Table Tennis Sciences and Medicine

JTTA meets ITTF on the way to Olympic Games Tokyo 2020

Tokyo 2014 – 2019

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All the abstracts are reprints of official “Programme and Abstracts” document from each yearly meeting.

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Message from the International Table Tennis Federation

International Table Tennis Federation Executive Vice President,
Japan Table Tennis Association Vice President,
MAEHARA Masahiro

From year 2014 to 2019, JTTA SSMC and ITTF SSMC have worked together to organize International Sports Conference in Tokyo, and this 6 year has been a great privilege and honour.

In 2020 Tokyo Olympic Games will take place. The Japanese Table Tennis history within the Olympic Games began in 1988 Seoul Olympic. At this event there where 4 events which was Men's and Women's Singles, Men's and Women's Doubles, this event was the begging of Table Tennis to be well known throughout the world. From 2008 Beijing Olympics Men's and Women's Team event was introduced making Table Tennis a famous sport. Currently (year 2020) there are 226 countries and region affiliated to ITTF which is the highest number out of all sports.

I truly hope and believe that Table Tennis will grow even bigger after the 2020 Tokyo Olympic games.

At the 6th International Conference, Prof. Kondric gave us the Keynote lecture on "having table tennis as a treatment for Parkinson disease" is one way of development. On 11th October to 13th October the 1st ever ITTF sanctioned Parkinson's World Table Tennis Championships was held in New York. There were 62 players who have participated in many games. This is a development which has the potential to further promote Table Tennis.

Table Tennis has yet got many possibilities. Not only to take part but to enjoy watching. Also to become fit and healthy, to be played as a treatment to disease. I believe what we expect from the sports science are to analyse this sport from the medical and scientific point of view, make assessment of it, and with the information gained, further promote the sport.

I hope the 6 years of working in Tokyo has created a good relation between all, and that this help produce many research results in the future.

Message from the Editors

Preface

It is a great honour and pleasure to issue this document on cooperation between JTTA Sports Science and Medicine Committee and ITTF Sports Science and Medical Committee.

This document includes all the papers presented at the yearly meetings of JTTA SSMC and ITTF SSMC during 2014 -2019 period. All the abstracts are reprints of official “Programme and Abstracts” document from each yearly meeting.

At the end of the book you can find reference list of published documents in period 2014 – 2019 related to the yearly meeting topics and connected to the table tennis content provided by the participants of the meeting. Conclusions and information on the meeting agenda have been provided to all the ITTF members (national associations) during the WTTC, which gives all involved better insight into sports science research and medical support in front of next Olympic Games in Tokyo 2020.

As a chance for Olympic Games in Tokyo 2020, we wanted the Sports Science of table tennis to develop furthermore. The ITTF SSMC members and Japanese researchers had held 6 joint meetings since 2014 in Tokyo, and it made the basis of the future progress.

These Meetings certainly have changed the Japanese researchers' consciousness. They have got interested in an international activity. International joint studies were started. A young pharmacist had been in Lausanne for eight months and worked as an anti-doping staff in the ITTF office. Now, a Japanese researcher is studying sports science in the Ljubljana University. Foreign researchers understood Japanese culture well through the 6 years' visits. Some young researchers have got valuable experiences and grown a lot.

In addition to those academic human exchanges, our meetings have had valuable impact on connection between researches and table tennis manufacturers. Our mutual understanding became even deeper.

These are the valuable achievement of our Meetings. They will continue for many years to come as a legacy of our meetings.

We hope that this and future activities will contribute to the major goal of the table tennis science and medicine, that is, to bridge the gap between sports scientists and practitioners in teaching, coaching, training and rehabilitation of table tennis.

Dr. Shiro Matsuo
Kazuto Yoshida, PhD
Miran Kondrič, PhD

Do young players have access to support from sport scientists — and if so, what difference does it make to their performance?

Science in Table Tennis

The general aim of the research in table tennis and exercise medicine is to present an evidence-based view of the beneficial and adverse effects of physical activity and exercise training on player and his/her health. Although the use of scientific research in sport has a long tradition, currently the practice of supporting table tennis with scientific findings is largely neglected.

Science in Table Tennis should bring together experts from around the world with the aim of furthering collaboration between players, coaches and scientists working in the field of training and competition in table tennis. Each part of training and the game gels theory (sport science) with practice (training and performance) in order to demonstrate the impact science can have on performance at the elite level. Examples could be given from other racket sports (tennis, badminton, squash) and in the context of specific countries within all continents. This team of scientists will be of great value to any one studying sport science degree with the aim of entering into coaching or training. It will also be a key resource for those already involved in the implementation of coaching strategies at the elite level and also for players themselves.

Success in table tennis is much more likely if players follow a sound training program based on scientific training principles, to prepare themselves physically and mentally for the rigorous demands of national and international competitions. Coaches are therefore obliged to encourage players to base their training on scientific training principles in order to enhance their performance, as well as to remain injury free.

The idea to include science into the training of table tennis it's a great initiative from JTTA Sports Science and Medicine Committee and ITTF Sports Science and Medical Committee for worldwide table tennis players and will help to move them forward to Olympics 2020 and beyond. It's an exciting time for table tennis sports science and we hope this will be a model also for other researchers. This could be the start of a new era of sports science in table tennis in the world. We don't want people sitting in committees day and night; we want them out in sports halls and at the training sessions, influencing players and making a difference to performance. Although Asian and European players are very successful, the player’s are much more art-based than science-based. We want a little bit more science to influence Olympics in 2020 and 2024.

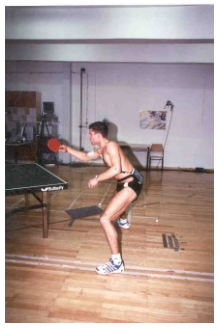
From the viewpoint of sport psychology sports medicine, nutrition, performance analysis, physiology, talent identification, strength & conditioning and biomechanics, we would like to carry out the scientific support for young and elite players in table tennis. The support of sport psychology will collect the data about behaviours in table tennis play by VTR, Sportsman Motivation Inventory (SMI) for searching the psychological conditioning state of peaking, and heart rate in the game. In the support of biomechanics, EMG, load and nutrition distribution methods were adapted for studying the muscular activity and load distribution ratio in the game. Based on these data, the staffs of scientific support and the coach of table tennis will have a meeting to examine the effects of the scientific supporting project.

BRANCHES FOR SCIENTIFIC RESEARCHES IN TABLE TENNIS

SPORTS MEDICINE

Sports and Exercise Medicine involves the medical care of injury and illness in table tennis. Solutions require accurate diagnoses, careful clinical examination and experience and knowledge of sport specific movement patterns (especially different strokes in table tennis). Sports Physicians have to be trained in musculoskeletal ultrasound and various injection techniques – particularly regarding loads which come out in table tennis game (which is the most important demand!). Sports medicine is particularly important to performance athletes, both from an injury and illness perspective. Where ever possible it should be available at short notice as time is crucial for players in terms of getting back to the table tennis as quickly as possible as usually injuries get worse if they are left.

PERFORMANCE ANALYSIS



Performance Analysis is the provision of objective feedback to performers trying to get a positive change in performance. Essentially it is about telling the table tennis player what actually happened as opposed to what they perceived to be happening. Research shows that on average, players and coaches can only recall 30% of performance correctly - performance analysis helps with the remaining 70%.

In table tennis the analysis can either take place immediately following the performance i.e. on the court or can take place in the laboratory in a more controlled environment – which is not common in table tennis. One of the benefits of providing immediate feedback is providing the player with the opportunity to make adjustments to improve performance straight away. But the coach is valuable to the analysis as spotting the

problem is easy, but the trick is how to fix it and that's where the coach comes in. Within a training environment immediate visual feedback software could be used which offer images pre and post-feedback for comparison. In a competitive environment, the player would look at the profile and stats of their opponent for the next game or day; they would then discuss the data and that would contribute, along with past experiences, to the player's game plan.

PHYSIOLOGY

Exercise Physiology is the study of how exercise alters the function and structure of the body. A sports physiologist examines the acute responses and chronic adaptations to player's performance in a variety of training and competition situations. The physiologist possesses a wide-ranging understanding of the body, enabling them to advise athletes and coaches of how training and preparation influence competition performance.

Testing can take place in the lab, which ensures a controlled environment to compare exercise test results. However, it is not always possible to simulate sporting activity in a lab (especially in table tennis!) and with advances in technology physiologists use field-based testing as much as possible. This work is vital as it can evaluate training as it happens; allowing the player and coach to objectively monitor what impact a particular session has had on the body. Physiology can improve an athlete's performance by giving important objective information which can help coaches to adapt training programmes to maximise their desired outcome. This will depend on many factors including the conditions, diet, gender, age and health.

PSYCHOLOGY

The mind has a key role to play especially in table tennis. What we think and how we feel will impact on any sporting performance and not only on game outcome. Sport psychology is a positive psychology focussing on enhancing sport performance by helping players and coaches develop mental skills to become better at what they are already very good at.

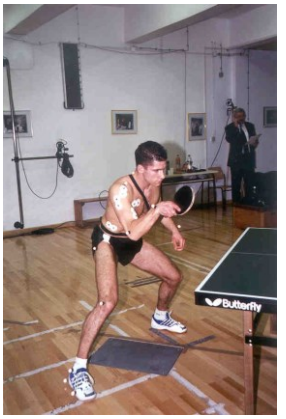
A positive mindset during training keeps player focused on making the small

improvements to make him better. A positive mindset during competition may make that 1% difference between achieving player goals. Sport psychologists help player identify that winning mindset to develop, enhance and maintain optimal performance.

TALENT IDENTIFICATION

Talent Identification is both an art and science involving a complex blend of scientific knowledge and assessment, alongside coaching art. It is designed to proactively seek out those that possess the raw material for World Class success, and respond positively to an intense training and competition environment. The scientific approach of identifying talent involves a series of rigorous assessments and filters to detect individuals that have 'higher probability' for podium success. The system has to be smart enough to select individuals based on their future abilities and standards required to deliver medals in five years time. Not just current performance abilities being produced here and now.

BIOMECHANICS



Biomechanics is the scientific discipline which studies mechanical parameters of human motion. In sport and especially in table tennis, it can help to improve performance by means of developing more effective motion technique as well as to avoid injury.

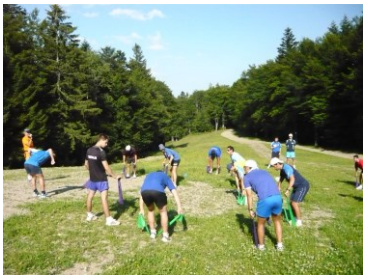
Biomechanists can use a wide range of tools: instrumented measurements using force platforms or telemetry systems, 3D video analysis, speed guns and high speed cameras, electro-typography and pressure distribution systems. Testing can take place both within the lab as well as the field which could include analysing the performance of a player in training and competition analysis. This can help diagnose any problems which might be limiting sporting potential and with close consultation with the players coach, training patterns may be altered to rectify the problem. The impact this can have on a players' performance is significant.

STRENGTH AND CONDITIONING

Strength and Conditioning is the physical and physiological development of athletes for elite sport performance. The role of the S&C coach is to bridge the gap between the theory of training and applied training, helping players to become faster,

stronger and more flexible and to build their muscular endurance so they perform better and remain injury free.

Strength and Conditioning is about more than lifting weights - it encompasses the entire development of the player and what is needed to improve physical performance. This includes plyometrics, speed and agility, endurance and core stability with strength training being just one piece of the jigsaw.



Strength and conditioning coaches' works alongside a table tennis coach to assist them in designing specific programmes that will address the particular need of the player. There are many ways a well constructed programme can add to the rehabilitation, speed, agility, endurance and strength of the players - a periodised programme that targets both strengths and weaknesses will produce the best possible performance.

PHYSIOTHERAPY

Physiotherapy aids injury prevention and assists in the rehabilitation of players back to normal performance levels. In terms of injury prevention, a physiotherapist must work closely with a player to make sure they are in a better position to avoid recurring injuries - helping them to identify the tell-tale signs and to introduce exercises to address the problem earlier.

A physiotherapist does not work in isolation but relies on the expertise of the coach, the strength and conditioning coach and the sports doctor. Through teamwork, an agreement is reached in the short, medium and ultimate long term goal and what support package is required to attain those goals. Athlete treatment can take place at the training and/or competition venue.

NUTRITION

Nutrition can play a huge role in supporting the training and competition demands of any elite player. Food alone will not make you to beat Ma Lin or Wang Liqin, but the right diet is absolutely central in supporting training to make those achievements possible. Good food choices help ensure fuel needs are met to promote adaptations to training, to aid recovery in order to continue and intensify training and to ensure good health to prevent illness and injury.

OTHER FEAUTURES WE HAVE TO TAKE IN CONSIDERATION

- Analysis Equipment - Biomechanics
- Anthropometry Equipment
- Blood Analysis Equipment and Consumables
- Computing Equipment - Biomechanics
- Electronics - Biomechanics
- Ergometers
- Field Testing Equipment - Physiology
- Maximal Oxygen Uptake Equipment and Consumables
- Software Applications
- Strength and Conditioning Training Equipment
- Strength/Force Testing Equipment
- Video Equipment - Biomechanics

The JTTA/ITTF SSMC Science in Table Tennis Team have to complete recruiting its team of sport science and sport medicine experts to drive its support services forward over the coming cycle. It will be a great marker that we will now have the team in place to help us drive the delivery and development of all of the sport science and medical services the JTTA/ITTF SSMC offers to elite sport over the coming years.

ITTF SSMC chairman
Miran Kondrič, PhD

PART 1

Documentation of 2014 – 2019 JTTA SSMC and ITTF SSMC annual meetings

2014

Japan Table Tennis Association http://www.jtta.or.jp
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1-1-1 Jinnan, Shibuya-ku, Tokyo 150-8050 JAPAN
Fax:+81-3-3481-2373
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Invitation to the annual SSMC meeting 2014

I am a chairperson of the Japan Table Tennis Association sport science and medicine committee, and hold the debrief session of scientific research in February every year. I and Kazuto Yoshida(vice-chairperson) want to hold the meeting just before the world championship 2014, and to accept participation of the member of the ITTF sports science and medical committee.

We will perform a presentation in English. And we are ready to discuss about joint research with you.

Since opening of the world championship is on April 28(Mon), I am going to hold our meeting on 26(Sat)-27(Sun) April.

If the member of the ITTF sports science and medical committee wishes the participation in our meeting and visits Japan three days before world championship opening (25 April), we will offer stay for two days.

I do not want this meeting to be a one-off event. Although I can not make any promises now, I am hoping to obtain a public subsidy and, if successful, invite ITTF sports science and medical committee members every year after 2015. Indeed the Japanese government is going to be promoting international co-operation, in the hope of having a successful Tokyo Olympic Games in 2020.

This plan is the beginning. We are looking forward to your participation. If you wish to participate, please inform me by February 20.

Schedule: April 26 (Saturday):
Morning: Inspection of institutions: Japanese Institution of Sports Science, Japan Anti-Doping Agency, National training center
Afternoon: JTTA sports science and medicine committee meeting; Result-of-research & Activity reports (in English)
18:00 - Party

April 27 (Sunday):
Early morning: JTTA sports science and the medicine committee (in Japanese)
Morning: Discussion about the joint research between JTTA and ITTF members (in English)
Afternoon: Registration in Shinagawa Prince Hotel (official Hotel for world championships)

Thanks and regards, Shiro MATSUO (ITTF SSMC Chief Anti-doping, JTTA SSMC Chairman)

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August 21st, 2014

Japan Table Tennis Association
Sports Science and Medicine Committee
Annual Meeting 2014

I am pleased that we can hold this annual meeting again in 2014. Thank you for your attendance.

This year is a turning point for Japanese sports organizations. This year, we begin our journey toward the Tokyo Olympic Games and we have many preparations to make by 2020.

"Internationalization" is one of the most important issues. We, the JTTA sports science and medicine committee, decided to open our annual meeting to researchers from other fields, and also to invite the members of the ITTF sports science and medical committee. This is the first step in our internationalization.

We have been conducting this meeting for over ten years. Each researcher is the authority in their field, we have confidence in our research. I am sure that publishing our research results is helpful not only for domestic researchers but also for the researchers in foreign countries. I hope we will leave this meeting with new knowledge, new skills, new expertise and a network of new friends and colleagues.

Finally, I would like to emphasize once again, this is only the first step and we have a long journey ahead of us before we will see any concrete results. " Little and often fills the purse." I will make the utmost effort for the continuation of this meeting in years to come.

Shiro MATSUO

Outline

Date: April 26 (Sat) - 27 (Sun) 2014

April 26 (Saturday):

Morning: Inspection of institutions:
Japanese Institution of Sports Science,
Japan Anti-Doping Agency,
National training center

Afternoon: JTTA sports science and medicine committee meeting;
Research reports & Activity reports (in English)

18:00 - Party (no charge)

April 27 (Sunday):

Early morning: JTTA SSMC meeting (in Japanese)
Morning: Discussion between the JTTA and the ITTF members (in English)
Afternoon: Registration in Shinagawa Prince Hotel (official Hotel for WTTC)

Venue

AJINOMOTO National Training Center

http://www.jpnsport.go.jp/corp/english/tabid/382/Default.aspx

Zip code; 115-0056
Address :3-15-1 Nishigaoka Kita-ku, Tokyo 115-0056

Japan Institute of Sports Sciences

http://www.jpnsport.go.jp/corp/english/activities/tabid/393/Default.aspx

Hotel

Hotel METS Akabane http://www.jrhotelgroup.com/eng/code/codeeng152.htm

http://www.hotelmets.jp/akabane/

Zip code; 115-0045
Address : 1-1-76 Akabane, Kita-ku, TOKYO, JAPAN
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Abstracts

[1]

Scientific support for improving service skills in table tennis: focusing on junior players of the JOC elite academy team

Kazuto YOSHIDA *Shizuoka University*
Koshi YAMADA *Table Tennis Friendship Club*
Sho TAMAKI *Keio University*
Haruhiko IKEBUKURO *Japan Sport Council*
Hisashi NAITO *Juntendo University*

Abstract: Scientific support for improving service skills was conducted to increase the competitiveness of junior table tennis players in the JOC elite academy program. Two experiments per year had been ongoing for three years. A high-speed camera (1000Hz) was used to measure the rotation speed of the service ball and two normal speed cameras (30Hz) were used to measure players' movements. A meeting was held on the day after each experiment to discuss the results. Through these practices, some effective cases on improved service skills of the players were observed, with removing the bad habits of their service motions, and with increasing the rotation speed of the ball. Various constructive demands about the support were proposed from the players who participated in the experiment several times. It was suggested that this support was beneficial with not only increasing their competitiveness but also providing the junior players opportunities to learn how to apply scientific knowledge.

