis team is coaching team and the scientific research team. In the cooperation, the coaching team and scientific research team do work with each other, not in isolation. Chief coach is both the leader of coaching team and the participant of research team, a junction of team operation.

（4） The organization management mode is scientific and reasonable: with advanced management concept; reasonable organization and management agencies; brainstorm decision concept; perfect management system and strict discipline.

（5） Following the principle of training, scientific training and development is an important assurance for the Chinese table tennis to keep long time situation for a long time.

（6） Having the highest goal of the motherland, no failure only success became the motivation of the team members to the relentless pursuit. The spirit of patriotism is the mainstream of the team all along, the mainstay to support the team.

（7） Cycle practice of London Olympic Games shows: as to compound training team construction of "training, science, medical and protect", the Chinese table tennis team has accumulated valuable wealth, and its operation mechanism and mode of cooperation is worthy of reference for our country's other competitive project team to learn.

Key words: *the Chinese table tennis team, compound, training team, cooperation*

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THE RESEARCH OF INJURY PREVENTION AND REHABILITATION IN ELITE TABLE TENNIS ATHLETE

Abstract

Objective

Doing general survey of injuries on top Chinese table tennis players. 2. To study the mechanism, analyse the reason and investigate the treatment of the main diseases.3.Investigate the rehabilitation program.

Research methods:

Using questionnaire investigation, clinical test, imaging method and statistical analysis to do a general survey of injuries.2.Using literature research, injury risk assessment and strength test to study the injury mechanism.3.Using literature reference, Expert consultation and collective debate to investigate treatment method and rehabilitation program.

Results and discussion:

1. Epidemiological survey of wrist triangular cartilage complex injury is conducted to find that this injury is related to training age. And the high incidence in women high level athlete is related to muscle strength and masculine style.

2. Shoulder injury. Shoulder injuries mainly consist of shoulder impingement (including rotator cuff injury, subacromial bursitis, and Shoulder outreach syndrome). The cause of these injuries is too much forehand exercise, internal rotation had received roughly shoulder muscle strength significantly greater than the abduction and external rotation strength, internal rotation angle becomes smaller, shoulder muscle imbalance and other causes of glenohumeral instability and impact occurred; External rotation weakness, also may be associated with cervical joint dislocation that may entrapment disposable external rotation muscle nerve.

3. Elbow injury there is on the rise, with tennis elbow based; play feature and local load intensity are the main reasons.

4. Spinal disease The main diseases of the spine disease have cervical disease, thoracic and lumbar joint disorders, lumbar herniation basin, pelvic rotation shift syndrome; obvious characteristics found in the spine morphological changes. pelvic tilt, thoracic and lumbar physiological curvature change and rotate scoliosis, curvature changes and cervical intervertebral joint disorder obvious; both sides of the spine and upper limb muscle imbalance, dominant side was stronger than the non-dominant side; these may related to spinal pathology.

5. Lower limb injuries there exists some correlation between knee and ankle injuries and lumbar spine and pelvic position changes.

Conclusion:

1. Wrist triangular cartilage complex injury is among the most common injuries in top table tennis players and has high incidence in women athletes, which is related to training age and the masculine style. Taping is of great help to prevent Wrist triangular cartilage complex injury.

2. Shoulder injuries: top table tennis athletes have high incidence of shoulder injuries, which is related to the muscle imbalance of scapula muscles and rotator cuff.

3. Elbow injuries: The incidence of elbow injuries is increasing now, which is related to technical styles and overweight load.

4. Spinal disease: the incidence of spinal disease is pretty high, which is related to the morphological change of spine and pelvis. Rectifying lumbar joints, thoracic joints, and neck joint disorder and adjusting pelvis are main treatments of these diseases.

5. Lower extremity injuries, knee and ankle injuries for instance are caused by morphological change of lower extremity, which could lead to the biomechanical changes of lower extremity.

6. Reasonable treatment and rehabilitation program can effectively prevent injuries in table tennis players.

Key words: *table tennis*

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THE TECHNIQUE AND TACTICS ANALYSIS OF FAN ZHENDONG IN THE QUARTERFINAL OF THE 2015 KUWAIT OPEN

Abstract

1. **Purpose**

Born in 1997, Chinese table tennis player Fan Zhendong has improved greatly in techniques and tactics in the past two years and has stood out quickly among many young players with his advanced techniques. Growing with such astonishing speed, Fan has won the men's team champions in 2014 Tokyo World Table Tennis Championships, 2014 Inchon Asian Games and the men's singles gold medal in 2014 Nanjing Youth Olympic Games. This thesis studies Fan's performance in 2015 Kuwait Open in detail and hopes to provide scientific basis to his technical and tactical training in the future.

2. **Methods**

This thesis studies 1 important matches of Fan in 2015 Kuwait Open:

quarterfinal match Fan Zhendong VS ZHUANG Zhiyuan (score 4:2)

The thesis analyses his application in techniques and tactics through counting scoring rate, using rate and related score trend of the first and third strokes, the second and forth strokes and sustained rally.