*The paper for a part of this study is 'in press' in the Japanese Journal of Sport Education Studies (34-1:2014).

[2]

Effect of racket mass and rate of strokes on kinematics and kinetics in the table tennis topspin backhand

Yoichi IINO *The University of Tokyo*
Takeji KOJIMA *The University of Tokyo*

Abstract: The purpose of this study was to investigate the effect of the racket mass and the rate of strokes on the kinematics and kinetics of the trunk and racket arm in the table tennis topspin backhand. Eight male Division I collegiate table tennis players hit topspin backhands against topspin balls projected at 75 balls/min and 35 balls/min using three rackets varying in mass of 153.5 g, 176 g, and 201.5 g. A motion capture system was used to obtain trunk and racket arm motion data. The joint torques of the racket arm were determined using inverse dynamics. The racket mass did not significantly affect the racket kinematics and the trunk and racket arm joint angular velocities. However, the peak wrist dorsiflexion torque was significantly larger for the intermediate and large mass rackets than for the small mass racket. The use of heavy rackets may put players at greater risk of injuries of the wrist dorsiflexors. The racket speed at impact was significantly lower for the high ball frequency than for the low ball frequency. The result highlights one of the advantages of playing close to the table and making the rally speed fast.

[3]

Effects of the timing of presentation of ball course information on kinematics of table tennis forehand and backhand drives

Yoichi IINO *The University of Tokyo*

Abstract: 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. Eight Division I and eight 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 and 2) that ball course was not apparent until the time when balls were projected. A motion capture system was used to collect the 3D coordinate of the markers attached to the participants. The racket speed at ball impact during the forehand drive was significantly higher for the early condition than for the late condition in the Division I players. Other results will be presented at the meeting.

[4]

Vibration characteristics by a combination of table tennis rackets and rubbers

Kai MURAKAMI *Niigata University*
Yukihiko USHIYAMA *Niigata University*
Kei KAMIJIMA *Niigata Institute of Technology*

Abstract: In this study, we aimed to judge combination of table tennis rackets and rubbers by vibration characteristic. There were measured combination 4 rackets and 5 rubbers by collision experiment. A method of measurement is collision experiment that ball collide to supported rackets. Support style is 2 ways. 1^{st} is immovably-support. 2^{nd} is free-support. We measured vibration in square and angular rackets. Measurement item is natural vibration frequency and logarithmic dumping rate. Finally we considered this item. We show vibration data (Fig.1) and Power spectrum (Fig.2) by Fast Fourier

Transform (FFT). δ is logarithmic dumping rate. Vibration convergence time becomes shorter as the logarithmic dumping rate is larger. On the contrary, Vibration convergence time becomes longer as the logarithmic dumping rate is smaller. When we combined racket C and each rubber, there is little to choose between measured values. We think that racket C demonstrate a stable effect. When we combined racket D and each rubber, there is great difference between tension and glutinosity rubber. We think that it is difficult to demonstrate a stable effect by combination.

It is important for raising the player's performance to understand the vibration characteristic by a combination of table tennis rackets and rubbers.

[5]

A 3D simulation of the flight of the table tennis ball with its interaction with the ball

Suguru ARAKI and Naomi WADA
Department of Information Science
Tohoku Fukushi University
Sendai, Miyagi 981-8522 Japan

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 (e.g. Kasai and Yanai 2014). 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 kinematically determined 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 is 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 2013).

References

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Kyohei Endo 2013: “HTML5 による物理シミュレーション.” CUTT System, 2013.

[6]

Anti-doping activity in 2013

Shiro MATSUO *Japan Table Tennis Association Doping Control Committee*

Report: I would like to report the JTTA anti-doping activity in 2013.

We carried out in-competition testing at four separate tournaments in 2013 in co-operation with the Japan Anti-Doping Agency. We obtained a total of 50 samples from players. Fortunately, there were no positive cases.

In addition, we provided four kinds of educational services, namely lectures, booklets, an outreach program, and an information service on the JTTA homepage.

We also provided ongoing support for our national team's players. Whenever a player had to take medicine due to illness, we checked the medicine for any banned substances. Furthermore, whenever players contacted us by e-mail or fax, we always tried to respond as soon as possible. We had 67 such questions in 2013. We checked a total of 149 different medicines and found banned substances in 15 of those. We subsequently advised the players not to take the medicines in question.

In addition, we supported some players who made TUE applications and provided a lot of advice in this regard.

[7]

Nutrition support program for table tennis players in the JOC elite academy project

Michiyo KIMURA, Ph.D., R.D. *Takasaki University of Health and Welfare*
Mizuho ADACHI, M.D., R.D. *Nippon Sport Science University*

Abstract: As part of the Elite Academy Project launched in 2008, the JOC (Japanese Olympic Committee) operates an Elite Academy Program to provide talented junior high school and high school players with the highest level of education, aiming to support and foster them to compete at international matches in the future. In 2013, 19 junior table tennis players were recruited in the Elite Academy Program. They lives athlete accommodation located adjacent to the NTC (National Training Center) in Tokyo. Nutrition support program for the Elite academy players is divided into the following 3 sections.

1. Nutrition assessment

At the start of a nutrition program, most of the players attend an individual screening with NF (national sports federations) dietitian to assess their eating patterns and important nutrition issues. NF dietitians evaluated dietary status and body composition every 4 months.

2. Dietary management

The NTC Dining Hall (Sakura dining) caters meals, feeding Elite Academy players as well as visiting groups. Food service dietitians develop seasonal menus called “KACHIMESHI”, which means a meal to win. As a quick guide, we also use a MELLON system to assist athletes to make good choices.

3. Nutrition education

Throughout the year, nutrition education sessions are presented to Elite Academy players to enhance self-management ability. Although our education sessions are sometime conducted in a traditional lecture format, players enjoyed and preferred some creative activities such as role playing, food taste testing, video clips and group discussions. Cooking classes are one of our most useful activities. These classes teach athletes how to plan menus for competition, recovery and overseas tour.

[8]

Questionnaire survey of sports injury in young table tennis players in Japan

Hiroyoshi OGASA *Yamaguchi University*
Teruaki MORI *Yufuin Kosei Nenkin Hospital*
Shiro MATSUO *Bessho Medical Clinic*

Abstract: Sports injury due to excessive practice or a high number of games is a problem in childhood competitive sports. However, there have been few nationwide investigations of injury during the growth phase, especially in school-age children. We carried out an unsigned questionnaire survey to investigate sports injuries in young table tennis players who participated in nationwide table tennis competitions.

We report several data in young table tennis player's sports injuries. As compared with the past report, starting age is decreasing in Japan table tennis competitions, while practice time is increasing. The rate of consultation with medical institutions, such as hospitals, is low in schoolchildren. We would like to utilize these data for injury prevention in the stage of a player development.

[9]

Development a web-based database system for performance analysis

Sho TAMAKI *Keio University, Graduate School of Science and Technology*
Kazuto YOSHIDA *Shizuoka University, Faculty of Education*
Koshi YAMADA *Table Tennis Friendship Club*

Abstract: Performance analysis, namely the statistical analysis of player's performance using enormous amount of data, has been advanced by many researchers for real application in table tennis. A performance analysis in real scenario was achieved by Japanese national team in London Olympics 2012. There, however, are some issues in conventional approach. One of the most important issues is the poor functionality of the data managing. We need time-consuming operations in order to share or manage the recorded and analyzed data. This study therefore considered a web-based database system for solving the issue. The analysis data can be shared and managed easily with the system because the data will be stored in a unique database on the web. In addition to that, the system can be operated at a small cost, for free for now, because it works on cloud computing environment. A prototype system and its client software, which is a graphic user interface for users, were then developed. The developed system demonstrates the possibility of solving the conventional issue.

[10]

The influence of the coordinated movement of the body on ball speed

Junichi KASAI *Waseda University*

Abstract: There have been many papers published on the ball speed of table tennis players. However, we find a dearth of information revealing the influence of the coordinated movement of the body on ball speed. We find far more information on ball-hitting and pitching operations in baseball which shows ball speed is increased by whip-like movements created by coordination of the feet, knees, hips, shoulders, elbows and fingers in that order.

We investigated whether the same phenomenon would be observable in table tennis. We have employed 3-dimensional motion analysis systems and portable oxygen intake measurement systems.

We measured various values for two players. At stroke speed values of 22m/sec and 25m/sec, ball speed values were 25m/sec and 27m/sec respectively. With this result, a direct correlation between stroke speed and ball speed was observed. Interestingly, we also found that stroke speed is regulated by the coordination of various body parts.

During testing, the oxygen intake was 90% of the maximum and the heart rate had reached maximum.

List of the participants at 2014 annual JTTA SSMC and ITTF SSMC meeting

JTTA – SSMC members

Nr.	*Name*	*Institution*
1	Shiro MATSUO	Japan Table Tennis Association doping control committee
2	Kazuto YOSHIDA	Shizuoka University, Faculty of Education
3	Hiroyoshi OGASA	Yamaguchi University
4	Mizuho ADACHI	Nippon Sport Science University
5	Suguru ARAKI	Tohoku Fukushi University
6	Takashi GUSHIKEN	Hakuai Hospital
7	Ayako HABU	Japan Table Tennis Association
8	Yoichi IINO	The University of Tokyo
9	Haruhiko IKEBUKURO	Japan Institute of Sport Science
10	Junichi KASAI	Waseda University
11	Michiyo KIMURA	Takasaki University of Health and Welfare
12	Shigeaki MATSUURA	Osaka University
13	Kai MURAKAMI	Niigata University
14	Takuro OKADA	Kameda Medical Center
15	Hiroaki SAKAKIBARA	University of Teacher Education Fukuoka
16	Sho TAMAKI	Keio University
17	Hideki TANIGUCHI	Japanese Red Cross Nagasaki Genbaku Hospital
18	Yutaka Tsuji	Emeritus professor of Osaka University
19	Yukihiko USHIYAMA	Niigata University
20	Naomi WADA	Tohoku Fukushi University
21	Koshi YAMADA	Table Tennis Kouryukai
22	Tugutake YONEDA	Japan Biathlon Federation
23	Kazuhiro YONEZAWA	Ather Co., Ltd.
24	Youji YOSHIZAWA	Nagoya University of Economics

ITTF – SSMC members and their guests

Nr.	*Name*	*Institution*
1	Miran KONDRIČ	University of Ljubljana, Faculty of Sport, Slovenia
2	Tsung-Min HUNG	National Taiwan Normal University, Taiwan R.O.C.
3	Xiaopeng ZHANG	Chinese Table Tennis Association, China
4	Emre AK	Middle East Technical Univ. Department of Physical Education and Sports, Turkey
5	Branko SBUTEGA	University of Belgrade, Institute for orthopedics "Banjica", Serbia
6	Jean Francois KAHN	Pierre and Marie Curie University, Faculty of Medicine, Laboratory of Physiology, France
7	**Kazuto YOSHIDA*	Shizuoka University, Faculty of Education, Japan
8	**Shiro MATSUO*	Japan Table Tennis Association doping control committee

** already at JTTM SSMC list.*

2015

Japan Table Tennis Association http://www.jtta.or.jp
Kishi Memorial Gymnasium Tel:+81-3-3481-2374
1-1-1 Jinnan, Shibuya-ku, Tokyo 150-8050 JAPAN
Fax:+81-3-3481-2373
e-mail:table-tennis@japan-sports.or.jp

May 21st, 2015

Dear ITTF SSMC members,

Re: Invitation letter for Japan Table Tennis Association Sports Science and Medicine Committee International Meeting 2015

We will have the Japan Table Tennis Association Sports Science International Meeting 2015 in AJINOMOTO National Training Center in Akabane, Tokyo from September 20th to September 21st 2015. I am writing to invite you to participate in this meeting. Since you are an expert in table tennis sciences, I believe your presence and our conversation would make this meeting very successful.

I am pleased to confirm that we will be able to fund the following expenses:

- round trip flight
- connection costs between Narita/Haneda airport and the hotel
- 4 nights' hotel accommodation, including breakfast
- lunch at the training center each day

I do hope you will accept this invitation, and would appreciate your RSVP by email on or before July 1st. For more information, please see the attached event schedule and notes.
Please feel free to contact me should you have any questions or comments.

Sincerely yours,
松尾 史朗 Shiro MATSUO Chair of the JTTA SSMC
email: shiro-matsuo@jcom.home.ne.jp
吉田 和人 Kazuto YOSHIDA Vice-chair of the JTTA SSMC
Vice-chair of the ITTF SSMC
前原 正浩 Masahiro MAEHARA General Director of the JTTA
Executive Vice President of the ITTF

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Fax:+81-3-3481-2373
e-mail:table-tennis@japan-sports.or.jp

Event schedule

September 18/19th: Arrival in Narita/Haneda, Japan* **
September 20th: am Inspection of institutions:
Japanese Institution of Sports Science and National Training Center pm JTTA SSMC International Meeting (in English) Welcome Party at the National Training Center
September 21st: am JTTA SSMC International Meeting (in English) pm ITTF SSMC meeting
September 22nd: Departure from Narita/Haneda, Japan* **

*We will send you a round trip economy class e-ticket for the flight from your city to Narita.

**Please wait to be picked up by our staff at Narita/Haneda Airport on September 19th and you will also be taken back from your hotel to Narita/Haneda Airport on September 22nd.

Venue

AJINOMOTO National Training Center
http://www.jpnsport.go.jp/corp/english/tabid/382/Default.aspx
Zip code; 115-0056 Address : 3-15-1 Nishigaoka Kita-ku, Tokyo, JAPAN
Japan Institute of Sports Sciences
http://www.jpnsport.go.jp/corp/english/activities/tabid/393/Default.aspx

Hotel

Mid in Akabane-Ekimae
http://www.midin.jp/akabane/index.html
Zip code; 115-0044 Address : 1-5-4 Akabane Minami, Kita-ku, Tokyo, JAPAN TEL ; 81-3-3902-3111

Please note:

As sponsor of this conference, the Japan Sports Council asks that all participants strictly comply with the following rules:

1) The e-ticket must only be used by the named person and it is not possible to change the flight details.
2) Please do not extend your stay in Japan for any reason, even if you are willing to bear the additional costs.

Thank you for your cooperation

Japan Table Tennis Association

Sports Science and Medicine Committee
International Meeting 2015

PROGRAMME

AND ABSTRACTS

20 - 21 September 2015,

National Training Center,

Tokyo, JAPAN

スポーツ振興くじ助成事業

Supported by Sports Promotion Lottery

Japan Table Tennis Association presidents greetings

I am pleased to announce the holding of "2015 JTTA SSMC International Meeting" at National Training Center, Akabane Tokyo from 20th to 21st September, 2015. Following the meeting held the year before, we have participants from ITTF SSMC and other International SSMC members joining us.

Sports Science & Medicine Committee (SSMC) was set up in 1987, by JTTA to introduce SSMC into strengthening of players. There are 27 members within the committee and they all work in different fields such as Doctors, Nutritionist, Psychological Researcher, Trainer, Sports Scientists Researcher, and Engineering Researcher. These members worked on the basic research (Practical and Theoretical) on Table Tennis to build the Medical Support, Mental Support, Nutritional Support, and Information Strategy.

Since 1990, researcher's got together once a year, bringing their research to share, discuss and evaluate for further development.

The meeting which has its history became an International Meeting for its first time last year when ITTF SSMC members who were in Japan at the time for the "World Team Table Tennis Championships in Tokyo".

We would like to share the conclusion of our research with everyone around the world and to have discussion on it.

I am delighted for such International Meeting to be held here in Tokyo, where the future Olympic and Paralympic Games will be held. I wish this meeting will be fruitful for all participants.

Japan Table Tennis Association
President

Sadayoshi FUJISHIGE

Greetings

I am pleased that we can hold this annual meeting again in 2015. Thank you for your attendance.

It has great significance to us to hold this meeting again in Tokyo. Last year, We, the JTTA sports science and medicine committee, decided to open our annual meeting to researchers from other fields, and also to invite the members of the ITTF sports science and medical committee. We had our first international meeting at the same place last year and it was extremely productive and beneficial.

It has great value to hold a 2nd international meeting. We often see that plans are carried out only once and are not continued. However, today we are having our 2nd meeting. Continuation is vital.

We have been conducting this meeting for over ten years domestically. Each researcher is an authority in their field, and so we have confidence in our research. I am sure that publishing our research results is helpful not only for domestic researchers but also for the researchers in foreign countries. I hope we will leave this meeting with new knowledge, new skills, new expertise and a network of new friends and colleagues.

Finally, I would like to emphasize once again, we have a long journey ahead of us before we will see any concrete results. I will make the utmost effort for the continuation of this meeting in years to come.

Japan Table Tennis Association
Sports Science and Medicine Committee Chairman

Shiro MATSUO

Organizing committee

Shiro MATSUO (Bessho Medical Clinic, JTTA SSMC)
Kazuto YOSHIDA (Shizuoka University, JTTA SSMC)
Hiroyoshi OGASA (Yamaguchi University, JTTA SSMC)
Koshi YAMADA (Table Tennis Friendship Club, JTTA SSMC)
Sho TAMAKI (Meio University, JTTA SSMC)

ITTF Sports Science and Medical Committee

Miran KONDRIC	SVN
Irene FABER	NED
Goran MUNIVRANA	CRO
Tsung-Min HUNG	TPE
Dora KURIMAY	HUN
Nicolae OCHIANA	ROM
Jean Francois KAHN	FRA
Shiro MATSUO	JPN
Kazuto YOSHIDA	JPN

JTTA Sports Science and Medicine Committee

Shiro MATSUO
Kazuto YOSHIDA
Hiroyoshi OGASA
Koshi YAMADA
Sho TAMAKI
Michiyo KIMURA
Mizuho ADACHI
Yoji YOSHIZAWA
Junichi KASAI
Suguru ARAKI
Yukihiko USHIYAMA
Nariaki MATSUURA
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Takashi GUSHIKEN
Osei TSUJ
Hiroyasu AKAGI
Takeshi NISHIKAWA
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Tsuyoshi KATSU
Yoichi IINO
Hitomi MURAKAMI
Hiroaki SAKAKIBARA
Takehiro WATANABE
Tuyoshi TOYOTA
Ayako HABU
Takahiro YAMAUCHI
Ayato TANAKA

Doping Control Committee

Takuro OKADA

PROGRAMME

Welcome

Sun. 20 September 1:00 pm-

Shiro MATSUO The chairman of JTTA sports science and medicine committee

Research presentations & Activity reports

Session 1: Research presentations

Sun. 20 September 1:00 pm-

Chair: Shiro MATSUO

1. R**apid adjustment of swing immediately before hitting in table tennis players**
   Kazuto YOSHIDA (*Shizuoka University, JTTA SSMC*)

2. **Assessment of table tennis strokes using inertial sensors**
   Yoichi IINO (*The University of Tokyo, JTTA SSMC*)

3. **Muscles of the legs fatigue analysis about forehand stroke in table tennis**
   Mai KITAMURA (*Niigata University, Graduate School of Modern Society and Culture*)

4. **The importance of orientation and initial selection pattern for table tennis**
   Nicolae OCHIANA (*University Vasile Alecsandri of Bacau, Romania, ITTF SSMC*)

5. **Profiling international elite youth table tennis players using a multidimensional approach**
   Irene R. FABER (*The Netherlands, ITTF SSMC*)

Session 2: Research presentations

Sun. 20 September 3:00 pm –

Chair: Kazuto YOSHIDA

6. **Rally Length in Top Level Table Tennis**
   Michael FUCHS (*Technische Universität München,* Perfo*rmance Analysis and Sport Informatics, Germany*)

7. **Determining the overall structure and the role of technical - tactical activities in modern, competitive level table tennis game (by using two different approaches/methods of collecting data)**
   Goran MUNIVRANA (*ITTF SSMC*)

8. **Development of a Web-based Application for Performance Analysis in Table Tennis**
   Sho TAMAKI (*Meio University, JTTA SSMC*)

9. **A 3D Simulation of the Flight of the Table Tennis Ball (2)**
   Suguru ARAKI (*Tohoku Fukushi University, Department of Information Science*)

10. **The research of responses of cardio-respiratory functions by many ball practices in table tennis**.
    Junichi KASAI (*Waseda University, JTTA SSMC*)

Special Program

Sun. 20 September 5:00 pm –

Chair**:** Chikara MIYAJI

1. Special lecture

High-speed Image Processing and Its Applications in Sports Science
Masatoshi ISHIKAWA (*The University of Tokyo*)

2. Explanation of the project

Developing an immediate feedback system on ball rotation speed in table tennis
Chikara MIYAJI (*Department of Sports Science, Japan Institute of Sports Science*)

3. Demonstration

Demonstration of high-speed tracking photography

4. Q&A

Key note lecture

Mon. 21 September 9:00 am –

Health status and incidences of injuries in para table tennis related to the substance misuse

Miran KONDRIC

(Chairman of ITTF Sports Science and Medical Committee)

Research presentations & Activity reports

Session 3: Activity reports & Research presentations

Mon. 21 September 9:45 am –

Chair: Shiro MATSUO

1. **Food environments in ITTF premium junior circuit**
   Michiyo KIMURA *(Takasaki University of Health and Welfare, JTTA SSMC)*

2. **The Appropriate Pharmacotherapeutics and the Role of Pharmacist in Sports**
   Takuro OKADA *(Kameda Medical Center, JTTA Doping Control Committee)*

3. **Introduction of the so-called "Baseball Elbow" in Japanese Adolescent Table Tennis Players**
   Hiroyoshi OGASA *(Yamaguchi University, JTTA SSMC)*

Session 4: Activity reports & Research presentations

Mon. 21 September 10:45 am –

Chair: Hiroshi SEKIYA (Hiroshima University)

4. **Mental support to the table tennis youth national team**
   Yoji YOSHIZAWA *(Nagoya University of Economics, JTTA SSMC)*

5. **Establishing Reliability of the Competitive Readiness Scale for Table Tennis *Athletes (CRSTTA)***
   Arnulfo LOPEZ *(University Of Santo Tomas, Graduate School of Psychology Philippines)*
   Oscar Yoshihiro SANTELICES *(University of the Philippines, Department of Sports Science, College of Human Kinetics, Philippines)*

6. **A multidisciplinary investigation of the effects of state anxiety on serve kinematics in table tennis**
   Voung NGO *(Glasgow University, Scotland)*

7. **The importance of pre-performance ritual and rituals between points (The Game Face Routine)**
   Dora KURIMAY *(ITTF SSMC)*

8. **A qualitative study on the factors for watching table tennis game**
   Yu-Ling LEE, Tsung-Min HUNG *(National Taiwan Normal University, ITTF SSMC)*

Closing Remarks 1:00 pm

Jean-François KAHN (*ITTF SSMC special adviser*)

Key Note Lecture

Health status and incidences of injuries in para table tennis related to the substance misuse

Miran KONDRIČ
Chairman of ITTF Sports Science and Medical Committee
University of Ljubljana, Faculty of Sport, Slovenia

In order to improve health status in table tennis and gain a better picture of incidences of injuries related to table tennis, we wish to examine some factors which could be important for sports results such as smoking, alcohol, narcotic drugs and doping agents among active sportsmen in para table tennis.

Scientists worldwide say the findings show that as physical activity is increasingly promoted as a critical part of a healthy lifestyle, sports injuries are becoming an important health issue for both children and adults. For effective prevention in table tennis players with disability, it is important to understand the functional anatomy and patho-physiology of injuries of different tissues but also the factors listed above. As a result, injury prevention efforts need to go beyond targeting children and start addressing the risks faced by physically active para table tennis players as well. Fortunately, most sports injuries can be treated effectively, and most people who suffer injuries can return to a satisfying level of physical activity after an injury. Even better, many sports injuries can be prevented if people take proper precautions.

When all factors, including nutritional supplementation, fail to provide the result athletes are striving for, the temptation to start doping emerges. In its most common sense, doping is defined as the occurrence of one or more anti-doping code violations, mostly observable in the presence of a prohibited substance or its metabolites or markers in an athlete's specimens (WADA). The results presented so far allow a broad discussion of the findings. The incidence of injury levels needs to be reduced and it can be achieved by concentrating more on preventative measures. Therefore, in order to prevent doping behaviour and injuries in para table tennis we strongly suggest intensive educational programs on sports nutrition and doping-related problems. Nutrition cannot replace an athlete's genetic potential, training regime or overall psychosocial preparation, but the most favourable nutritional strategies have been studied and have often proved beneficial. In short, optimal nutrition can reduce fatigue and injuries, promote recovery from injuries, optimize the human body's energy stores, and directly influence athletes' health status.

Special Program

1.Special lecture

High-speed Image Processing and Its Applications in Sports Science

Masatoshi ISHIKAWA (*The University of Tokyo*)

Abstract: We developed high-speed image processing at 1,000 frames per second and applied the technology to various research and engineering fields including sports science. In my talk, after the technology and some applications in engineering field will be briefly explained, applications in table tennis including high speed ping-pong ball tracking using 1ms auto pan/tilt system, vibration measurement of ping-pong ball and racket in play, dynamic projection mapping on a moving ball, and aerial display system with high speed gesture and motion capture. Since the 1ms auto pan/tilt system implements high-speed image processing for getting a position of a high-speed moving object at 1,000fps and two galvano mirrors for tracking by controlling an optical axis using the target position data, it can track a moving object at several hundred km/h and take a HD or high speed video simultaneously. Its system architecture, tracking method, and realized performance will be shown. In addition, baseball robots for throwing, tracking, hitting, running, and catching will be shown as a sample of sports playing robot.

2.Explanation of the project

Developing an immediate feedback system on ball rotation speed in table tennis

Chikara MIYAJI[1], Yuki INABA[1], Hiromasa OKU[2], Takanori ABE[2], Katsutoshi SAITO[3] and Kazuto YOSHIDA[4]

[1]*Japan Institute of Sports Science, Department of Sports Science,*
[2]*Gunma University, Graduate School of Science and Technology, Japan*
[3]*Broadcast Engineering Department, Japan Broadcasting Corporation*
[4]*Shizuoka University, Faculty of Education, Japan*

Abstract: Quick feedback about a multitude of parameters of athletic performance is crucial to improving skills. While coaches have performed this role it would be useful to have a monitoring system independently capture and analyze data for rapid analysis and feedback. In table tennis it is essential to obtain feedback on ball speed and rotation speed to improve skill. We intend to develop a video processing system to capture ball rotation speed in training situations.

In order to capture ball rotation by high-speed camera two contradictory conditions must be satisfied. (1) The camera should have narrow angle as possible to get the ball image clear and larger, (2) The camera should have wide angle as possible to catch the high speed flying ball in the image. We solve this problem using the camera with "1ms Auto Pan-Tilt" technology developed by Ishikawa-OKu lab.

Using this camera system we can get clear ball images while the ball is in flight and calculate the ball rotation speed in very short time using an image-processing program. This system will get the ball rotation speed just after the player strikes the ball.

While at this stage of development we do not yet have a suitable way of returning the information to a player during a rally, we expect the system will be very useful for the players to evaluate their skills during training.

Research presentations & Activity reports

[1]

Rapid adjustment of swing immediately before hitting in table tennis players

Kazuto YOSHIDA[1,4], Koji SUGIYAMA[1], Shin MURAKOSHI[1], Koshi YAMADA[2,4], Sho TAMAKI[3,4]

[1]*Shizuoka University*
[2]*Table Tennis Friendship Club*
[3]*Meio University*
[4]*JTTM SSMC*

Abstract: In our questionnaire, about 90% of table tennis players answered that they had experienced adjusting their racket movement for an irregularly bouncing ball, e.g. the ball rebounded at the edge of the table, immediately before hitting in matches. The purpose of this study was to investigate the rapid adjustment of forehand topspin stroke in table tennis players through an experiment.

Three table tennis players participated as subjects in the experiment. Two conditions, regular bound and irregular bound, were examined. Official balls were used in the regular bound condition and balls whose surface had been made uneven to cause irregular bounds were used in the irregular bound condition. The subjects were informed which ball would be used before each trial. In the trials, the subjects returned balls, which were delivered by a tosser, with powerful forehand topspin strokes. The delivered balls were controlled to land in a circle of 20cm radius on the right half court of the receiver. The center of this circle was 90cm from the net and 40cm from the sideline. In the irregular bound condition, the subjects were asked about their introspection on racket control after every hitting. The trials were filmed at 250 fps. Muscular activities of the upper limb were recorded at 1000 Hz. The following muscular activities were measured: extensor carpi ulnaris, extensor digitorum communis, extensor carpi radialis lognus and brevis, flexor carpi radialis, and pronator teres. Muscular electrical discharge was measured by a surface dipole dielectric method.

Acceleration sensors were installed on the table and racket. The accelerations were recorded at 1000 Hz to detect the moment of bouncing.

Under the irregular bound condition, several types of rapid adjustment of forehand topspin stroke were observed. In most cases, they made their impact time later than those in the regular bound condition. By comparing the electrical discharge of M. extensor carpi ulnarise between the two conditions, it was suggested that rapid adjustments in the muscular activities started after from 120 to 150ms of the irregular bound.

**This work was partially supported by JSPS KAKENHI Grant Number 18500474.*

[2]

Assessment of table tennis strokes using inertial sensors

Yoichi IINO

The University of Tokyo, Japan

Abstract:

1. Introduction

Inertial sensors are sensors based on inertia and generally refer to accelerometers and gyroscopes. Motion analysis using the sensors has advantages in terms of cost and portability compared to a motion capture system. However, the application in table tennis has been limited (Boyer, 2013). The purpose of this study was to assess table tennis strokes using three inertial sensors attached to the pelvis, upper trunk and racket and compare results with those obtained using a motion capture system.

Figure 1. Racket and an attached i nertial sensor

2.Methods

Two male table tennis players participated in this study. They are collegiate Division III players with training experience of 6 and 7 years. They provided written informed consent and the experimental procedure was approved by the local ethics committee.

The participants were asked to hit 10 consecutive topspin forehand drives against topspin balls projected by a ball machine. Three 9-dof wireless inertial sensors (LP-WS1103, Logical Product) with a mass of 30 g were attached to the racket (Figure 1), the upper trunk, and the pelvis of the participants. Three reflective markers were attached to each of the trunk inertial sensors and racket. The sensor data were recorded at 1000 Hz. The marker coordinates were determined at 200 Hz using a motion capture system (MAC 3D system, Motion Analysis) with electrically synchronized with sensor data.

The data from inertial sensors were smoothed using a Butterworth low-pass digital filter with a 20 Hz cut-off frequency. The coordinates of the markers were also smoothed using the filter with the cut-off frequencies that were determined with a residual analysis.

3.Results and Discussion

Overall, the time-curves for acceleration and angular velocity of the racket, upper trunk, and pelvis obtained from the inertial sensors were similar to those obtained from the motion capture system. The differences in peak angular velocities of the upper trunk and pelvis between the two methods were generally below 5% of their peak values. The results suggest that the racket and trunk angular velocity and acceleration can be obtained using inertial sensors with a similar level of validity to a motion capture system.

References

[1] Boyer, E., Bevilacqua, F., Phal, F. and Hanneton, S. (2013) Low-cost motion sensing of table tennis players for real time feedback. International Journal of Table Tennis, 8, 1-4.

[3]

Muscles of the legs fatigue analysis about forehand stroke in table tennis

Mai KITAMURA[1], Yukihiko USHIYAMA[2], Kei KAMIJIMA[3], Masahiro TAMURA[4]

[1]Niigata University, Graduate School of Modern Society and Culture, JAPAN

[2]Niigata University, Institute of Humanities, Social Sciences and Education, JAPAN

[3]Niigata Institute of Technology, Liberal Studies, JAPAN

[4]Niigata University, Faculty of Education, JAPAN

Abstract: Table tennis is almost individual competitions, and players do many games to win the title. Playing many games need physical strength, especially stamina. In table tennis, there are many play style, like a Drive-man, an Attacker, and a Chopper. Moreover table tennis trainings are classified into the using a ball and using many balls, and there are countless combinations about training are based on skills. It's important the training suit an individual. But in practice, almost players do same training regardless player's characteristics, their play styles and their levels in field of coaching about table tennis. We analyze muscles of the leg in order to know their fatigue, utilize the results, finding player's characteristics, and to be in effect training suit an individual.

The subjects belong to table tennis club of Niigata University. (n=10, average ±S.D., height172.8±6.0, weight61.1±5.8, experience10.2±3.6) They are all right-hander and they use pimples-in rubber on face of forehand. The electrodes were put on subject's biceps femoris muscles, vastus medialis muscles, and gastrocnemius muscles. The subjects wore goniometer to pick out a stroke with angle of elbow. Then, they did a stroke for a second and it continued for three minutes on trial. After taking a 15-minutes break, they did a trial again. Extracted electromyogram (EMG) was done fourier transform by the program was made with MATLAB2010a (produced by Math Works) on condition of sampling frequency 1000 Hz, section length 500msec, and shift length 20msec. We got Mean Power Frequency (MPF) to know information about frequency of muscle, and Average Rectified Value (ARV) to estimate muscle activities. Moving average was got to find tendency easily, and it was 10 seconds interval and move by 5 seconds.

In MPF, all cases were decreasing, and trial 2 was larger decreasing. Especially, 30-50seconds after the beginning the trial showed much decrease. There was fast-twitch fibers have high frequency activities decreased. In trial 2, it thinks muscle fatigue was accumulated. Comparing the three muscles, biceps femoris muscles showed most small fall. It guesses gastrocnemius muscles and vastus medialis muscles were more used in stroke. In ARV, there are two types, decreasing and increasing with time course. It thinks how to stroke and using muscle was different each subjects. In trial 2, ARV was decreasing in the fast, and increasing in the later. A part of decreasing was same part of especially decreasing in MPF. It guesses decrease of fast-twitch activities caused such a result. There are individual differences in muscle fatigue. To make use of players, it needs to study muscle fatigue about the arms and the trunk together. Also, we should perform physical performance test like a using exercise bike before study, and should consider about players in many directions.

[4]

The importance of orientation and initial selection pattern for table tennis

Nicolae OCHIANA

University Vasile Alecsandri of Bacau, Romania

Abstract: Orientation and selection in sports are two distinct processes that many authors mention among the factors favouring the performance capacity. The orientation and the selection for the sports activity are very important and up-to-date, high performance being achieved only by the ones who have special abilities and who also benefit from favourable conditions to develop them.

The purpose of the scientific investigations was the identification of abilities favouring the practice of table tennis, abilities proved at an early age, as well as their gathering into an initial selection pattern which should serve as a work tool for the coaches and teachers who deal with these problems.

Hypotheses of the research: although the orientation and the initial selection are different processes, we still consider that they may be served by a common operational tool (pattern) in the building of which hereditary favouring qualities and abilities are mostly involved, abilities which can be less improved later, during the training process The objectives of the research:

1. The bibliographical study has emphasized the fact that there is a conceptual aspect of the two processes, namely the orientation and the initial selection, but they have a slight practical operational character in the process of gradual evolution of the performance sportsmen in table tennis, and they are not enough applied according to scientific criteria;

2. The old didactic stages of selection (primary – secondary – final) are outdated, the promotion and the practical use of the selection patterns on formative levels being necessary; this has more advantages, among which we can mention the rigorous quality of “sifting” the whole population of pre-school and early school age in order to choose the subjects endowed for table tennis;

3. The orientation and the selection on *formative levels* is in fact a *continuous process*, *not a series of momentary actions or steps.*

4. The lack of a unique, centralized system of orientation and initial selection which could ensure the improvement of the two processes on national level.

5. The orientation and initial selection pattern in table tennis, which was made up after studying the specialized bibliography, adding the results of the inquiry and the personal experience, has led to the structuring of the abilities favouring the practice of table tennis into 8 modules: module A- the anthropometric pattern; module B- the functional pattern; module C- the kinetic pattern; module D- the psycho-motion pattern; module E- the psycho-intellectual pattern; module F- the psycho-adjusting pattern; module G- the indexes of the anthropo-physiometric pattern; module H- the specific motion abilities.