3. **Results and Conclusions**

(1) Fan could use his forehand counter spin serve to score or make chances for the third attack. His third backhand attack is fast with high spin, which helps him get a lot of points in the match.

(2) Receive and attack is his best performance part in this match. He repeatedly uses the speed and high side spin of the backhand twist over the table to bring some trouble for Chuang's return. In the whole match, Fan's forth stroke with high speed and spin is stronger than Chuang.

(3) The confrontation is Fan's shortcoming. In the confrontation, his speed of backhand stroke is restraint by his opponent, which causes more faults in the backhand and sideways drives.

Key words: *Fan Zhendong, 2015Kuwait Open, technique and tactics analysis*

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THE APPLICATION OF CAI COURSEWARE TO UNIVERSITY TABLE TENNIS TEACHING

Abstract

Research purposes: Table tennis requires skilful techniques and exquisite movements. Therefore, in order to help students learn table tennis technology better, we introduce a new cross subject - computer assisted instruction (CAI) to the school sports teaching. It integrates computer science, pedagogy, psychology, information theory, system theory and cybernetics, and organizes texts, images, sounds, animations, videos and other media skills, reflecting a new kind of education thought and approach. It breaks through the limitations of traditional teaching, and can vividly present information for the learners, which will have a profound influence on the educational reform and modernization. This article will discuss about the effect and development of the basic application of the computer aided teaching to table tennis teaching. Methods: documentation, experimental method, questionnaire survey, statistical method

Results and discussion:

1) The experimental results show that the application of CAI courseware in table tennis teaching can effectively improve the teaching effect and quality of physical education.

2) As can be seen by the results of the survey, the vast majority of the students are in favour of multimedia in table tennis teaching. Most of the students think that multimedia teaching is beneficial for them to maser basic skills of table tennis than traditional teaching.

Research conclusion and suggestion:

1) The use of computer multimedia in table tennis teaching can fully mobilize students' various perceptive organs to involve in table tennis learning, so as to stimulate students' learning enthusiasm and interest in the sport.

2) By using CAI courseware in table tennis technical teaching, teachers can make up for the differences in age, physical conditions, and special ability.

3) Physical education teachers should actively transform their thoughts, and give full play to the role of the computer aided teaching, striving for the early the modernization of physical education teaching. Meanwhile, teachers should update and enrich knowledge, and organically combine modern multimedia teaching with traditional teaching, so as to further promote the college physical education teaching reform.

Key words: *table tennis, multimedia, CAI courseware*

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ANALYSIS ABOUT TABLE TENNIS EXTRACURRICULAR ACTIVITIES IN ORDINARY UNIVERSITIES IN BEIJING

Abstract

Research purposes: with the development and reform of physical education, table tennis has become an important part of the ordinary university sports teaching. However, the current situation of table tennis is not optimistic as an extracurricular activity in ordinary colleges and universities in Beijing. In order to promote the sport, this paper deals with the research of the situation of table tennis carried out in ordinary colleges and universities in Beijing. It will discuss existing problems and causes, and put forward related suggestions, hoping to be a reference for table tennis teaching in ordinary colleges and universities.

Research methods: literature material, questionnaire survey, mathematical statistics, logic analysis

Result and discussion:

1) The analysis of motivation of students to choose table tennis: most of the students choose “interests”.2) The survey of students’ participation in playing table tennis in their spare time: policies, atmospheres and table tennis culture vary from school to school, and even teacher resources and equipment are quite different.3) The investigation and analysis of the table tennis conducted by schools: table tennis is rich in the form, but has not met the requirements of "lifetime sports" yet, so all kinds of games should be actively organized to arouse the students’ interest in participation in the sport, as well as enhance the awareness of physical exercise. In this way, the sport of table tennis can be promoted and extended.

Conclusion and suggestion:

The research holds the following conclusion that:

1) Students show a keen interest in table tennis, but they don’t play it often because of learning pressure;

2) Students have a positive attitude towards table tennis competitions, but there are few activities organized on campuses;

3) Students lack the platform to join the activity as a result of the form limitation;

4) Colleges and universities are lack of effective policy support and management system to promote the activity.

The research holds the following suggestion that:

1) Schools should further stimulate and maintain students’ interest, put forward favourable policies to guarantee, increase the investment for facilities, and especially further open to the public;

2) Schools should carry out a lot of games as a breakthrough, increasing the number of the games, and paying attention to the arrangement of the games.

3) Schools should enrich the forms of extracurricular activities, and increase the number of activities to establish the better platform for students.

Key words: *ordinary universities, table tennis extracurricular activities, Beijing*

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THE RESEARCH OF CORRELATION BETWEEN SCORE REGULARITY AND THE RESULTS FOR THE HIGH LEVEL TABLE TENNIS MEN'S SINGLES MATCH

Abstract

During the table tennis match, it is usually that the total score of the triumphant athlete is higher than the athlete who failed in the match, this kind of appearances reflects the ability of athlete controlling the match from the side. How to controlling the pace of match and influencing the results of match are the problems that coaches focus on for years.