6. The information gathered from the practical use of the orientation and initial selection pattern can be considered as reference data; however, the values reached can only be considered as guiding values, the experiment being carried out on a school level.

[5]

Profiling international elite youth table tennis players using a multidimensional approach

Irene R. FABER, *The Netherlands*

Abstract: Table tennis is a popular sport all around the world, but especially in Asia and Europe. Although no exact up-to-date statistics are available, it was estimated in 1995 that almost 300 million people play table tennis worldwide (Sklorz & Michaelis, 1995), including 40 million competitive table tennis players (http://www.olympic.org/table-tennis). Table tennis is an international, socially attractive sport, relatively cheap, practicable for players of all ages and easily accessible to many people. Although table tennis is practiced in many countries, China appears to have a monopoly on winning gold medals in world-level competition (http://www.ittf.com). Even in Europe, female athletes of Chinese origin dominate the top 10 ranking (http://www.ettu.org/; Heller, 2008). The sport's future global 'health' or existence might be violated by a domination of one country. A more diverse distribution of success probably provides a broader support for table tennis worldwide. Moreover, triumphs in sports can positively contribute to a nation's political and economical position, health status and well-being as successful elite players serve as a nation's representatives and as role-models for fellow citizens.

If countries in Europe or other continents want to be serious competitors at international table tennis events with native players, changes in policies and educational programmes seem inevitable. Additionally, only relying on deliberate practice (Ericsson, Krampe, & Tesch-Römer, 1993) for winning medals at world championships or the Olympic games seems outdated as training programmes in table tennis have been maximized and the sport has become highly professionalized.

Identifying the true 'high potentials' seems vital for many associations to compete at the highest level due to the relatively small numbers of table tennis players and low budget. Wrong choices in selecting youth players for the association's talent development programme and national teams will lead to failure and is a waste of time and of financial resources. Accurate selections of youth players already at a young age depend on the adequate evaluation of the potential of a child. Moreover, monitoring the development of players in the context of international elite performance seems sensible for optimal guidance during training. As table tennis on world-class level is recognised to be depending on various factors, a multidimensional approach seems appropriate. Consequently, talent development programmes might benefit from profiling international elite performance in youth table tennis players using a multidimensional approach (Elferink-Gemser, Jordet, Coelho E Silva, & Visscher et al., 2011; Faber, Bustin, Oosterveld, Elferink-Gemser, & Nijhuis, 2015; Faber, Oosterveld, Van den Heuvel, Bustin, Elferink-Gemser, & Nijhuis-Van der Sanden, *submitted for publication*).

Consequently, a research proposal will be presented to gain multidimensional international profiles of elite youth players, girls and boys, at different ages (U13, U15, U18, U21). Besides the multidimensional approach the possible confounding effect of variation in growth and biological maturation (Coelho E Silva, et al., 2010; Malina, Cummings, Morano, Barron, & Miller, 2005) and the possible relative age effect in youth national selection will be taken into account.

[6]

Rally Length in Top Level Table Tennis

Michael FUCHS, Martin LAMES

Technische Universität München, Performance Analysis and Sport Informatics, Germany

Abstract:

Problem: Typical interaction in net/wall games is alternating strokes in a rally, resulting in point for player A or B. Each stroke may mean the end of a rally, either as winner or error. Furthermore, each stroke in table tennis rallies has specific 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 105 women's and 154 men's singles matches. The matches were chosen from final stages of world table tennis top events. Data of 97 matches were available from previous studies carried out by the Technische Universität München in cooperation with the Shanghai University of Sports.

The remaining matches were available as video on demand either on the channels of the International Table Tennis Federation or the European Table Tennis Union. The data on rally length were collected by a recently developed match analysis software for real-time match analysis in table tennis. Impact of playing style, ball type, sex and ranking on rally length was statistically analysed.

Results: Because of a significantly higher rally length, matches with a defensive player were excluded. For further analyses only matches with two offensive players were considered. Whereas there were no differences in rally length in matches between different performance levels of male athletes (F=0,906, p=0,479, eta^2=0,032) there were significant differences in female athletes (F=3,811, p=0,004, eta^2=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.

Reference:

Zhang, H., Liu, W., Hu, J.-J., & Liu, R.-Z. (13. 05 2013). Evaluation of elite table tennis players' technique effectiveness. *Journal of Sports Sciences , 32*(1), 70-77.

Keywords: Table tennis, real-time match observation, rally length

[7]

Determining the overall structure and the role of technical - tactical activities in modern, competitive level table tennis game (by using two different approaches/methods of collecting data)

Goran MUNIVRANA

University of Split, Faculty of Kinesiology, Croatia

Abstract: Table tennis is considered to be one of the most demanding sports games when viewed in terms of its structural complexity in comparison with other sports disciplines. It is technically and tactically an extremely complex sport because it demands a wide range of different playing techniques which, among other things, depend on the material (type of rubber) with which a stroke is made, and the type of stroke made by the opponent. Therefore, as the technical-tactical abilities are one of key factors for achieving success in table tennis game, studies of players' technical-tactical activities assume a key role in the analysis of players' match performances.

When seeking to establish the overall group of technical-tactical activities used in table tennis and scientifically analyze their role in modern table tennis game one of the main issues is choosing the most appropriate method of collecting the data.

In the previously conducted research studies on the technical-tactical characteristics of table tennis, the data have been primarily collected by means of video analyses of table tennis matches, in which different types of players' technical-tactical activities in matches have been analyzed and their role evaluated *(Djokić, 2001, 2007; Galina, 1992; Guan et al., 2011; Pfeifer et al., 2010; Pradas et al., Wang et al., 2009 2010; Yu et al., 2008; Zhao et al., 2007; Zhe et al., 2007, 2010;*

ect.). Although the method of collecting technical-tactical data by means of video analyses of table tennis matches is quite valid and objective, there are few "obstacles" which needs to be taken into account when using the method with the aim to establish the overall group of technical-tactical activities used in table tennis; The first one is that there are always two opponents (or teams) confronting each other (like in all sports games) and the data obtained from the observed matches also depend directly on the quality of the opponent and its playing style. So, it would be important to ensure that players with different styles (systems) of play meet and play with different materials (rubbers) so as to enable all table tennis techniques/activities to appear in the sample in order for them to be adequately evaluated; The second one is that a single match only generates a limited amount of information and the data obtained merely represent a partial or relative value in the observed matches. So it would be necessary to analyze a huge sample of matches, point by point, and note every technique performed, whilst even then it is still uncertain that it would be possible to fully cover the entire group of technical-tactical activities which can occur in table tennis game.

The other possible approach for collecting data on technical-tactical activities in table tennis is by using expert analysis as the data collection method. This method has been well-established in numerous sports' studies, but has never been used in order to analyze technical-tactical activities in table tennis, until just recently (Munivrana, Furjan-Mandić and Kondrič, 2015). The method used in the study, has been shown to be very reliable as the experts, which were chosen amongst world class coaches, have shown to be highly objective in determining and evaluating overall group of technical-tactical activities that can be used in table tennis. The main advantage of the method is that it facilitate collection of the overall data and it is potentially more comprehensive of the two. The main disadvantage is that it is based on empirical (subjective) data, so it is necessary for experts to show a high level of agreeing in evaluating technical-tactical activities for results to be validated.

Consequently, a research proposal will be presented with aim to evaluate and compare advantages and flaws of the two methods and combine them, by using the best features of the both, in order to obtain the most objective image of the real value of all technical-tactical activities used in a table tennis game.

[8]

Development of a Web-based Application for Performance Analysis in Table Tennis

Sho TAMAKI, Kazuto YOSHIDA, Koshi YAMADA

Abstract:

1. Introduction

We already had developed some computer programs for performance analysis in table tennis. In 2012, we developed Windows application to analyze table tennis matches more easily and more immediately, which was used in London Olympics. In 2013, we developed a server-side program as a first step to share an analysis

method with everyone who loves table tennis. This program was a Data-Base Management System, which used Google OpenID for the authentication, and Google App Engine and Big Table for the management of analysis data.

As a next step, we added the new function to the server-side program and developed a client-side program. In the following of this paper, we report the achievements and future tasks of this research. 2. Outline of the achievements

2.1. Server-side development

The server-side program developed the last year only received a set of all data stored in client program, namely only full backup was available with that one. Any client program, therefore, was forced to be implemented an inefficient backup function, backup was executed at regular time intervals, not right after the inputs. We added functions which creates, refers, updates, and deletes a specific kind of data, e.g. competition, round, team, athlete, match or rally. This function makes it possible to develop a client program which has a more efficient and useful backup, namely immediate differential backup.

2.2. Client-side development

The challenge of the development of client-side program is to consider and solve the problem with an existing web-based application, which had already been developed in another project. The biggest problem was the inability of an immediate data input due to the screen transition when we input the information of a rally. In order to solve the problem, we redesigned the input screen, removed some controls and added the function of them into score-board control, and united two screens. Now, real-time data input has been realized with that modification.

3. Future tasks

At first, we need to combine the two programs, server-side one and the client-side one. The two developments were conducted independently in this research. It took a so long time to develop the client-side program and the combining wasn't achieved. We think it's the most important task in this research. Next, the screen design of client-side program should be modified to improve the usability. Currently, some inefficient processes are required to the user. We will solve the problems to release this web-based application as soon as possible.

Acknowledgments

We would like to express our gratitude to Yasuhisa Okazaki and Masahiro Yoshiura, Saga University, for their contribution in the development of the client-side program.

[9] A 3D Simulation of the Flight of the Table Tennis Ball (2)

Suguru ARAKI

Abstract: A new method of simulating the flight of the table tennis ball under the influence of the Earth's gravity, the air drag, and the lift generated by its spin has been proposed (Araki and Wada 2014). In this second project of a series I apply the above method to present a detailed simulation of the net cord services and edge balls (11.2, 12.2 Handbook for Match Officials 15th ed. 2014).

[10]

The research of responses of cardio-respiratory functions by many ball practices in table tennis

Junichi KASAI

Waseda university, Japan

Abstract:

1.Purpose

The physical fitness is very important. The player must hit the power ball in modern table tennis. Indeed, top player in Japan, to make the spin of the ball to the energy which raise the dumbbells about 20 kg and is said to be consumed. In addition, the ball speed is 126 km per hour and the rotation of the ball is 125 per hour, it has been reported. Anaerobic severe exercises of about 4 second in table tennis game are repeated. Table tennis player is required high level power and endurance. In this study, a multi ball exercise method is used. The player moved during foot work exercises for one minute. Used strokes of hitting the ball is the forehand smash. The level of oxygen consumption and heart rate were measured for evaluation for performance.

2.Methods

The subject is 4 male players belonging to the Waseda university table tennis club. Subjects A ranked 22 in all over the world ranking. All members participated in the all japan championships. To measure oxygen consumption and heart rate, instrument k4b2 was used. After resting for a few minutes, the player moves to the left and right alternately. And, the player hit the ball 60 times by forehand smash strokes for l minute. Immediately after the exercises, oxygen consumption and heart rate are recorded by the heart rate to return to resting level.

3.Result & discussion

All subjects showed the highest the value in heart rate (b/m) showed immediately after 1 minute. Subject A and B and C showed the highest value in oxygen consumption (ml/kg/m) immediately after 1 minute. On the other hand, subject D did not show the highest value in oxygen consumption (ml/kg/m) immediately after 1 minute. From these results, A and B and C could hitting the ball during 1 minute for the supply of oxygen sufficiently. Subject A showed 109 (b/m) of the heart rate at 80 seconds after maximal effort. These result shows that the value of oxygen consumption and heart rate will became better index of good player.

[11]

Food environments in ITTF premium junior circuit

Michiyo KIMURA *Takasaki University of Health and Welfare*
Mizuho ADACHI *Nippon Sport Science University*

Background and purpose

Junior table tennis players usually have to repeat several matches in a day in ITTF premium junior circuit and compete late into the night. However, they are still in the stage of growth and development and are required to have adequate nourishment and rest. The purpose of this study were therefore to survey current food environments in ITTF premium junior circuit and gather information to make new guideline for junior players on food environments in ITTF premium junior circuit.

Methods

We accompanied the Japanese cadet and junior team (13 players) at Polish junior and cadet open, which was held in May 2015. Match schedules and rest time between the matches were surveyed. In addition, we did interview survey about dietary intake state of the Japanese junior players.

Results

Average numbers of matches and games during the Polish junior and cadet open were 16 matches and 73 games/player. A male cadet player, who won the silver medal in the men's cadet singles event, repeated 9 matches in a day. His total energy expenditure for matches estimated to be 1125 kcal. He had only about 40 min between matches so that he could not have enough time to have lunch and digest it (he had energy bars and jellies instead of lunch). In addition, there were several players who missed dinner because they had to compete in matches during the dinner time.

Conclusion

Since the match schedules seem to be very tight in ITTF premium junior circuit, junior players sometime have difficulty in having adequate dietary intake and have tendency to be energy deficient. Thus, we propose that enough rest time should be scheduled during lunch and dinner time so that junior athletes are able to have adequate food intake.

[12]

The Appropriate Pharmacotherapeutics and the Role of Pharmacist in Sports

Takuro OKADA *Japan Table Tennis Association Doping Control Committee*
Shiro MATSUO *Japan Table Tennis Association Doping Control Committee*

Abstract: In Japan, the Sports Pharmacist System was launched in 2009. Pharmacists have been in charge of anti-doping activities by the launch of this system. Recently, pharmacist activities have expanded gradually.

In Japan Table Tennis Association (JTTA), the Doping Control Committee is in charge of anti-doping activities, such as the testing and educational activities. In addition to the above-mentioned activities, the pharmacist, as a member of this committee, is in charge of the activities based on pharmaceutical knowledge.

The Doping Control Committee has checked the medicine which National Team players take. When players take medicine, they contact the Doping Control Committee in advance. The pharmacotherapeutics in sports have to select the medicine which does not contain banned substances. When players try to take medicine which contains banned substances, we advise them to stop taking medicine and propose an alternative medication. In addition to checking the medicine for banned substance, the pharmacist carries out a suggestion of alternative medication and provision of drug information which doctors use for a medical examination.

As activities except anti-doping, the pharmacist carries out medication history management of players and provision of information to the national team doctors. Moreover, the pharmacist participates in selection of medicines which National team takes to overseas expedition.

I have been in charge of Therapeutic Use Exemption (TUE) committee of the International Table Tennis Federation (ITTF) from 2013. This committee review the TUE application from ITTF players. The pharmacist provides the other committee members with drug information, and moreover the pharmacist gives a pharmaceutical opinion to them.

Thus, pharmacist activities in sports associations have expanded not only anti-doping, but also other activities for which pharmacological knowledge is needed. Pharmacists need to grasp the necessity for pharmaceutical interventions and respond to a sports site request. Thereby, I think pharmacists in sports associations will play a major role.

[13]

Introduction of the so-called “Baseball Elbow” in Japanese Adolescent Table Tennis Players

Hiroyoshi OGASA, Shiro MATSUO

Abstract: In Japan, throwing injuries around elbow joint are common in adolescent baseball players. Among those injuries, osteochondritis dissecans (OCD) of the humeral capitellum is an intra-articular lesion and one of the leading causes of permanent elbow disability. In baseball, the repetitive, excessive compression forces in the radiocapitellar joint caused by elbow valgus stresses during throwing motions can result in OCD of the capitellum. On the other hand, OCD of the capitellum sometimes occur in adolescent elite table tennis players. Similar biomechanical characteristics is supposed in OCD of the capitellum of table tennis players, however, the particulars of its mechanism are unknown. I present several cases of OCD in adolescent table tennis players.

[14]

Mental support to the table tennis youth national team

Yoji YOSHIZAWA *Nagoya University of Economics*

Abstract: I began mental support to the table tennis national team in 1987. The mental support continued until table tennis world championships (Makuhari) in 1991. The mental support stopped it afterwards.

Mental support to the Sydney Olympics national team began in 2000. I performed mental support to the table tennis world championships (Osaka) national team of 2001 successively. By the table tennis world championships (Osaka), I stayed at the hotel same as a player and observed the psychological condition of the player in breakfast. Furthermore, I snuggled up to a player by the warm-up before the game and supported the psychological condition adjustment before the game.

When a game began, I rooted for the player.

I perform mental support of the table tennis youth national team now. When I perform mental support, I am careful about the following things.

1) I announced "the study on coaching behavior of the coach whom the motivation of the player was sublimed" into in 2014.
2) I extracted 3 factors ("technical guidance" "praise/expectation" "criticism") which prescribed "a coaching behavior" in this study.
3) I explained the coaching behavior that a player made a motivation to a coach.
4) I asked coaches to understand psychological grounds for coaching and to cope a player.

I perform mental support to the youth national team as a standard of the mental support in the above-mentioned thing.

A mental support has two correspondence methods.

1) Method of the mental support to deal with player directly
2) Method to change the coaching behavior of coaches

I perform mental support by two methods of the direct and indirect coping methods. I perform an action aiming at the effect that is longer-term than a short-term effect by the mental support. I think to continue mental support in hope of the youth maturing into representative from Japan.

[15]

Establishing Reliability of the Competitive Readiness Scale for Table Tennis Athletes (CRSTTA)

Arnulfo LOPEZ[1] and Oscar Yoshihiro SANTELICES[2]

[1]*University Of Santo Tomas, Graduate School of Psychology, Philippines*

[2]*University of the Philippines, Department of Sports Science, College of Human Kinetics, Philippines*

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, coachability, 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.

[16]

A multidisciplinary investigation of the effects of state anxiety on serve kinematics in table tennis

Voung NGO *Glasgow University, Scotland*

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 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.

Keywords: Anxiety, bat kinematics, Mental Readiness Form-Likert, heart rate, table tennis.

[17]

The importance of pre-performance ritual and rituals between points (The Game Face Routine)

Dora KURIMAY *ITTF SSMC*

Abstract: An athlete's mental and physical preparation is crucial during the "in-between" times in sports. Loehr (1988, 1994) revealed that the mentally toughest tennis players consistently completed four distinct steps in between points and that this crucial time reveals what is really happening in terms of mental competency and consistency. Mental toughness is learned, not inherited (Loehr, 1995; Kuehl, Kuehl, Tefertiller, 2006; Selk, 2008). Through a case study of working with an elite squash player this presentation will walk you through the importance of creating rituals between points in racket sports. The goal of the presentation is not simply to demonstrate how having a ritual increases performance under pressure but also to illustrate a step-by-step process about how to create a visualization routine as a pre-performance ritual. The in-between time includes four steps:

Reaction, Recovery, Readiness (Tactics), and Serve/Serve Return Ritual (Loehr, 1988; 1994; Toon & Kurimay, 2012; Kurimay, 2012; Toon, Kurimay & Kurimay, 2013; Kurimay & Toon, 2014). This presentation will discuss specifically how visualization and in-between time routine can assist to handle pressure and increase performance from the perspective of an elite athlete personal experience.

[18]

A qualitative study on the factors for watching table tennis game

Yu-Ling LEE, Tsung-Min HUNG

National Taiwan Normal University

Abstract: ITTF, continental, and national table tennis associations have been working hard to develop table tennis from a participation sport to a both participation and spectator sport. Although these efforts have achieved some progress, there are rooms for improvement on this endeavour. Understanding reasons for watching table tennis game will provide information for improving the game to attract more audience. Therefore, the purpose of this presentation is to share the findings from a qualitative study that interviewed people on their reasons for watching or not watching table tennis game onsite and on TV. Findings from this study can be used to construct a questionnaire for mass data collection off and during table tennis competitions.

List of the participants at 2015 annual JTTA SSMC and ITTF SSMC meeting

JTTA – SSMC members and their guests

Nr.	*Name*	*Institution*
1	Shiro MATSUO	Japan Table Tennis Association doping control committee
2	Kazuto YOSHIDA	Shizuoka University, Faculty of Education
3	Hiroyoshi OGASA	Yamaguchi University
4	Mizuho ADACHI	Nippon Sport Science University
5	Hiroyasu AKAGI	Nagato Memorial Hospital
6	Suguru ARAKI	Tohoku Fukushi University
7	Takashi GUSHIKEN	Hakuai Hospital
8	Ayako HABU	Japan Table Tennis Association
9	Yoichi IINO	The University of Tokyo
10	Haruhiko IKEBUKURO	Japan Institute of Sport Science
11	Junichi KASAI	Waseda University
12	Michiyo KIMURA	Takasaki University of Health and Welfare
13	Shigeaki MATSUURA	Osaka University
14	Hitomi MURAKAMI	Ather Co., Ltd.
15	Takeshi NISHIKAWA	Shizunai Dermatological Clinic
16	Kazuhide OGINO	Tottori University
17	Takuro OKADA	Kameda Medical Center
18	Hiroaki SAKAKIBARA	University of Teacher Education Fukuoka
19	Sho TAMAKI	Meio University
20	Ayato TANAKA	Japan Table Tennis Association
21	Tsuyoshi TOYOTA	Nagano Matsushiro General Hospital
22	Ousei TSUJI	Asahino General Hospital
23	Yutaka TSUJI	Emeritus professor of Osaka University
24	Takehiro WATANABE	Chubu University
25	Koshi YAMADA	Table Tennis Kouryukai
26	Takahiro YAMAUCHI	Fukui University
27	Youji YOSHIZAWA	Nagoya University of Economics
28	Takanori ABE	Gunma University
29	Isao HAYASHI	Kansai University

Nr.	*Name*	*Institution*
30	Yuki INABA	Japan Institute of Sports Sciences
31	Masatoshi ISHIKAWA	Tokyo University
32	Mai KITAMURA	Niigata University
33	Chikara MIYAJI	Japan Institute of Sports Sciences
34	Sadayuki MIZUSHIMA	Japan Table Tennis Association
35	Hiromasa OKU	Gunma University
36	Katsutoshi SAUTO	NHK
37	Hiroshi SEKIYA	Hiroshima University
38	Eishin TERAOKA	Niigata University

ITTF – SSMC members and their guests

Nr.	*Name*	*Institution*
1	Miran KONDRIČ	University of Ljubljana, Faculty of Sport, Slovenia
2	Tsung-Min HUNG	National Taiwan Normal University, Taiwan R.O.C.
3	Irene R. FABER	Saxion University of Applied Sciences, Faculty of Physical Activity and Health, The Netherlands
4	Goran MUNIVRANA	University of Split, Faculty of Kinesiology, Croatia
5	Dora KURIMAY	Hungarian Table Tennis Association, Hungary
6	Nicolae OCHIANA	University Vasile Alecsandri of Bacau, Romania
7	Michael FUCHS	Technische Universität München, Performance Analysis and Sport Informatics, Germany
8	Jean Francois KAHN	ITTF SSMC special adviser
9	Arnulfo LOPEZ	University Of Santo Tomas, Graduate School of Psychology, Philippines
10	Oscar Yoshihiro SANTELICES	University of the Philippines, Department of Sports Science, College of Human Kinetics, Philippines
11	Voung NGO	Glasgow University, Scotland
12	**Kazuto YOSHIDA*	Shizuoka University, Faculty of Education, Japan
13	**Shiro MATSUO*	Japan Table Tennis Association doping control committee

** already at JTTM SSMC list.*

2016

Japan Table Tennis Association http://www.jtta.or.jp
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February 24th, 2016

Dear ITTF SSMC members,

Re: Invitation letter for the Japan Table Tennis Association Sports Science and Medicine Committee International Meeting 2016

We will have the Japan Table Tennis Association Sports Science and Medicine Committee International Meeting 2016 in AJINOMOTO National Training Center in Akabane, Tokyo from September 24th to September 25th 2016. I am writing to invite you to participate in this meeting. Since you are an expert in table tennis sciences, I believe your presence and our conversation would make this meeting very successful.

I am pleased to confirm that we will be able to fund the following expenses:

- round trip flight
- connection costs between Narita/Haneda airport and the hotel
- 4 nights' hotel accommodation, including breakfast
- lunch at the training center each day

I do hope you will accept this invitation, and would appreciate your RSVP by email on or before July 1st. For more information, please see the attached event schedule and notes.

Please feel free to contact me should you have any questions or comments.

Sincerely yours,

松尾 史朗 Shiro MATSUO Chair of the JTTA SSMC
email: shiro-matsuo@jcom.home.ne.jp
吉田 和人 Kazuto YOSHIDA Vice-chair of the JTTA SSMC
Vice-chair of the ITTF SSMC
前原 正浩 Masahiro MAEHARA General Director of the JTTA
Executive Vice President of the ITTF

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e-mail:table-tennis@japan-sports.or.jp

Event schedule

September 22/23rd: Arrival in Narita/Haneda, Japan* **
September 23rd: TBD
September 24th: am TBD pm JTTA SSMC International Meeting (in English)
Welcome Party at the National Training Center
September 25th: am JTTA SSMC International Meeting (in English) pm ITTF SSMC meeting
September 26th: Departure from Narita/Haneda, Japan* **

*We will send you a round trip economy class e-ticket for the flight from your city to Narita.

**Please wait to be picked up by our staff at Narita/Haneda Airport on September 22/23th and you will also be taken back from your hotel to Narita/Haneda Airport on September 26th.

Venue

AJINOMOTO National Training Center
http://www.jpnsport.go.jp/corp/english/tabid/382/Default.aspx
Zip code; 115-0056 Address : 3-15-1 Nishigaoka Kita-ku, Tokyo, JAPAN
Japan Institute of Sports Sciences
http://www.jpnsport.go.jp/corp/english/activities/tabid/393/Default.aspx

Hotel

Hotel Met Akabane http://www.jrhotelgroup.com/eng/code/codeeng152.htm
Zip code; 115-0045 Address : 1-1-76 Akabane, Kita-ku, Tokyo, JAPAN TEL ; 81-3-5939-0011

Please note:

As sponsor of this conference, the Japan Sports Council asks that all participants strictly comply with the following rules:

1) The e-ticket must only be used by the named person and it is not possible to change the flight details.
2) Please do not extend your stay in Japan for any reason, even if you are willing to bear the additional costs. [We are negotiating with our sponsor now.]

Thank you for your cooperation

Japan Table Tennis Association

Sports Science and Medicine Committee International Meeting 2016

PROGRAMME

AND

ABSTRACTS

24 - 25 September 2016,

National Training Center,

Tokyo, JAPAN

スポーツ振興くじ助成事業

Supported by Sports Promotion Lottery

JTTA Presidents Greetings

On behalf of Japan Table Tennis Association (JTTA), I am pleased to be able to invite members of International Table Tennis Federation Sports Science and Medical Committee (ITTF SSMC) and other International SSMC researchers to "JTTA Sports Science and Medicine Committee International Meeting 2016" which will be held from 24th to 25th of September 2016 at Ajinomoto National Training Center, Kita-ku Tokyo.

JTTA started up its SSMC in 1987, to introduce Sports Science and Medicine into strengthening of players. Currently there are 29 members within the committee and they all work in different fields such as Doctors, Nutritionist, Psychological Researcher, Trainer, Sports Science Researcher and Engineering Researcher. These members work in the basic Practical and Theoretical research for Table Tennis, like Medical Support, Mental Support, Nutritional Support and Information Strategy which is related with Table Tennis.

Held once every year since 1990, this Committee Meeting has gone on for more than 20 years where researchers get together with their achievement to share and discuss for further development.

This committee which has its long history, became International in 2014 by co-hosting with ITTF SSMC. We would like to share with the world, our achievement on science & medicine within the field of Table Tennis and to hold a healthy debate about it.

Finally I am delighted to be able to hold such International Meeting here in Tokyo, where the next Olympic and Paralympic will be held on year 2020. I wish this meeting which will be held for the next 2 days will be most fruitful for all participants which is possible only with your understanding and support.

Japan Table Tennis Association
President
Sadayoshi FUJISHIGE
藤重 貞慶

Greetings

I am pleased that we can hold this annual meeting again in 2016. Thank you for your attendance.

It is of great importance to us to hold this meeting again in Tokyo. In 2020, Tokyo will hold Japan's 2nd Olympics and Paralympics Games. The Olympic Games in 1964 ignited high economic growth of Japan. We, Japanese hope that the next Olympic Games will also change Japan for the better and this change will create a long lasting legacy.

Now, in Tokyo, preparations are already underway for the 2020 Olympic Games.

Construction of venues and improvement of various urban infrastructures have begun. In regards to table tennis, the Japan Table Tennis Association has setup a new framework for our National Team to achieve gold in 2020. However, our purpose is not only a victory. JTTA has planned various things until 2020.

They have asked us to activate more sports science research and to advance the internationalization of Japanese sports scientists in order to leave a 2020 legacy. We would like to achieve this with you, so, we planned this meeting for this purpose.

I am sure that publishing our research and presenting our results will be helpful for domestic and foreign researchers. I hope you will leave this meeting with new knowledge, new skills, new expertise and a network of new friends and colleagues.

Japan Table Tennis Association
Sports Science and Medicine Committee Chairman

Shiro MATSUO
松尾 史朗

Organizing committee

Shiro MATSUO (Bessho Medical Clinic, JTTA SSMC)
Kazuto YOSHIDA (Shizuoka University, JTTA SSMC)
Hiroyoshi OGASA (Yamaguchi University, JTTA SSMC)
Koshi YAMADA (Table Tennis Friendship Club, JTTA SSMC)
Sho TAMAKI (Meio University, JTTA SSMC)

ITTF Sports Science and Medical Committee

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Ayako HABU
Takahiro YAMAUCHI
Ayato TANAKA

Doping Control Committee

Takuro OKADA

PROGRAMME
Welcome

Sat. 24 September 1:00 pm-

Shiro MATSUO Chairman of JTTA sports science and medicine committee

Key note lecture

Sat. 24 September 1:00 pm-

Researching in table tennis
- Are we on the right path?: A critical view
Miran Kondric
Chairman of ITTF Sports Science and Medical Committee

Research presentations & Activity reports

Session 1: Research presentations & Activity reports

Sat. 24 September 1:45 pm-

Chair: Shiro MATSUO

1. ***Injury survey of Japanese high school table tennis players***
Hiroyoshi Ogasa
Yamaguchi University, Graduate School of Medicine, Japan JTTA SSMC

2. ***Injuries in table tennis players compared with injuries of some of the best tennis players – Slovenian case***
Nicolae Ochiana
University of Bacău, Faculty of Movement Science, Sports and Health, Bacău, Romania ITTF SSMC

3. ***Questionnaire study of the sleeping quality of Japanese players and coaches during ITTF junior & cadet open for the practice of ideal medical support***
Takashi Gushiken
Kyoai Hospital, Japan
JTTA SSMC

4. ***Psychological Support based on Counseling for Japanese Junior table tennis players***
Sadayuki Mizushima
Japan Table Tennis Association

5. ***Effects of coingestion of glucose with milk after exercise on insulin secretion in female university students***
Michiyo Kimura
Takasaki University of Health and Welfare, Faculty of Health and Welfare, Japn
JTTA SSMC

Session 2: Research presentations

Sat. 24 September 3:40 pm –

Chair: Kazuto YOSHIDA

6. ***Developing a multidimensional assessment to profile elite youth table tennis players.***
Irene R. Faber, *The Netherlands*
ITTF SSMC

7. ***Comprehensive analysis of modern, high competitive level table tennis game, by combining different approaches/methods of performance diagnostics***
Goran Munivrana, Croatia
ITTF SSMC

8. ***Anticipation in table tennis***
Tsung-Min Hung
National Taiwan Normal University, Taiwan ITTF SSMC

9. ***Table Tennis Spectators Motivation: Are you going to Table Tennis Game?***
Poon Soon Cheong
National University of Malaysia, Malaysia

10. ***Change of rubber rebound characteristics by using booster***
Kouhei Mayuri (Niigata Univ.),
Niigata Univ. Japan
JTTA SSMC

Special Program

Sat. 24 September 5:30 pm –

Chair: Chikara MIYAJI (Project Researcher, Ishikawa-Watanabe Lab., The University of Tokyo, Department of Creative Informatics)

1. Special lecture
Dynamic Image Control based on High-Speed Optical Devices and its applications in Sports Science
Hiromasa Oku (*Gunma University*)

2. Demonstration
Demonstration of high-speed tracking photography

3. Q&A

Special Programs

Sun. 25 September 9:00 am –

Chair: Shiro MATSUO

Special Lecture 1

ITTF Education and Training – A brief look at the history and the perspectives involved
Mikael Andersson , *Technical Director WTTC 2018 Halmstad*

Special Lecture 2

ITTF Anti-Doping Activities
Françoise Dagouret, *ITTF Anti-Doping Manager*

Research presentations

Session 3: Research presentations

Sun. 25 September 10:10 am –

Chair: Hiroyoshi Ogasa

11. ***Medication Analysis from the Viewpoint of Anti-doping: A Study by the Japan Table Tennis Association***
Takuro Okada
Department of Pharmacy, Kameda General Hospital, Japan
JTTA Doping Control Committee

12. ***Software Tools for Game Analysis in Table Tennis***
Michael Fuchs
Technische Universität München, Chair for Performance Analysis and Sport Informatics, Germany

13. ***Development of a Mobile Application for Table Tennis Analysis***
Sho Tamaki
Meio university, Japan
JTTA SSMC

Session 4: Research presentations

Sun. 25 September 11:30 am –

Chair: Hiroyoshi Ogasa

14. ***Control of racket kinematics at impact and its relationships with ball landing location in the table tennis topspin forehand***
Yoichi Iino
The University of Tokyo, Japan
JTTA SSMC

15. ***Attenuation of the spin angular momentum over the flight of the table tennis ball in play***
Suguru Araki
Tohoku Fukushi University, Department of Information Science, Japan JTTA SSMC

16. ***Estimation of Trajectories and Bound Positions of a Table Tennis Ball by using Audio and Visual Data***
Takeuchi Yoshinori
Daido University, Japan

17. ***Issues in International Journal of Table Tennis Sciences, No. 1 (1992): Past and present of the scientific research on table tennis***
Hiroaki Sakakibara
University of Teacher Education Fukuoka, JAPAN JTTA SSMC

Closing Remarks 1:00 pm
Jean-François Kahn (*ITTF SSMC special adviser*)

Key Note Lecture

Researching in table tennis - Are we on the right path?: A critical view

Miran KONDRIČ
Chairman of ITTF Sports Science and Medical Committee
University of Ljubljana, Faculty of Sport, Slovenia

This presentation provides an overview of a subsequent edited collection of works by researchers who have incorporated table tennis in their investigations. Themes that are discussed include examples of all available published papers who provide further insight into (among others) different fields of table tennis development and experience within the context of sport and physical activity. By including a range of over 1000 papers in sport and table tennis the intention is to gain a clearer understanding of it – and, ultimately, be in the position to consider whether the direction of researches in the future has a right path and it can be worthwhile step forward.

During the JTTA SSMC and ITTF SSMC international meeting 2016, the multidimensional assessment and its background, including the scientific fundament and pragmatic considerations, will be presented to the participants together with the proposed analyses of the data. The topic should present an example of how to improve cooperation between coaches and scientists in the field of table tennis on basis of scientific results. National and international sports bodies can stimulate improved cooperation between table tennis scientists for instance, through joint funding of high-priority applied interdisciplinary research, application and coaches training programs. However, in some countries there is a lack of experts in the area of table tennis science who could provide high quality services in table tennis research and its application. One possible solution would be to use the database established and provided by ITTF, which could deliver the necessary services for elite players and their coaches.

After Olympic Games in Rio we need more than ever concentrate our researches also to doping area. Even though table tennis is less affected sport to doping issue, the threat is still there. ITTF SSMC has already had opportunity to suggest some ways to improve research and application in anti-doping policy. More important is now to involve some new institutions in table tennis researches.

Special Program

Dynamic Image Control based on High-Speed Optical Devices and its applications in Sports Science

Hiromasa OKU
Gunma University

Abstract: Fast and agile centering of moving targets, such as a ball, is an ideal function for the cameras for sports. Key technologies to achieve this kind dynamic control of imaging are both high-speed image processing and high-speed optical devices. We have concentrated on the development of the latter high-speed optical devices with millisecond order response time.

In this presentation, the developed high-speed optical devices will be described. The applications of the devices combined with high-speed image processing technology are introduced. In particular, automatic centering system named "1ms Auto Pan/Tilt system" and its applications in sports science including the latest results will be explained.