This article researches 100 men's singles event from the top ranking 30 athlete in the past 4 years (2011-2014), by mainly using literature, interviewing experts, video observation and mathematical statistics, analysed the outcome correlation between each round and the entire match, as well as during within-difference of each stage and round in the singles four-of-seven series of high level men's table tennis athletes. The aim to explore the effect from every beginning stage, middle stage and final stage to the entire match. The conclusion of the research is as below:

(1) The order of the effects from every single round to the entire match results: round 6 > round 1 > round 4 > round 2 > round 5 > round 3.

(2) In the first round, when leading 5-6 scores in the mid-game period, athlete is easily volatile. The middle period and final period usually decided the results of the 1st round.

(3) In the 2nd round, when leading 3-4 scores in the beginning-game period, athlete's competition form is less stable; winning rate is lower than the score difference within 1-2.

(4) The athletes' performance in the 3rd round actually reflects their competitive form and ability level. Hence, the performance in 3rd round could be treated as the reference of the athletes 'competitive level.

(5) The 6th and 7th rounds affect the match results the most. By the analysis, during the transition period from beginning to middle of these 2 rounds, athletes need to drive the awareness of risk. It is easily to be pulled the score difference in this period and the final results will be effect eventually.

Key words: *table tennis, score, score different, correlation, match results*

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THE RESEARCH ON EVALUATION SYSTEM OF THE HIGH LEVEL TABLE TENNIS ATHLETES UNFORCED ERROR

Abstract

No matter which kind of table tennis match, unforced errors bring trouble to the athletes and affect their competition results. Hence, the establishment of table tennis unforced error evaluation system provides the standard for the judgment of the unforced error during the table tennis match, as well as provides the indicator for evaluating the athlete's competitive ability.

In this study, we take unforced errors evaluation system of high level table tennis players as the research object, by using the methods of literature, expert interviews, questionnaire survey, video observation and statistics respectively, the author construct an unforced errors index system of high level table tennis players in singles, doubles and singles adolescent athletes. We develop unforced errors evaluation criteria of high level table tennis players in singles and doubles though this deviation method. It can be divided into three levels for the unforced error of high level single and double match. Conclusion of the main topic is:

1. Set up system of the unforced error index of the high level table tennis athletes; The first class target include attacking stage, meets serves assaults stage and a stalemate; The second level corresponds to the first round and the third, second and fourth, fifth and the following round; The third level specific forms of the unforced errors.

2. To establish an evaluation standard of unforced errors of the high level table tennis players: table tennis unforced error rates are divided into: excellent, good, medium, passing and failing five grades.

3. There's a significant difference between men's and women's singles player during service attack stage, the top 3 cricket unforced error of men's singles: second > third > first round, the top 3 of women's: second > third > fifth round;

4. The men's and women's doubles the cricket unforced error rate descending sort of top three: Fifth > Fourth > third round

Key words: *high level table tennis players, unforced errors, index system, evaluation standard*

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RESEARCH ON DYNAMIC GAMES PROCESS BASED ON TABLE TENNIS SPEED TACTICAL BEHAVIOR

Abstract

With high level of competitive sports, technology is the foundation, tactics is the core, psychology is security, tactical plays a vital role in the game, and more importance of the ball speed, and it is possible of that in the IT field development of three-dimensional reconstruction and visual tracking techniques for measuring the actual velocity.

In this article, Based on a single fixed camera calibration constant speed, build relationships transformation point and the point on the image plane of motion on a plane between the spheres of solving the exact speed, providing new analytical framework for the accurate calibration of the speed table tennis. At the same time, the speed of the ball by getting information, analysis Dynamic Games athletes find a relationship between cricket and cricket next set strategy matrix to help athletes in track rapid changes in finding effective strategy, tactical forecasts to help athletes build their tactical system, and further enrich the study of the laws of winning tennis.

This research bases on the experimental method, game analysis and other methods for 44 games video captured study constructed game matrix tactics of both players in the game, and the matrix is solved to obtain the Nash equilibrium. After empirical study, we draw the following conclusions:

1. Based on at a fixed speed camera, this paper confirmed by experiments at the venue often single uncelebrated case, by three-dimensional reconstruction method more accurately calculate the feasibility level of the average velocity of the sphere. Under solves the actual state of the athlete ball speed indicators and effective monitoring tactics.

2. the process of the State tennis tournament during a tactical behaviour of the state with the next tactical behaviour is the essence of the relationship between the previous and the next cricket, this relationship comes to table tennis and line speed, but also related to the athletes behavioural strategies and tactics, it is the probability of a matrix of choices, this tactic behaviour policy matrix is the core of the game. Therefore, the game matrix solver can explore the deeper reason tactical behaviour of the players.