Special Lecture 1

ITTF Education and Training - A brief look at the history and the perspectives involved

Mikael ANDERSSON, *Technical Director WTTC 2018 Halmstad*

History

ITTF Educational activities, in this case defined as technical courses outreach style, came through in the mid-eighties , initially supported by the introduction of Olympic Money working through the IOC Olympic Solidarity programme that kicked in following the successful commercialization of the Olympic Games in Los Angeles 1984.

In the very beginning the ITTF offered courses and technical assistance directly to national association with the main support and funding generated by the IOC ambitions to develop sports world wide.

With a significant increase in funding, and a much more offensive development strategy, the ITTF started, in the second half of the nineties, to offer more education activities, including a series of High Performance Coaching courses featuring technical experts offered as a service to the continents. Main priority at the time was to develop the sport with mainly Latin America and Africa as highly prioritized continents.

During the years 1998 – 2002 the ITTF grew staff wise and hired expertise to implement the High Performance program as the main coaching education initiative and also invested heavily into what today is one of the best Development programs

in the world. More than fifty courses yearly were offered around the world during the very early expansive and offensive time for the ITTF.

Standard coaching courses – funded by the ITTF or by the Olympic Solidarity were scheduled five to seven days. Forty + hours of theory and practical instructions often involving top prospects in the country taking part in the sessions.

The more important outcome from the ITTF HP initiative was a regular form of contact with the continental presidents and other parties interested in High Performance. The courses often had the same continental management and formed in such a way the perfect platform for talent identification both in terms of individual athletes and coaches. Invaluable opportunities were created to approach National Olympic Committees with the assistance of national associations and continental bodies.

The ITTF Development programme came into the international scene in 1999 and quickly grew with the help of a structured approach and solid political strategies. Continental development managers played a key role in terms of implementation and just in a few years' time – actually co-existing with the successful introduction of the ITS Global Junior Programme (2002) the ITTF had a wonderful drive in developing table tennis.

ITTF Global Junior Programme – 2002 – ITTF Development pushing the boundaries

As a direct result of the ITTF High Performance program came the ITTF Global Junior Program, introduced in the year 2002. The first world junior championships were organized in Santiago, Chile 2003 and at the same time the first official world cadet challenge came alive with the test event in Hungary 2002 , followed by the first ever competition featuring continental teams in Malaysia 2003.

With the two yearly major competitions forming the backbone of the ITTF GJP, educational initiatives and a wide range of scholarship opportunities targeting young talented players and promising coaches were added to form a program with the grand vision to create more of a level playing field for athlete's development by initiating support for young and upcoming talents.

The general vision of the ITTF Global Junior Programme pushed for educational activities to be added to gatherings / courses and meeting points. Learning by doing in the shape of quality age related events allowing coaches and interested parties to meet expectations and to constantly evaluate developmental trends.

At the same time the ITTF Development program kicked in with full force to cover more grounds in close cooperation with the continental association. Targeted funding was introduced with a number of criteria to fulfill in order for funding to be released.

The growing needs of a certification system for coaches also gained grounds and the ITTF Coaching certification system was introduced starting with a pure grass/root approach. The system is now in full operation with three levels of coaching education offered around the world.

ITTF Educational and Training – 2009. New Initiative opening the doors to the future.

When the ITTF competition program absorbed most of the work connected to the Global Junior Programme , the more youth oriented questions transferred to the newly formed ITTF Educational and Training Department shaping up after the Beijing Olympic Games 2008.

This introduction opened the doors to a more scientific approach to education and covered initially significant grounds / spectrums actually involving the Umpires and Referee committee for the YOUNG Umpires education , alongside with various other parties connected to the ITTF . The ITTF Equipment committee problem solving with the glue and boosting issues was also on the agenda and initially took a lot or planning and execution time.

For players and coaches the ITTF Hopes programme was introduced as a yearly meeting point for the very youngest talents and their coaches. Successful events / like the ITTF Hopes challenge was organized in Vienna 2012 The programme has since then become a popular sought after offering from the ITTF – now offered through the development programme with a number of educational opportunities added online and in practical terms, during the events.

The Future – Perspectives – Summary

The ITTF Education and Training nowadays operates in perfect sync with the ITTF Development program. A more structured approach is in effect, with much less direct athletes support involved. The current model and all events connected to the ITTF GJP have a strong educational focus – a direction also supported by the new www.ittfedcuation.com platform.

New initiatives introduced for the European market also have a strong online focus aiming at a general professionalization of the coaching work done at all levels.

The ITTF is drumming on with a very formal coaching accreditation system that in many ways can hamper creativity – but at the same time provide a solid step by step approach to coaching education. Although the current grassroots oriented model can be questioned in terms of efficiency – it is clear that the model works in the context of Olympic solidarity support.

One major weakness with the current system is to become fully operational with a solid offering for the highest level of coaching – pure PRO level or HIGH Performance. It is also obvious that more and more national association can feel very comfortable with the ITTF offerings and in such a way neglect the important work to form their own HP model.

Future initiatives should therefore involve more direct educational support and a drive from the ITTF to prioritize High Performance coaching. Such a movement will support the important connection between applied sport science and quality coaching.

Halmstad , Sweden – August 14 – 2016

Special Lecture 2

"ITTF Anti-Doping Activities"

Françoise DAGOURET*, ITTF Anti-Doping Manager*

Introduction and background

The ITTF Sports Science and Medical Committee, ITTF staff as well as external experts and organization manage anti-doping activities on an ongoing basis.

In May 2014, ITTF has adopted anti-doping rules in line with the revised Code, effective as of 1 January 2015.

Since then, ITTF is progressively taking action to put it into practice, especially, with regard to the new approach in "smart" testing. This key element in anti-doping activities is discussed first, followed by a review of other activities.

Test Distribution Plan (TDP)

Risk assessment:

In the last months of 2015, ITTF elaborated the documented risk assessment required in the WADA International Standard for Testing and Investigation (ISTI). With the exception of stimulants and - to a relative certain extent - anabolic agents, and given: 1) the predominant skill sport nature of table tennis (TT), 2) the dual dimension of its physiological-related aspect, no substance in the current prohibited list can be definitely assessed as having a direct enhancing impact on the achievement of the TT player performance. However, some predictive risks factors have been identified.

Prioritization of Athletes and establishment of the yearly testing model:

The testing model is based on the principle of a greater unpredictability at the highest level, according to the

WADA recommended Pyramid Testing Model (Overall Pool of Athletes, International-Level (IL) Athletes, Testing Pool (TP), Registered Testing Pool, (RTP). The first step in this process consists in expanding testing at all times with an approximate average rating of 60% out-of-competition (OOC).

The initial static TDP document is based on 1) player's levels, 2) WADA's Technical Document for Sports Specific Analysis (TDSSA) and 3) the OOC testing focusing on the very top-level players and the ABP steroidal module monitoring.

Once initiated, it will become more dynamic overtime, based on the risks assessed and reacting to new information, and will evolve from structured to target testing, with more and more intelligent based testing.

First evaluation of the program to date:

New RTP and TP have been finalized, In-Competition (IC) and Pre-Competition testing have become more unpredictable and targeted, Athlete Biological Passport (ABP) has been optimized with the valuable assistance of the Tokyo Athlete Passport Management Unit (APMU), the ability to react promptly on tips has been successfully experienced.

However, many challenges and areas for improvement remain: existing IC policy with high amount of designated events and tests contradicting the TDP model,

implementation of the TDSSA, administrative workload on RTP / TP follow-up and subsequent OOC testing, cooperation with NADOs being very time consuming, structured intelligence gathering process and storage and further analysis policy not considered yet.

TUE

ITTF must recognize a TUE already granted to IL Athletes if it meets the criteria set out in the International Standard for TUEs (ISTUE), whereas IL Athletes who do not already have a TUE must apply to ITTF. Practice shows that cooperation spirit and mutual trust between IFs and NADOs are very important. It allows flexibility when needed for the convenience of Athletes, for example, when considering renewals. However, it must be outlined that "automatic" recognition without sharing medical information is not possible.

Result Management

Since the 2015 Code has become effective, no case has been brought forward as an alleged Anti-Doping Rule Violation (ADRV) within ITTF. As of 1 January 2016, ITTF has simplified its Initial Review procedure by making its Doping Review Panel (DRP) not mandatory, or formed on adhoc basis.

Information and Education

ITTF uses its anti-doping webpage to provide basic and essential information to its stakeholders. The Development and Training Director manages online education activities using WADA tools such as "Alpha" and "CoachTrue". On punctual basis, outreach activities in cooperation with NADOS and workshops are conducted at ITTF events.

Other activities

The harmonized worldwide anti-doping system requires ongoing increasing activities such as reporting, preparing statistics, responding to consultations, following anti-doping news and documentary research.

Conclusion

Significant action has been taken in the past year, however there are still areas for improvement. The increasing complexity of the anti-doping system, the new approach in testing policy and the cooperation with NADOs require more time, resources and professional expertise. Moreover, the current context of potential reforms to come in the global system needs to be closely scrutinized.

[1]

Injury survey of Japanese high school table tennis players

Hiroyoshi OGASA (*Yamaguchi University Graduate School of Medicine*)
Shiro MATSUO (*Bessho Medical Clinic*)

Abstract: Recently, the starting age of players in Japan table tennis competitions has decreased while the amount of practice from childhood has increased, with a corresponding effect on injuries in the growth phase. Table tennis players participating in the nationwide elementary school championships have reported previously that they started table tennis around 6 years old, practicing 2~3 hours almost every day. The incidence of injuries among these players is: acute injury 11.2%, and chronic injury 7.1%. Although it is necessary to start competition from childhood to develop advanced table tennis skills, excessive exercise should be avoided in development terms. Furthermore, considering the strengthening of Japan National Team, injury in teenage years is an important problem, because many high school student players have the potential to uphold Japanese table tennis in the future. Therefore, an injury survey was conducted in questionnaire form among high school players who competed in "Inter-High" (the National High School Championships) to reveal the extent of injury among these players.

[2]

Injuries in table tennis players compared with injuries of some of the best tennis players – Slovenian case

Nicolae OCHIANĂ[1], Gabi OCHIANĂ*[1] and Miran KONDRIČ[2]

[1]*University of Bacău, Faculty of Movement Science, Sports and Health, Bacău, Romania*

[2]*University of Ljubljana, Faculty of Sport, Ljubljana, Slovenia*

Abstract: Injuries are part of the modern competitive sport and as a result of increasing participation, intensity, demands and longer training periods, the potential risk of injuries in sport increase. For coach that's why it is necessary to understand what factors have to be involved in an injury-prevention strategy for table tennis and tennis. On the sample of 68 top Slovenian athletes we have studied the frequency of injuries among table tennis and tennis players, types of injuries and severity of injuries – the latter based on data of players absences from training and/or competition processes. Although table tennis is one of the less risky sports, we found out that the number and level of injuries are quite the same in both sports.

The most liable parts to injuries are in table tennis shoulder girdle (20.05%), and in tennis ankle (20.00%) followed by spine and hips (both 15.79%) in table tennis and spine (15.38%), wrist and shoulder (both 13.85%) in tennis; other parts of body are slightly less liable to injuries. According to this data, we can see that the greatest problem of both sports are abrupt movements – in table tennis no swing phase in the end of some strokes and in tennis fast movement blocking on hard surfaces. The

majority of injuries occur halfway through a training session or a competition event, mostly during a competition season. The injuries primarily pertain to muscle tissues; these are followed by joint and tendon injuries.

The results of this research provide coaches, strength and condition coaches, physiotherapists, doctors, performance analysist and other interested valuable information on causes of injuries and preventive activities of team around the table tennis and tennis players.

[3]

Questionnaire study of the sleeping quality of Japanese players and coaches during ITTF junior & cadet open -for the practice of ideal medical support

Takashi GUSHIKEN, Shiro MATSUO, Hiroyoshi OGASA, Kazuhide OGINO, Takeshi NISHIKAWA, Nariaki MATSUURA, Oosei TSUJI, Hiroyasu AKAGI (*JTTA SSMC*)

Abstract: ***Introduction:*** Medical stuff and coaches always support for the players to win the games. Long journey by plane will be associated with travel fatigues and insomnia. The aim of this study was to investigate the sleep quality of Japanese junior & cadet players and coaches.

Methods: A total of 52 players and 34 coaches were participated in this study. The players were requested a questionnaire of the Atene Insomnia Scale (AIS). In the same way, coaches were requested a questionnaire of the Pittsburg Sleep Quality Index (PSQI).

Results: Poor sleepers were found 35% of junior & cadets players. And a considerable number of coaches (85%) were found to be good sleep.

Conclusion: These findings suggest that players suffer a preponderance of poor sleep quality.

Keywords: Sleep quality; AIS; PSQI

[4]

Psychological Support based on Counseling for Japanese Junior table tennis players

Mizushima SADAYUKI

Japan Table Tennis Association

Abstract: In Japan, table tennis National Team is divided into 3 stage, Top National Team, Junior National Team (18 years old~13 years old) and Hopes National Team (12 years old~11 years old). I have done Psychological Support based on Counseling for part of the Junior National Team (and Junior National Team candidate) players since April 2015.

1) Problems / Crises of Japanese Junior table tennis players

Japanese Junior table tennis players meet various Problems / Crises.

- Wall of World Ranking.
- Increasing Ability difference from rivals.
- Give up his dream from childhood. Motivation lower. Being heart away from table tennis.
- Losing existence value. Denied his whole personality.
- High pressure, Anxiety, Impatience.
- Discontent, Vexation, Anger.
- Interpersonal relationship (with coach, parent, support staff, team mate, rival).
- Repeat injury.
- Body weight too much or not enough.
- Unable to follow school study.

To solve above problems/crises, for example we coach him, teach him, persuade him, praise him, encourage him, scold him, punish him, sometime we can't lead these problems/crises to solve. Under this situation, one of approach we can cope with is Psychological Support based on Counseling.

2) Practice of Psychological Support based on Counseling

Main action of practicing Psychological Support based on Counseling is " listening to his (player's) story". But, " listening to his story" is surprisingly difficult. Following phenomenon often occur: He almost doesn't talk his story; His story finish in a few minutes; He talk about limited superficial matter; He talk as " goody-goody "; When I notice, I talk my story; etc.

(important point when listening to his story)

- I keep his story secret. Be his ally.
- I listen to his story what he want to talk, but not what I want to listen.
- I grasp what he expresses, and think carefully its means.
- I get close to process of discovering/creating his unique story.
- In some cases I listen in steady frame, another cases I listen in lax frame.
- I protect players, and myself too.

3) Influence of Psychological Support based on Counseling

It's difficult that we declare that this phenomenon is effect of Psychological Support based on Counseling. It's more match to my heart that we say that to this phenomenon we feel influence of Psychological Support based on Counseling. What phenomenon have/had occurred to Japanese Junior table tennis players I have/had supported?

Achieve his world tour result goal. Break through the wall of World Ranking.

- Change of attitude to daily practice. Passive → Active . Coach's menu → My own menu .
- Change of Interpersonal relationship (with coach, parent, support staff, team mate, rival).
- Face his problems / crises.

- Increase self-expression.
- Change of performance under high-pressure game.
- Fantastic shining smile.

[5]

Effects of coingestion of glucose with milk after exercise on insulin secretion in female university students

Michiyo KIMURA[1], Maimi MARUYAMA[1], Chieko OIE[1], Shinichi OKAMURA[1], Shin TERADA[2]

[1]Takasaki University of Health and Welfare, Faculty of Health and Welfare

[2]The University of Tokyo, Graduate School of Arts and Sciences

Abstract:

Background and Purpose

Insulin stimulates glycogen and protein synthesis in skeletal muscle. Post-exercise nutritional strategies designated to augment insulin secretion are therefore required for athletes to improve athletic performance and enhance training adaptations. Intakes of protein and fat are known to stimulate gut-derived incretin hormones such as GLP-1 and GIP, which have capacity to potentiate glucose-induced insulin secretion from pancreas. In this context, we investigated the effects of post-exercise ingestion of glucose in combination with milk, which contains the balanced protein and fat, on insulin secretion.

Methods

Seven female university students were recruited in this study. They completed 30-min cycle ergometer exercise on two separate occasions. Immediately after each exercise, they ingested a solution containing 1) glucose alone (1 g/kg body weight dissolved in 250ml water) or 2) glucose (1 g/kg body weight) + milk (250 ml). Blood samples were collected before and 15, 30, 60 and 120 min after the ingestion to determine the concentrations of blood glucose and plasma insulin levels.

Results

There were no significant differences in heart rate (HR) and rating of perceived exertion (RPE) during the 30-min exercise between the trials, suggesting that exercise-induced stresses were similar in both trials. Plasma insulin concentration was significantly higher and blood glucose level was significantly lower after the coingestion of glucose with milk than glucose alone.

Discussion and conclusion

These results suggest that coingestion of glucose with milk immediately after exercise stimulates insulin secretion and it might be a valuable nutritional strategy to promote post-exercise glycogen recovery and protein synthesis in skeletal muscle.

[6]

Developing a multidimensional assessment to profile elite youth table tennis players

Irene R. FABER, *The Netherlands*

Abstract: Creating an international benchmark for talent development in youth table tennis intends to support associations' talent development programmes all around the world and consequently stimulating table tennis worldwide. For that reason, an multidimensional assessment (Elferink-Gemser et al., 2011; Philips et al., 2010) is developed by the TT Talent Consortium to monitor talented youth players from 10-18 years. This assessment includes not only test items for talent characteristics like physical appearance, physical fitness and motor abilities, but also for cognitive functioning and psychological aspects (Faber et al., 2016). Moreover, it is intended that associations all over the world will be able to use this assessment in future. Consequently, test items that can be used by anyone regardless their language, financial situation or technological equipment were sought.

The results of the multidimensional assessment will objectively show the strengths and weaknesses of the youth players when compared to each other. This information can support the trainers and coaches to setup an individual programme which will help the youth player to develop. Moreover, it might support selection procedures in future when applied in longitudinal studies. Nevertheless, it must be acknowledged that none of the players' profiles will guarantee becoming a world-class elite player and probably players with different profiles could make it to the top of the world.

During the Japan Table Tennis Association Sports Science and Medicine Committee International Meeting 2016, the multidimensional assessment and its background, including the scientific fundament and pragmatic considerations, will be presented together with the proposed analyses of the data.

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[7]

Comprehensive analysis of modern, high competitive level table tennis game, by combining different approaches/methods of performance diagnostics

Goran MUNIVRANA

ITTF Sports Science and Medical Committee

Abstract: Evaluation of the structure of sports activities is one of the most important diagnostics' functions in competitive sport. In sports games, because of the interactive process between the two teams or players, it is especially important to obtain diagnostic information on competition. Moreover, table tennis is probably the most complex of all individual sports games, when viewed in terms of its structural (technical-tactical) complexity. It demands a wide range of different playing techniques, performed with fast projectile (table tennis ball) and racquet with different materials (types of rubber) on it, and the game itself is conducted around a small playing space and depending on the type of a stroke made by the opponent.

Therefore, as the technical-tactical abilities are one of key factors for achieving success in table tennis game, studies that are analysing the game characteristics and are aiming to establish structure and role of technical-tactical activities of high level competitive table tennis game, are extremely important for understanding the main features of modern table tennis sport.

In table tennis, performance diagnostics offers many different many possible approaches to analyse the game and when seeking to determine the game characteristics and structure of technical-tactical activities that are used in modern table tennis, researchers of the field have used different methods and models for the purpose. In the previously conducted research studies on the performance analysis of elite table tennis, different types of technical-tactical activities in competitive matches have been analyzed and their role evaluated (Djokić, 2001, 2007; Galina, 1992; Guan et al., 2011; Pradas et al., Wang et al., 2009 2010; Yu et al., 2008; Zhao et al., 2007; Zhe et al., 2007, 2010; ect.), or a rally length and success/failure rates of different strokes have been observed (Zhang, Liu, Hu & Liu, 2013), or state-transition-models to describe tactical behavior in table tennis were developed (Pfeifer, Zhang and Hohmann, 2010). The data have been primarily collected by means of video analyses of table tennis matches, but some authors have also used expert analysis as the other possible approach of collecting the data (Munivrana, Furjan-Mandić, Kondrič, 2015; Munivrana, Kondrič, Petrinović 2015).

Although, all the used approaches have proven their validity to a certain extent and have contributed to the development of performance diagnostic methods in table tennis, all together they usually lack a scope of uniform performance criteria.

From a performance diagnostic point of view, the key task of systematic game observation is to structure the playing performance in all its complexity, i.e. to analyse the game structure and find determining factors that influence competitive performance.

In this context, as one of the main issues of performance diagnostics in table tennis is choosing the most appropriate method of modelling the game, a research proposal will be presented with aim to present a model that would combine different methods and approaches in order to scientifically analyze the structure and the role of technical-tactical activities in modern table tennis game.

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[8]

Anticipation in table tennis

Tsung-Min HUNG

National Taiwan Normal University

Abstract: Among cognitive and perceptual abilities, anticipation is one of the critical components in table tennis because of its open skilled nature that requires a fast reaction according to the opponent's action. Expert-novice comparison studies have shown that high skilled tennis players can anticipate the final ball location of tennis strokes more precisely than low-skill players, particularly in the case of strokes which are performed near the net. This Advanced anticipatory capability has been attributed to the better use of ball extrapolation from advanced cues such as the position of the racquet, ball, and other body parts prior to ball-racquet contact, and signals from opponents' movements. Findings from all the racket sports such as tennis, badminton, and squash can be implicative for the understanding of anticipation in table tennis. This presentation intends to review studies related to anticipation from these racket sports, in terms of the major findings, research paradigms employed in these studies, and possible directions for future studies.

[9]

Table Tennis Spectators Motivation: Are you going to Table Tennis Game?

Poon Soon CHEONG

National University of Malaysia, Malaysia

Abstract: Table tennis is the most popular racquet sport in the world and ranked second overall in terms of participation. However, the spectator attendance in the

live arena is unsatisfied. Hence, the purpose of this study is to identify the motivators that affect the Table Tennis spectator attendance in Malaysia. The research followed a quantitative questionnaire that consists of 46 questions, and using a seven-point Likert scale. The analysis of this study involved 100 respondents, who were attended 2016 World Table Tennis Team Championship and few national-level competitions in Malaysia. The result shows that the excitement of the game has the strongest effect toward spectator attendance. This result is useful to Table Tennis Association of Malaysia to come out with a new strategy that emphasis in the excitement of the game in order to improve the popularity of table tennis sport, to provide useful information on how to advertise table tennis in a more effective way, and therefore contributes to the existing table tennis spectator motivations literature. Although, the present study appears to be somewhat supportive of the work of earlier researcher, this study suggests that more respondents from various backgrounds and countries are needed.

[10]

Change of rubber rebound characteristics by using booster

Kohei MAYURI, Ushiyama YUKIHIKO, Gao PING, Shioiri AKIYOSHI
Niigata Univ. JAPAN

Abstract: After the Beijing Olympic Games, the ITTF decided to announce a total ban on using »speed glue" and "after processing". However, it is clear that speed adjuvant, not included organic solvent, called "booster" is still used in international competitions.

The booster cannot be detected by conventional tester (ex. ENETS) because of not including organic solvent.

The banned booster, therefore, is infested, as Mizutani, a Japanese top table tennis player, implied in "Number", a sports magazine, that a newly inspection method be established. This problem has not been solved for several years. The purpose of this study is to obtain underlying data for establishing an inspection method by quantifying the change of reflection coefficient when using boosted glue rubber.

The rebound characteristics was measured by dropping an iron ball weighing 5.45g from 3 different heights such as 0.3, 0.4, 0.5m onto the rubber put on the racket. Each rebound was filmed by a video camera in order for knowing each height of the rebound. The dropping was conducted ten times on each condition. Four kinds of rubber (KYOHYO NEO3, TENKYOKU NEO3, TENERGY05, Fastarc G-1) with two types of boosters

(DATEIYU and RIKIDO) were compared with those of not using booster (untreated) rubbers.

This report focuses on the data as to TENKYOKU NEO3 treated with DATEIYU (4.5g) and RIKIDO (2.3g), which was predicted the high usage rate of booster.

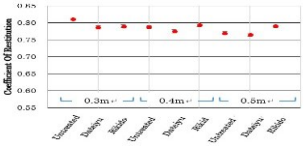

Figure1) Comparison with TENERGY 05

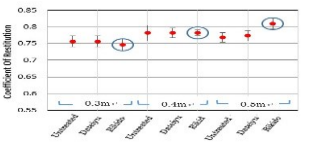

Figure2) Comparison with TENKYOKU NEO3

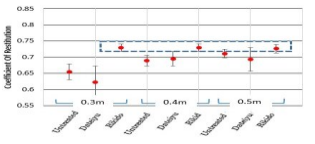

Figure3) Comparison with KYOHYO NEO3

Regarding TENKYOKU NEO3 when using the RIKIDO, coefficient of restitution appeared higher (=same as collision-generated force became stronger) as increase with height of free-fall meanwhile RIKIDO used for KYOHYO remained stable in coefficient of restitution regardless of the change of collision-generated force. In this investigation, it is considered RIKIDO as more likely to be effective for rubbers made in China.

Also, this inspection method cannot be detected to change by using a booster for rubbers made in Japan. (TENERGY05, FastarcG-1) For the reason, it needs to verify another method that the iron ball crash on the rubbers put onto the racket from oblique direction.

[11]

Medication Analysis from the Viewpoint of Anti-doping: A Study by the Japan Table Tennis Association

Takuro OKADA[1, 2] and Shiro MATSUO[2]

[1] Department of Pharmacy, Kameda General Hospital, Japan [2] Japan Table Tennis Association Doping Control Committee

[12]

Software Tools for Game Analysis in Table Tennis

Michael FUCHS, Sebastian WENNINGER

Technische Universität München, Performance Analysis and Sport Informatics, Germany

***Introduction*:** The use of video analysis for game observation particularly by means of software tools (SIMI Scout, SportsCode, utiliusVS), has changed the functioning and the understanding of players and coaches (Lames & Hansen, 2001). These tools – especially because of their complexity and low optimization for a specific sport – are less user-friendly and less efficient in the data collection and evaluation process (Link & Ahmann, 2013). Therefore, two software tools have been especially designed and developed to collect and evaluate data in table tennis matches.

***Data collection*:** The tool for data collection – TUM.TT Scouter – enables efficient, manual data collection, taking table tennis specific match rules and rhythm into consideration. The score and the server are updated automatically after each point, for example. Due to partially automated data collection, necessary manual inputs

are thus reduced. The position of the ball on racket contact can be extrapolated from the placement and the direction of the previous stroke, for instance.

***Data evaluation*:** The data evaluation tool – TUM.TT Viewer – essentially consists of control elements to execute filter actions, of different types of result lists as an outcome of filter actions, and of a media player for qualitative analysis. The procedure for filter actions depends on individual preferences of players and coaches. Based on the importance of serve and receive, of the point winning stroke, and of the three-phase-evaluation-model, detailed filter possibilities are available for the first four strokes and the point winning stroke in a rally. For visualisation of play structures and tactics used by the players, within the qualitative analysis, a so-called report can be generated. ***Conclusion*:** By implementation of table tennis specific knowledge into both software tools, a more efficient data collection and evaluation was achieved. The automatic identification and calculation of performance-related and performance-relevant parameters reduces the data input and is an example of a partially automated game observation in professional sport.

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Link, D., & Ahmann, J. (2013). Spielanalyse im Beachvolleyball – Die Softwaretools für die Olympischen Spiele 2012. *Leistungssport, 43 (1), 58-63*

Keywords: Table tennis, software tool, game analysis, video analysis

[13]

Development of a Mobile Application for Table Tennis Analysis

Sho TAMAKI, Kazuto YOSHIDA, Koshi YAMADA

1. Introduction

In 2014, we developed a web-based application for table tennis analysis, which was presented at the JTTA SSMC International meeting 2015. We proposed a modern style performance analysis and a graphical user interface that realizes real-time data collection by developing a prototype. However, the developed application has problems on usability. At first, users might irritate the latency on operations. The latency time of web-based application is always longer than that of native ones, because web-based ones run on a web browser. In addition, distributing form might be unnatural. Many people think mobile applications are always located in the Apple iTunes store or the Google play store, while web-based applications are located in www. Moreover, unusual operations are required if users want to place an application's icon on the home screen, where mobile applications are always placed.

We newly developed a mobile application to solve the issues mentioned above. In the following of this manuscript, we report the outline of the developed application and future tasks of this research.

2. Developed application

2.1. Operating environment

The application runs on iOS 8+ or Android 4.1+. We employed Adobe PhoneGap to make the application run on multiple platforms.

2.2. Functionality

1) Data Collection

Match related information, such as competition name, match date, category (women or men), event (singles or doubles), round, number of games, the name and the gender of players can be recorded with graphical user interfaces. In addition, rally related information, such as game score, point score, winner, loser, server, receiver, and the number of shots in a rally, can be recorded easily with optimized interfaces.

2) Data Analysis

Running score, scoring rate (number of scoring shots / number of shots) of the *i*-th shot, losing rate (number of losing shots / number of shots) of the *i*-th shot, and effectiveness (scoring rate – losing rate) of the *i*-th shot can be calculated. Scoring rate, losing rate, and effectiveness are translated into the rate on a one-to-ten scale, because it is hard to evaluate the raw value of statistics. The translation to one-to-ten scale is done on the basis of the results of 70 matches in an international competition.

3) Backup

If one signs in Google via this application, it is possible to upload data to the database server, which runs on Google App Engine. This function is helpful to move data to another device.

2.3. Comparison with the previous web-based application

The developed application no longer runs on a web browser and the latency is surely shorter than that of the previous application. The problem of distribution is going to solve. It is planned to distribute the developed application in Apple iTunes store and Google Play Store as soon as possible. In addition, the user interfaces that show statistics are easier to understand.

3. Future tasks

At first, we need to use the developed application by ourselves to consider what can/cannot do with this application.

As a next step, we should spread the application and teach how to use it to the people who like to play table tennis.

Acknowledgments

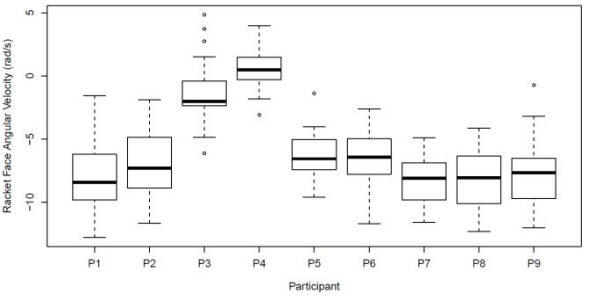
We would like to express our gratitude to Isao Hayashi and Wang Zhijun, Kansai University, for their contribution in the development of the application.

[14]

Control of racket kinematics at impact and its relationships with ball landing location in the table tennis topspin forehand

Yoichi IINO, *The University of Tokyo, Japan*

1. Background and Objectives



The ability to hit a ball at aimed location in forehand and backhand drives is important to win a table tennis match along with the ability to strike the ball with greater speed and amount of spin. However, few studies have examined how players control the racket movement around ball impact and how the racket kinematics is related to the ball landing point on the table in table tennis drives. The purpose of this study was to determine how players control the racket around impact in the forehand drive and to investigate the relationship between the ball landing location on the table and the racket kinematics at impact.

2. Methods

Participants were 9 male Division I collegiate players in Kanto Collegiate Table Tennis League (mean age 20.4 years, height 1.72 m, body mass 65.3 kg). The players were instructed to hit cross-court forehand drives aiming at a target on the opponent's court as fast and as accurately as possible against backspin balls that were launched by a ball machine. A motion capture system (MAC3D System, Motion Analysis) was used to record the movement of the racket at 200Hz. A high-speed camera (HAS 220, Ditect; 200Hz) was used to shoot the landing location of the ball onto opponent's court and the 2D coordinates were determined using a two-dimensional DLT method. For each player, 30 trial with higher racket speed at impact were selected. Racket speed, the racket face angle, the racket trajectory angle and their rates of change in these variables around impact were determined. A regression analysis by linear mixed model was used to determine relationships between the ball landing location on the table in depth direction and each of the racket face angle, racket trajectory angle, and racket speed ($P < 0.05$).

3. Results & Discussion

Seven of 9 players were opening the racket surface at impact (Figure 1). All players were hitting the ball while increasing the racket trajectory angle. In addition, seven of 9 were increasing the racket speed at impact. Ball landing location in the depth direction was significantly related to the racket face angle at impact, suggesting that opening the angle by 1 degree corresponds to the landing location being 4.7cm far. On the other hand, no significant relationship between the landing location of the ball and racket trajectory angle or racket speed was observed.

The results suggest that control of the racket face angle rather than the racket

trajectory angle or racket speed is important because the variable significantly affects the landing point of the ball on the table. The racket face angle becoming open at impact in many players implies that the racket face angle varied substantially due to the timing variability and suggests that racket face control may not be optimal in these players.

[15]

Attenuation of the spin angular momentum over the flight of the table tennis ball in play

Suguru ARAKI

Tohoku Fukushi University, Department of Information Science, Japan

Abstract: While in play, on one hand, the spin of the table tennis ball is attenuated due to its collision with the table. This happens “over” the collision. On the other hand, “between” the collisions it is attenuated due to the friction between the ball and the surrounding air. The former attenuation occurring over the collision is determined by velocity components parallel to the table of the surface point coming into contact immediately before the collision relative to the table, and by parameters representing surface properties of the ball and the table. The latter attenuation over the flight of the ball between successive collisions is determined by integrating, over the entire ball surface, the friction drag that the boundary layer in the vicinity of any ball surface element exerts upon its surface element.

[16]

Estimation of Trajectories and Bound Positions of a Table Tennis Ball by using Audio and Visual Data

Yoshinori TAKEUCHI (*Daido University*)
Kazuto YOSHIDA (*Shizuoka University, JTTA SSMC*)

1. Introduction

In table tennis, bound positions of a ball on the table, the number of shots played per rally that is the sum of a correct service and correct returns are major concerns of coaches and players. Therefore, a simple method for collecting those quantitative data is required.

In this study, we propose an automatic method to estimate the trajectory and bound position of a table tennis ball from audio and visual data obtained by a single video camera. The data is obtained by a camera and microphone equipped on the ceiling of the National Training Center.

2. Methods

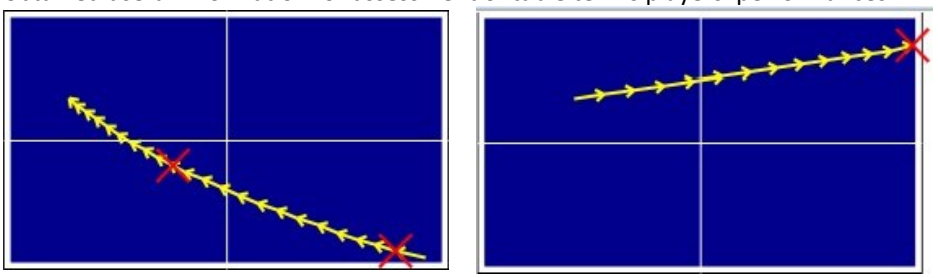
We extract a ball trajectory and bound positions for every hit of the ball. We developed a fast image processing method because our goal is instant feedback of the results. At first, we extract the ball position in the table from each image frame. Then, we track the ball position for successive frames. The trajectories of the ball

are obtained from this process. We developed one pass extraction method in which the process is finished only one raster scan of the image, so that this process takes 14.1ms which is more than 60 frames per second.

We detect bound positions from audio data. The size of the ball is 40mm, and the resonant frequency is 345/0.04 = 8625Hz. Therefore, we extract sound component of the ball bound by filtering the sound with 8525-8725 pass frequency band. This process is simple and quite fast, and high time resolution. We combine the audio and video data to detect the bound position. The time resolution of the sound is much higher than that of the video, we interpolate or extrapolate the ball position by using detected time from the sound.

3. Results

Figure 1 shows a sample of the detected ball trajectory and bound positions. We can estimate ball speed by the length of each arrow since the time duration of each arrow is known. By testing with audio and visual data of practice games, we obtained useful information for assessment of table tennis players' performances.



Service **Return of the service**

Figure 1 Sample of the detected ball trajectory and bound positions: Arrow represents detected ball position of each frame. X represents bound position. Left shows a service trajectory and two bound positions. Right shows the return trajectory and one bound position.