3. Tactical game of table tennis ball in a game, a ball of perspective is a zero-sum game, but in the perspective of a cricket's not a zero-sum game, but a change and the game. In this paper, change ideas, re-enacted the benefit of quantitative indicators tactical game of table tennis.

4. with the process of tactical behaviour table tennis game, the strategy of athletes itself no good or bad, the merits of the strategy depends on the opponent's game tactics, strategy constitutes a combination of both strategies in order to determine its advantages and disadvantages. Therefore, athletes must have not only the tactical thinking countermeasure awareness, but also a rival consciousness.

Key words: *the tactics of table tennis, strategy selected, dynamic game, Nash equilibrium*

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A DISCUSSION ON THE MANAGEMENT MODE OF LUNENG TABLE TENNIS PROFESSIONAL CLUB

Abstract

1．research purpose：

China table tennis club super league has developed more than ten years. Luneng table-tennis club's creation and development have played a very important role during it. In order to give other table tennis club and the professional development of ping super league to provide theoretical reference, the authors investigate and inductive analysis Luneng table-tennis club management model to summarizing the characteristics of its management mode and several problems of the preliminary analysis of the present.

2．research methods:

This paper adopted the method of documentation, expert interview method, logic analysis and other research methods

3．results and discussion:

3.1 Luneng and the professional development of Chinese table tennis club

3.2 Luneng club management model, adhere to the strategy of "construction of the one hundred club"

3.3 New coaches and athletes management operation mechanism

3.4 Perfect management system and the new management system

3.5 With excellent enterprise culture undertakings of physical culture and sports

4．conclusions:

4.1 The advantages of Luneng management mode

Club from the truth, according to the characteristics of the table tennis project and strict management, and refer to some basic rules of enterprise management, make the club to realize scientific management and standard operation.

4.2 The characteristics of the Luneng management mode

The coaches of dynamic system, adopt contract management. Club management personnel for recruiting from the society, establish a mechanism for the evolution of the competition. Athletes' management mechanism formed a team of education management work normal operation mechanism.

4.3 Luneng characteristic of management mode

The club's new management system of "secondary responsibility system", this model the biggest breakthrough is achieved the devolution of the board of directors.

4.4 Luneng management mode innovation

Luneng enhance core competitiveness of Luneng taishan sports with culture, promote the connotative development of Luneng taishan sports with culture, formed the unique Luneng sports culture system, is unique to the Luneng taishan sports development train of thought.

Key words: *Luneng table tennis professional club, professionalism, management mode*

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INITIAL RESEARCH ON THE MODEL FOUNDATION OF TECHNIQUE AND TACTICS OF ELITE TABLE TENNIS PLAYERS_TAKE SINGLE MATCH FOR EXAMPLE

Abstract

Introduction: The analysis of table tennis players' technique and tactics should innovate to the combination of qualitative analysis and quantitative analysis. It is the appropriate direction which makes further and specific analysis of technique and tactics, reflects the essential law of table tennis exactly, and provides objective and accurate evaluation criteria for coaches and players. This new analysis has characteristics such as pertinence and improvements resulting in the importance of foundation of technique and tactics in table tennis.

Methodology: This research chooses 40 matches of excellent man' single and woman' single as subjects. Frist of all, five stages: serve, serve-receive, the third strike, the fourth strike and the fifth link of ball holding (the fifth beat to the last one) are delimited to reflect the effect of players' technique and tactics according to practical needs in analysis; Secondly, evaluation indexes which can directly reflect the match result are chosen; Rates of usage, score and loss are counted; Thirdly, ranking system of evaluation index is built: percentile method uses median as the reference value, other percentiles as discrete distance. Finally, evaluation model are built to reflect the result of technique and tactics.

Result and Discussion: Under the whole situation of usage rate, score rate and loss rate, evaluation model could be built to test the result of every step in elite table tennis players' technique and tactics. Lateral comparison of every step becomes a possibility to avoid the situation which people evaluate player's techniques and tactics unilaterally and empirically. With this evaluation model, people can analyse and diagnose the table tennis technique and tactics more accurately, which leads to the more real and objective reflection of player's technique and tactics.

Key words: *table-tennis, technique and tactics, evaluation index, model*

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THE TECHNIQUE AND TACTIC ANALYSIS OF BOLL VS MALONG IN 2013 WORLD TABLE TENNIS CHAMPIONSHIPS

Abstract

1. Purpose:

As the strong opponent for Chinese table tennis team, Boll won Ma Long many times, and Ma Long won Boll many times in the international matches. The level of technique and tactic ability of both was equal. It is necessary to analyse the details of Boll's techniques and tactics, which were used in the last 2013 WTTC, as the 2015 WTTC is coming. The purpose of this study was to provide some scientific basis for Ma Long's future technical and tactic training and matches.

2. Methods:

The subject of this study was the quarter match of Boll vs Ma Long in 2013 WTTC. The result of the match was 2:4 (-4,-9,9,-8,8,-9). Boll lost the match. The technique and tactic of Boll was analysed by the classical three- phase method, using the Simi Scout software.

3. Results

The main results were shown in Table 1.

Table 1 The data of three-phase

	Score	Lose points	Subtotal	Usage	Scoring rate
Serve and attack phase	16	9	25	22.94%	64.00%
Receive and attack phase	17	21	38	34.86%	44.74%
Rally phase	16	30	46	42.20%	34.78%
Subtotal	49	60	109	100.00%	44.95%

4 Conclusions

(1) As for Boll, the scoring rate of serve and attack phase was high, but the using rate was slow. Boll had a normal performance in the receive and attack phase, had a bad performance in the rally phase.

(2) The techniques of Boll's serve were mainly back-spin and side spin. The drop point was mostly at Ma Long's middle and forehand when he served back-spin. The drop point was focused on Ma Long's backhand when he served side-spin. Boll had a high ability to attack after serve, when the quality of Ma Long's receive was not so good.

(3) Boll had a lot of methods to receive. The excellent technique of backhand wring made Boll score a lot directly. The middle and forehand was the relatively weak when he received.

Key words: *Boll, Ma Long, World Table Tennis Championships, technical and tactic analysis*

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BIBLIOMETRIC ANALYSIS OF CORE JOURNALS ON TABLE TENNIS IN CHINA

Abstract

This paper use the methods of statistical, documentation and content analysis, and so on, analysis and research the relationship of 2001-2012 year's core journals of China table tennis in amount of published papers, impact factors and citation rates, and according to the type of research and research paradigms classified and studied on table tennis papers in the journals. The research results show that papers have high quality mainly published in the core journals of sports, but few papers of table tennis published in non-core journals. From the perspective of research paradigm, most of the research is quantitative research, mainly on styles and technique and tactics statistics. From the perspective of research purposes, most papers are mainly descriptive, few exploration and interpretative researches. This study is intended to analyse the research status of papers, grasp the overall characteristics of table tennis papers, and provide the direction of research on the topic and method references of table tennis for the future.

Key words: *table tennis, core journals, bibliometric, analysis*

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THEORY ANALYSIS ON THE DETERMINATION OF THE PING-PONG EDGE BALL AND RESEARCH ON THE INTRODUCTION OF VIDEO PLAYBACK TECHNOLOGY

Abstract

1 Objective

With the high ratio of edge balls in current table tennis competitions, it's a trend to introduce high-tech methods to assist referees make correct judgments.

2 Research methods

Experiments of different kinds of edge balls are conducted through serve machine. It's observed that it's surely an edge ball when a diagonal edge ball, a linear edge ball or a linear edge ball flying to the side line is impacting the surface of the table. By constructing the mathematical model, four groups of videos of edge balls and non-edge balls recorded from the experiments are played back to the experts.

3 Results

The category of edge balls is classified in this study. Profound experiments are conducted base on the elastic collision principle of physics to construct a mathematical model of ball gravity. By analysing the mathematical model, it's found out that the key factors of affecting edge balls is the horizontal tangent of ball gravity and the vertical dimension of the horizontal plane of the table. When it's verified by the actual camera of video playback, it's proved that it's feasible and manoeuvrable to judge the category of edge balls by using video playback technology to determine the gravity center of the ball.

4 Conclusions

(1) It shows that an edge ball occurs only when the horizontal tangent of ball gravity is higher than the vertical dimension of the horizontal plane of the table. Therefore, the key physic factor of producing an edge ball is the relative height between the ball gravity point and the table surface.

(2) By constructing the mathematical model, the key physic factors affecting the edge balls and the bounce direction and range of a side line edge ball affecting the judgment are analysed.

(3) And that the video playback technology can provide data support for referees to penalize the state and bounce direction of an edge ball. This study is of great practical significance and theoretical value for television sports broadcasting and in-field judgment.

Key words: *table tennis, edge ball, playback technology, assisting judgment, feasibility*

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THE EXPLORATION AND PRACTICE OF COMMUNITY FAMILY TENNIS SKILL TRAINING

Abstract

Research purpose

With the rapid development of our country economic society and people's living standards continue to improve, to enhance community residents tennis fitness consciousness, service demand increasingly vigorous, but the people with different levels of family in learning tennis in gender, age, psychological, physiological and physical aspects of differences. So in accordance with the need of community family tennis training, a set of more scientific, systematic, practical and effective training methods, in order to satisfy the demands of family tennis fitness.

The research methods

A. Literature: Through the network retrieval CNKN China knowledge network, the data repository of ten thousand, chongqing weipu database consulting a large number of relevant parties such as journals, more than 30 papers and documents.

B. Practice method; The owner of inferior to Hangzhou on as the research object. Implement method and means: adopt the training methods of parents, young and old, effect of test and evaluation: using the Chinese tennis association evaluation method for evaluation of the implementation of skill level.

The results and discussion

A. Community family for tennis fitness structure types are divided into two kinds:

one is nuclear family, about 3 people. Parents and unmarried children of family; the second is the trunk family, about 4 people. Parents and married children of family.

B. Community family personnel to participate in the tennis training time and cycle. Tennis training time to 1 and a half years time, weekly training, training for 2 hours at a time. In the process of practice mainly divided into three stages: the first stage is the training for 1 month; The second stage is the basic motion practice for 1 year, The third stage is the practice for five months.

C. Community family tennis skills training of the use of the method

Parent-child teaching method: parent-child teaching method refers to the children and parents to participate learning under the guidance of the coach and the exchange, mutual cooperation to improve the quality and efficiency of learning, to cultivate harmonious parent-child relationship, promote each other to learn and progress of a kind of teaching method.

Parent-child education belongs to the category of parent-child education, so in the teaching process in addition to the following general tennis teaching and Training methods, combine children's physiological and psychological characteristics of the teaching and training of science. So we explore a more reasonable and effective training methods of teaching, to help them complete their tennis skills learning effectively.

Music teaching method: young and old, old and young music teaching method refers to the children and old people to participate learning under the guidance of the coach and the exchange, mutual cooperation to improve the quality and efficiency of learning, to make them have fun in the tennis a teaching method. According to the old man and the physiological and psychological characteristics of children, in the process of teaching mainly cultivate their interest and self-confidence, enabling them to be happy in tennis. First in the young and old music teaching elements too fast and easy ten step teaching method in tennis but first they have to hit the ball skills, able to serve, the ball back in a small field, the American and score, make them improve interest and have fun. After to the teaching of basic movements, allowing them to play games.

The research conclusion

Vigorously the national fitness activities, community tennis fitness training has been integrated into the family daily life. By young and old music teaching, parents and teaching method of teaching and training practice, to make them most tennis skill level has reached the Chinese tennis technical grade 1 - grade 2 (CTA1 - A2). At the same time for different people leisure time to master tennis skills have certain practical value.

Key words: *tennis*

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AN EXPLORING STUDY ON THE PACKAGING OF BROADCASTING TABLE TENNIS MATCHES

Abstract

1 **Objective**

The combination between sports and television creates a "win-win" situation, and this tightened combination has become a symbol reflecting the quality of a successful sport packaging. As a classic representative of sports that compete with a net in the middle of the court, table tennis is extremely competitive. Certainly, table tennis is deficient in its broadcasting packaging, especially in providing game stats, up till now, is still a relative blank: besides watching the match itself, what spectators get are simply game score and results through subtitles. However, broadcasting without subtitles can never be called a complete sport broadcast today. The current level of table tennis broadcast packaging still have great potential in improving the ornamental value, increasing watching focus and so on. Therefore, this research start from game stats, exploring and discussing the future development of table tennis broadcast packaging and conceiving some specific plans.

2 **Research methods**

Employing the method of literature review, the method of video observation and method of statistics, this paper has taken the token examples of NBA's and Tennis Grand Slams' packaging through the utilization of game stats as reference, exploring the future packaging plan for table tennis matches.

3 **Results and conclusions**

(1) Using game stats to serve for match broadcast complies with the trend of development in contemporary sports, raising the quality and ornamental value of sports matches, a trend which table tennis must grab, enhancing its development in this field.

(2) The packaging of table tennis broadcast also needs to follow the popular model, using game stats accordingly for pre-match, during the match and after match packaging.

(3) Pre-match packaging mainly provides recent statistics on matches of both sides, statistics of matches between the two opposing sides, so as to reflect their current status, advantages & disadvantages and technique features, suggesting watching focus and commentaries.

(4) Packaging during the match generally needs to provide statistics promptly and properly, backing up the commentaries through graphs and subtitles.

(5) For after match packaging, the key is to provide game stats through graphs and tables of this very match, reviewing the critical factors, leading the broadcasting to a wonderful end. Table tennis broadcasting employing game stats for its packaging has just reached its starting stage. This paper suggests chose high level world competitions as primary packaging targets, then promoting the use of game stats in more table tennis matches so its packaging level can be improved.

Key words: *table tennis, broadcasting packaging, game stats*

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THE STUDY ON ENGLISH AND CHINESE INTERPRETATION CONTROL DATABASE FOR TECHNIQUE AND TACTICS OF TABLE TENNIS

Abstract

1. Research Objectives

As the national sport in China, table tennis is quite popular among people, especially young and inquisitive people. Take the undergraduate for example, they always want to have a more in-depth and professional understanding of it. In such circumstance, we are facing two major problems. First, we lack of straightforward and various teaching materials, especially videos of classic game which can be available for audience anytime. Second, we should make good use of these materials to improve our teaching and guidance in a better and more professional way. To cure the above problems, this very scientific research project aims at the flowing two parts. The first step is to set up a certain amount of database for table tennis competition videos on line. Then, we should select some of the videos as teaching materials to provide professional commentary about table tennis technique and tactics, as well as related knowledge. Considering the fact that the 2016 Olympics are approaching, and that since GDUFS has the advantage over language teaching and research, as well as the need, we can provide both Chinese and English commentary.

2. Research Methods: Reference of document literature, Observation of video, Mathematical statistics and Segmentation index evaluation.

3. Results and Discussion

(1) To collect a certain amount of typical and high quality competition videos; to edit various videos about technique and tactics, then equip them with commentary in both Chinese and English; to set up a reliable database and design a software to storage and search above materials; to use professional table tennis theory and make good use of language research in order to popularize table tennis in and around school, at home and abroad. All in all, to build up a standing foundation of professional teaching so as to keep national ball's flag flying for decades, meanwhile to shape a better educational image of GDUFS.

(2) To set a whole classic competition as case, through technique statistic and commentary of specific technique, in order to reduce personal experience of socialism and subjective randomness. Base on above commentary, use scientific methods, and compare different players, styles and games to deepen the understanding of table tennis technique and tactics in order to improve teaching. Base on a large amount of language materials of table tennis in Chinese and English, comparatively analyse the difference in vocabulary, sentence, passage and pragmatics for purpose of using the accurate language to comment. Last, to build a rather complete comparison table for technique and tactics in Chinese and English, providing a bilingual platform for international and professional communication.

Research Conclusions

Building a database for table tennis commentary in Chinese and English not only fills in the blank, but also improve the quality of teaching. At the same time, it expands the horizons of studying table tennis technique and also provides effective teaching methods for coach and teachers.

Key words: *table tennis, interpretation, database*

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CAUSE AND RECOVERY MEASURES OF BADMINTON AMATEURS' WRIST INJURY

Abstract

Badminton is a Racket sport which is widely popular and attracts different groups of fitness enthusiasts. Although badminton court is not big, but the excise intensity is high, and needs for good agility and fast moving. Most of the badminton amateurs do not have years of professional training. They can't be compared with the professional athletes on both the technique and the physical activity. Moreover, due to the low "threshold" to participate, badminton beginners don't prepare enough on the conditions as clothing and equipment and other hardware. They start to play only by their own feelings and habits. So sports injuries will occur easily, especially common in the wrist. Therefore, this study aimed at analyses the common causes of wrist injury of badminton amateurs, and puts forward the corresponding suggestions on prevention and rehabilitation, guide badminton amateurs scientifically.

This research mainly adopts the research methods of questionnaire, interview and literature. In order to know the overview of wrist injury, selected randomly 30 amateurs as investigation object from six amateur badminton clubs in Beijing Fengtai district. Visit badminton coaches and sports injury treatment expert, and to explore the causes of badminton wrist injury and prevention measures.

Due to the complexity and delicate structure in anatomy, any bone or ligament damage can cause pain in the wrist. Study shows that triangular fibrocartilage injury, ligament injury and tenosynovitis are the three most common injuries. Causes lie in subjective and objective factors. Subjective factors include: substandard motion, lack of physical fitness and insufficient ideological understanding. Objective factors include: badminton technology characteristics and the external conditions, such as courts and equipment's.

Aiming at wrist injury prevention in badminton, the proposals are as followed: first, master the standard techniques; second, warm-up correctly and fully; third, increase exercise load step by step; four, choose suitable equipment. During the recovery of wrist injury we should: first, completes emergency treatment after injury; second, follow the doctor's treatment advice; three, to work appropriately; Four, completes the psychological adjustment positively.

Key words: *badminton amateurs, wrist, injury, recovery*

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THE CHINESE AND FOREIGN EXCELLENT TECHNIQUE USING THE CHARACTERISTICS OF THE BADMINTON MEN'S SINGLES COMPARATIVE ANALYSIS FOR LIN DAN AND LEE ZONGWEI - FOR EXAMPLE

Abstract

With the improvement of contest rules and research level, techniques and tactics direct the development of badminton. Although researches always focused on technique and tactics of men's single, with different emphasizes, the results are quite different. This thesis mainly focuses on how to beat Lin Dan by Lee Chong Wei. By documents collection, video statistics, and comparative analysis, some theories will provide to Lee Chong Wei to beat Lin Dan. The conclusions as follow:

1. The serve of Lee and Lin are both backhand serve. The backhand serve before net is given priority, and adjust with opponent's position. The main serve of Lee is Flat shooting ball.

2. About teeing ground, Lee and Lin both choose no.1 and no.5, and the targets are no.3 and no.5 in back court.

3. In serve technique, Lee's technique is mainly net ball, then is toe lift.

4. About techniques and tactics for front court, Lee and Lin are the same, the frequency of net ball, toe lift and pushball is ranked from high to low. But the frequency of push ball for Lee is higher than Lin. And techniques and tactics for front court as hook and rush shot, the lee's is apparently higher than Lin's. The significant differences only between net ball and rush shot.

5. For technical and tactical usage in the midfield area, Lin and Lee mainly used retaining net and smash, among which the wide usage one was retaining the ball in the front net. As for the frequency of using retaining net, Lee was above Lin. When compared with the scoring and loss rate, as for scoring rate, retaining net, smashes, intercepting and loft scoring of Lin are higher than Lee; as for loss rate, retaining net, loft, intercepting and flick loss of Lee are higher than Lin.

6. About techniques and tactics for back court, Lee and Lin both choose smash and high ball. Lee lose more scores than Lin in parrel ball, passive parrel ball and passive drive ball. Lee lose more scores than Lin except in smash.

7. The get zones of Lee are front court, back court and midfield successively.

Keywords: *badminton, men's single, Lee Chong Wei, Lin Dan*

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RESEARCH ON THE CULTIVATION STATUS AND THE SUSTAINABLE DEVELOPMENT OF BADMINTON TALENTS IN CHENGDU

Abstract

With the Implementation of Western Development in china, Chengdu, one of important cities in Western China, has developed quiet fast. At the same time, Competitive Sports also ushered in a rare development opportunity. It was the main purpose of this essay that knowing the condition of development of badminton in Chengdu, seizing the opportunity and providing countermeasures and proposal for sustainable development of badminton.

According to the survey and interview with badminton athletes and coaches in Chengdu, looking into material and documents about reserve personnel training, and the generalizing analysis about restricting factors of reserve personnel training, the essay proposed methods and the suggestion for sustainable reserve personnel training of Chengdu badminton.

The present situation of badminton reserve personnel training in Chengdu:

1. In recent years, Chengdu badminton had good development tendency, but there was still huge gap of the badminton level between Chengdu and other powerful provinces. In the past several years, the badminton sport was not traditional superiority project in Chengdu. According to the analysis of various domestic competitions, we concluded that Chengdu badminton competition results were in lower level in China. So player's skills, tactics, mentality and comprehensive abilities still need to be greatly improved.

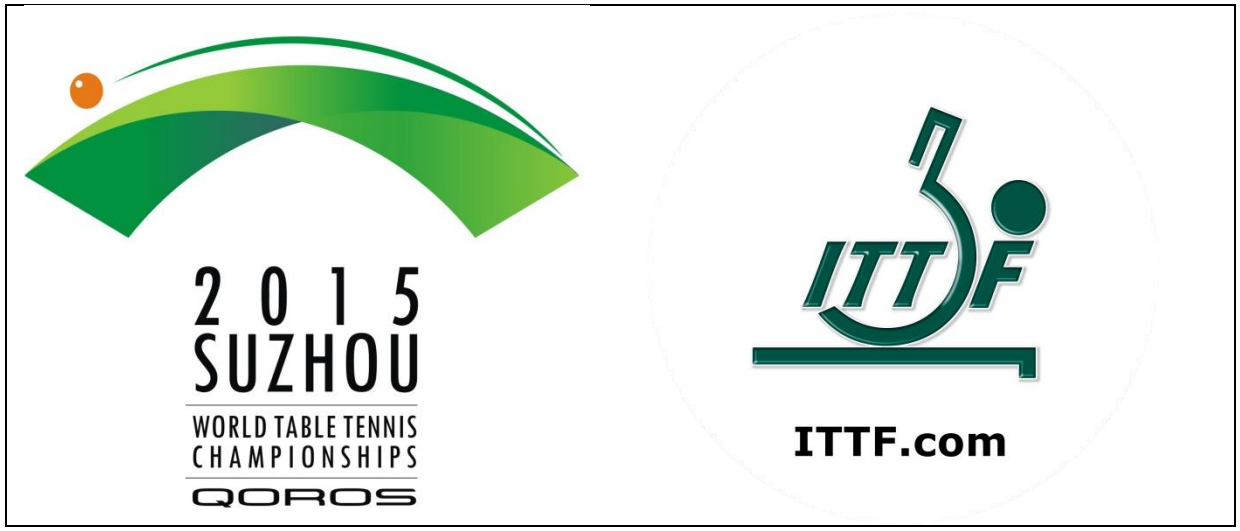
2. In terms of reserve sports talents, we bring in too many mobile players, without coordinating and developmental permanent mechanism about autochthonous talents and enthetic talents. The top athletes with development potential were much less than we needed. We have not established rational selecting mechanism and standard. The science training level is not high.

3. Many coaches, having a poor education and low quality, were lack of theoretical knowledge of professional training. They published no research paper of great value.

4. The fund was deficient. The budget for training was unstable.

The essay put forward the solution to the problem of the badminton reserve sports talents in Chengdu: We need establish rational selecting mechanism and training mechanism, and consummate the coaches training system to improve their quality, We should expand access to raise money and ensure the investment in training funds, proving the material foundation and guarantees for reserve personnel training.

Keywords: *badminton, talent*



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