[17]

Issues in International Journal of Table Tennis Sciences, No. 1 (1992): Past and present of the scientific research on table tennis

Hiroaki SAKAKIBARA

University of Teacher Education Fukuoka, JAPAN

The purpose of this presentation is to explain the rationale and process of publishing as well as the procedures taken to obtain an International Standard Serial Number (ISSN) for the International Journal of Table Tennis Sciences. The first issue of this scientific journal was intended as a platform for the proceedings of the International

Congress of the International Table Tennis Federation, Sports Science Committee (ITTF-SSC) held at in the city of Fukaya in 1991, spearheaded by the late

Professor Nobuo Yuza and a number of the editorial board members and JTTA Sports Science and Medical Committee.

Prof. Yuza provided a detailed description of the submission process in the imprint of this journal's first issue in 1992. Scientific papers on table tennis were divided into two categories, namely, original investigations and other reports. After the presentation of these papers at the international congress, steps were taken for their submission to Prof. Yuza's editorial office. Papers submitted for contribution were peer reviewed, the results of which were returned to their respective authors. After a number of modifications, the editorial board accepted these papers.

In establishing an international academy on table tennis, including the publication of this journal, former ITTF

President Ichiro Ogimura planned for the application for the journal's ISSN. He convinced the ITTF office, located in Hastings in the United Kingdom, to apply for ISSN to the ISSN UK Centre under the auspices of the British

Library. The printed copies of this journal's first and second issues in 1992 and 1994, respectively, were deposited with the British Library. Initially, 300 copies of the both issue were printed and sent to members of the ITTF-SSC. And then Prof. Dr. Yutaka Tsuji has taken over the role of the editor in chief at the journal from its sixth issue, which was the first to be released in digital format. Nowadays, the electric journals of publication on ITTT Home page have continued, with the active support and promotion by Prof. Dr. Miran Kondric and Dr. Jean François Kahn, as well as other ITTF-SSC members.

This presentation suggests that each scientific paper included in the journal should be authorized to apply for DOI (a Digital Object Identifier), a type of persistent identifier for the unique identification of electronic documents.

List of the participants at 2016 annual JTTA SSMC and ITTF SSMC meeting

JTTA – SSMC members and their guests

Nr.	*Name*	*Institution*
1	Shiro MATSUO	Japan Table Tennis Association anti-doping committee
2	Kazuto YOSHIDA	Shizuoka University, Faculty of Education
3	Hiroyoshi OGASA	Yamaguchi University
4	Mizuho ADACHI	Nippon Sport Science University
5	Suguru ARAKI	Tohoku Fukushi University
6	Takashi GUSHIKEN	Hakuai Hospital
7	Ayako HABU	Japan Table Tennis Association
8	Yasunobu HOSHINO	Juntendo University
9	Yoichi IINO	The University of Tokyo
10	Haruhiko IKEBUKURO	Japan Institute of Sport Science
11	Junichi KASAI	Waseda University
12	Michiyo KIMURA	Takasaki University of Health and Welfare
13	Yuji MAENOHARA	The University of Tokyo
14	Shigeaki MATSUURA	Osaka University
15	Hitomi MURAKAMI	Ather Co., Ltd.
16	Takeshi NISHIKAWA	Shizunai Dermatological Clinic
17	Kazuhide OGINO	Tottori University
18	Takuro OKADA	Kameda Medical Center
19	Hiroaki SAKAKIBARA	University of Teacher Education Fukuoka
20	Sho TAMAKI	Meio University
21	Ayato TANAKA	Japan Table Tennis Association
22	Ousei TSUJI	Asahino General Hospital
23	Ukihiko USHIYAMA	Niigata University
24	Koshi YAMADA	Table Tennis Kouryukai
25	Takahiro YAMAUCHI	Fukui University
26	Youji YOSHIZAWA	Nagoya University of Economics
27	Takanori ABE	Gunma University
28	Etsuko ENAMI	ITTF
29	Isao HAYASHI	Kansai University
30	Teruho HUJII	Exvision Corporation.
31	Yuki INABA	Japan Institute of Sports Sciences

Nr.	*Name*	*Institution*
32	Toru IZAWA	Gunma University
33	Yuta KOIKE	Gunma University
34	Michika MARUYAMA	The University of Tokyo
35	Chikara MIYAJI	Japan Institute of Sports Sciences
36	Sadayuki MIZUSHIMA	Japan Table Tennis Association
37	Ken OGASAWARA	Gunma University
38	Hiromasa OKU	Gunma University
39	Shuichiro OOTAKE	Tokyo-Kita Medical Center
40	Katsutoshi SAITO	NHK：Japan Broadcasting Corporation
41	Seiichi SUZUKI	Ibaraki Prefectural Central Hospital
42	Yutaka TSUJI	Emeritus professor of Osaka University

ITTF – SSMC members and their guests

Nr.	*Name*	*Institution*
1	Miran KONDRIČ	University of Ljubljana, Faculty of Sport
2	Tsung-Min HUNG	National Taiwan Normal University
3	Irene R. FABER	Saxion University of Applied Sciences, Faculty of Physical Activity and Health
4	Goran MUNIVRANA	University of Split, Faculty of Kinesiology
5	Nicolae OCHIANA	University Vasile Alecsandri of Bacau, Romania
6	**Kazuto YOSHIDA*	Shizuoka University, Faculty of Education
7	**Shiro MATSUO*	Japan Table Tennis Association doping control committee
8	Jean Francois KAHN	ITTF Special adviser
9	Françoise DAGOURET	ITTF Anti-Doping Manager
10	Mikael ANDERSSON	Technical Director WTTC 2018 Halmstad
11	Poon Soon CHEONG	Table Tennis Association of Malaysia
12	Michael FUCHS	Technische Universität München, Performance Analysis and Sport Informatics, Germany

** already at JTTM SSMC list.*

2017

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Dear Prof. Kondric,

Invitation letter for the Japan Table Tennis Association Sports Science and Medicine Committee International Meeting 2017

We will have the Japan Table Tennis Association Sports Science and Medicine Committee International Meeting 2017 in AJINOMOTO National Training Center in Akabane, Tokyo from September 23th to September 24th 2017. I am writing to invite you to participate in this meeting. Since you are an expert in table tennis sciences, I believe your presence and our conversation would make this meeting very successful.

I am pleased to confirm that we will be able to fund the following expenses:

- round trip flight
- connection costs between Narita/Haneda airport and the hotel
- 4 nights' hotel accommodation, including breakfast
- lunch at the training center each day

I do hope you will accept this invitation, and would appreciate your RSVP by email on or before July 1st. For more information, please see the attached event schedule and notes.

Please feel free to contact me should you have any questions or comments.

Sincerely yours,
松尾 史朗 Shiro MATSUO Executive Director of the JTTA
email: shiro-matsuo@jcom.home.ne.jp
吉田 和人 Kazuto YOSHIDA Chair of the JTTA SSMC
Vice-chair of the ITTF SSMC
前原 正浩 Masahiro MAEHARA Executive Vice President of the JTTA Executive
Vice President of the ITTF

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Event schedule

September 21st /22nd: Arrival in Narita/Haneda, Japan* **
September 22nd: free time ; I'll show you around Tokyo if you'd like.
September 23th: am ITTF SSMC meeting pm JTTA
SSMC International Meeting
(in English) Welcome Party at
the National Training Center
September 24th: am JTTA SSMC International Meeting
(in English) pm ITTF SSMC meeting
September 25th: Departure from Narita/Haneda, Japan* **

* We will send you a round trip economy class e-ticket for the flight from your city to Narita.

** Please wait to be picked up by our staff at Narita/Haneda Airport on September 21/22nd and you will also be taken back from your hotel to Narita/Haneda Airport on September 25th.

Venue

AJINOMOTO National Training Center
http://www.jpnsport.go.jp/corp/english/tabid/382/Default.aspx
Zip code; 115-0056 Address : 3-15-1 Nishigaoka Kita-ku, Tokyo, JAPAN
Japan Institute of Sports Sciences
http://www.jpnsport.go.jp/corp/english/activities/tabid/393/Default.aspx

Hotel

Hotel Met Akabane
http://www.jrhotelgroup.com/en/152.html
Zip code; 115-0045 Address : 1-1-76 Akabane, Kita-ku, Tokyo, JAPAN
TEL : 81-3-5939-0011

Please note:

As sponsor of this conference, the Japan Sports Council asks that all participants strictly comply with the following rules:

1) The e-ticket must only be used by the named person and it is not possible to change the flight details.

2) Please do not extend your stay in Japan for any reason, even if you are willing to bear the additional costs. [Sorry. Our sponsor did not accept our request.]

Thank you for your cooperation

Japan Table Tennis Association

Sports Science and Medicine Committee International Meeting 2017

PROGRAMME

AND

ABSTRACTS

23 - 24 September 2017,

National Training Center,

Tokyo, JAPAN

スポーツ振興くじ助成事業

Supported by Sports Promotion Lottery

JTTA Presidents Greetings

On behalf of Japan Table Tennis Association (JTTA), I am pleased to be able to invite members of International Table Tennis Federation Sports Science and Medical Committee (ITTF SSMC) and other International SSMC researchers to "JTTA Sports Science and Medicine Committee International Meeting 2017" which will be held from 23rd to 24th of September 2017 at Ajinomoto National Training Center, Kita-ku Tokyo.

JTTA started up its SSMC in 1987, to introduce Sports Science and Medicine into strengthening of players. Currently there are 30 members within the committee, and they all work in different fields such as Doctors, Nutritionist, Psychological Researcher, Trainer, Sports Science Researcher and Engineering Researcher. These members work in the basic Practical and Theoretical research for Table Tennis, like Medical Support, Mental Support, Nutritional Support and Information Strategy which is related with Table Tennis.

Held once every year since 1990s, this Committee Meeting has gone on for more than 25 years where researchers get together with their achievement to share and discuss for further development.

This committee which has its long history, became International in 2014 by co-hosting with ITTF SSMC. We would like to share with the world, our achievement on science & medicine within the field of Table Tennis and to hold a healthy debate about it.

Finally, I am delighted to be able to hold such International Meeting here in Tokyo, where the next Olympic and Paralympic will be held on year 2020. I wish this meeting which will be held for the next 2 days will be most fruitful for all participants which is possible only with your understanding and support.

Japan Table Tennis Association
President
Sadayoshi FUJISHIGE
藤重 貞慶

Greetings

I am pleased that we can hold this annual meeting again in 2017. Thank you for your attendance.

It is of great importance to us to hold this meeting again in Tokyo. In 2020, Tokyo will hold Japan's 2nd Olympics and Paralympics Games. The Olympic Games in 1964 ignited high economic growth of Japan. We, Japanese hope that the next Olympic Games will also change Japan for the better and this change will create a long lasting legacy.

Now, in Tokyo, preparations are already underway for the 2020 Olympic Games.

Construction of venues and improvement of various urban infrastructures have begun. In regard to table tennis, the Japan Table Tennis Association is continuing efforts to achieve gold in 2020. However, our purpose is not only a victory. JTTA has planned various things until 2020.

They have asked us to activate more sports science research and to advance the internationalization of Japanese sports scientists in order to leave a 2020 legacy. We would like to achieve this with you, so, we planned this meeting for this purpose.

I am sure that publishing our research and presenting our results will be helpful for domestic and foreign researchers. I hope you will leave this meeting with new knowledge, new skills, new expertise and a network of new friends and colleagues.

Japan Table Tennis Association
Sports Science and Medicine Committee

Shiro MATSUO
松尾 史朗

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Shiro MATSUO (Bessho Medical Clinic, JTTA SSMC)
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Hiroyoshi OGASA (Yamaguchi University, JTTA SSMC)
Yoichi IINO (The University of Tokyo, JTTA SSMC)
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Doping Control Committee

Takuro OKADA

PROGRAMME

Welcome

Sat. 23 September 1:00 pm-

Shiro Matsuo
JTTA sports science and medicine committee

Key note lecture

Sat. 23 September 1:00 pm-

Where do our ideas for TT research come from?

Miran Kondrič[1,2]
[1]*ITTF Sports Science and Medical Committee*
[2]*University of Ljubljana, Faculty of Sport, Slovenia*

Research presentations & Activity reports

Session 1: Research presentations & Activity reports

Sat. 23 September 1:40 pm-

Chair: Kazuto Yoshida
Chairman of JTTA sports science and medicine committee

1. **The development of sports clubs for Germany**
   Volker Bouvain
   University of Paderborn,
   German Table Tennis Association, Germany,

2. **Social influence on attracting spectators to table tennis game**
   Poon Soon Cheong
   National University of Malaysia, Malaysia

3. **Is talent written in the stars?- The relative age effect in table tennis**
   Irene Faber
   Saxion University of Applied Sciences, Faculty of Physical Activity and Health, Enschede, The Netherlands.
   Radboud university medical centre, Radboud Institute for Health Sciences, IQhealthcare, Nijmegen, The Netherlands
   International Table Tennis Federation, Lausanne, Switzerland.

4. **A first step to create an international benchmark for talent development in table tennis – a pilot study.**
   Goran Munivrana
   University of Split, Faculty of Kinesiology, Croatia.
   International Table Tennis Federation, Lausanne, Switzerland.

5. **Will Visuo-Spatial Working Memory Differentiate Skill Levels in Table Tennis Players: an ERP study**

Tsung-Min Hung

National Taiwan Normal University, Department of Physical Education

6. **Importance of Shoulder in Playing Table Tennis: Skill Visualization Using Fuzzy Rules Acquired by TAM Network**

Isao Hayashi

Kansai University, Faculty of Informatics, Japan

Session 2: Research presentations

Sat. 23 September 4:00 pm –

Chair: Hiroyoshi Ogasa

Vice chairman of JTTA sports science and medicine committee

7. **Importance of healthy training and healthy development of young table tennis players focusing on the performance tests**

Emre AK

Sports Scientist & Manager of Sports Operations

Gloria Sports Arena, Belek, Antalya, Turkey

8. **Introduction for Prevention of Injuries in Table Tennis**

Fethi Regaieg

Aspetar, Orthopedic and Sports Medicine Hospital, Qatar

9. **Training load and injury incidence in youth table tennis players: A pilot study**

Samuel A. Pullinger, Abdallah Rejeb, Evodkia Varementi, & Marco Cardinale

Aspire Academy

10. **Investigation of mechanical factors related to osteochondral lesions at the elbow joint in table tennis players**

Yoichi Iino

The University of Tokyo, Japan

11. **Problem phenomena faced by Japanese elite junior table tennis players and its psychological background**

Mizushima Sadayuki

Japan Table Tennis Association

Special Program

Sat. 23 September 6:00 pm –

SPORTS NUTRITION SYMPOSIUM

Chair: Michiyo Kimura
Takasaki University of Health and Welfare
JTTA sports science and medicine committee

1. **Present Activities of Certified Sports Dietitian in Japan**
Kazuko Ishikawa-Takata
Head, Department of Nutritional Education and Shokuiku
National Institutes of Biomedical Innovation, Health and Nutrition, Japan
President of Japan Sports Nutrition Association

2. **Recent progresses in Nutritional strategies to promote post-exercise recovery and adaptations**
Shin Terada
The University of Tokyo, Graduate School of Arts and Sciences, Japan

3. **Nutritional service for the Japanese national badminton team**
Nagisa Matsumoto[1)], Taro Iizuka[2)]
[1)] Japan Institute of Sports Sciences, [2)] Nippon Badminton Association

4. **Q&A**

Special Programs

Sun. 24 September 9:00 am –

Chair: Shiro Matsuo
JTTA sports science and medicine committee

Special Lecture

A Scientometric Study about Badminton applied to Sports Science Research
Cabello-Manrique, David
University of Granada, Spain

Research presentations

Session 3: Research presentations

Sun. 24 September 9:40 am –

Chair: Yoichi Iino
Vice chairman of JTTA sports science and medicine committee

12. **TUM.TT Software – New Feature and Practical Experiences**
Michael Fuchs
Technical University of Munich, Chair of Performance Analysis and Computer Science in Sport, Germany

13. **Statistical Analysis of Decision Making of Table Tennis Service**
Sho Tamaki
Meio University, Japan

14. **Development of system of table tennis game analysis using ultrasonic sensor**
Akiyoshi Shioiri
Niigata University, Graduate School of Modern Society and Culture, Japan

15. **The Impact of the Net Height in Table Tennis**
Drago Torkar
Jozef Stefan Institute, Ljubljana, Slovenia

16. **The Influence of Chinese Taipei National Team training toward table tennis ball change**
Mei-Jen Huang
National Kaohsiung Normal University, Taiwan, Republic of China

Session 4: Research presentations

17. **Case Study on Effective Skills of Service in Table Tennis to Conceal Spin, Course, and Speed of the Ball from the Receiver**
Kazuto Yoshida
Shizuoka University, Japan

18. **Development of stroke assessment application for table tennis strokes using an inertial sensor**
Yoichi Iino
The University of Tokyo, Japan

19. **Kinetic Analysis of Forehand Strokes in Elite Table Tennis Players**
Yuki Inaba
Japan Institute of Sports Sciences, Department of Sports Science

20. **The time profile of the spin of the table tennis ball in play**
Suguru Araki
Tohoku Fukushi University, Department of Information Science, Japan

Closing Remarks 1:00 pm
Kazuto Yoshida
Chairman of JTTA sports science and medicine committee

Key Note Lecture

Where do our ideas for TT research come from?

Miran KONDRIČ[1,2]
[1]*ITTF Sports Science and Medical Committee*
[2]*University of Ljubljana, Faculty of Sport, Slovenia*

In its development, table tennis was always looking for ways to improve the game. In earlier years, the method of trial and error was mainly used, but these days more and more coaches are adopting the scientific approach. So, a question arises when talking about the communication between a scientist and a coach: Where and how do they identify their most pressing concerns? Coaches are looking for the best possible training process, but today this process can only reach a truly high level with the support of sports science. It seems to me that already just this way of thinking inspires TT scientists. Another question might be: But what fuels their innermost motivations? Is it a requirement for them to be inspired? I don't think so. I would like to share some of my views which might inspire other table tennis scientists to comment on what makes the process of scientific discovery in table tennis so exciting.

New challenges lie before the ITTF. During the JTTA SSMC and ITTF SSMC gathering in September in Tokyo, we will be presented with a lot of results provided by researchers from Japan and abroad. We will discuss ways to put those results into the practice of players and coaches. But there are still more questions that need to be answered. In the last two decades, the ITTF has changed certain rules and monitored the development of the game. Yet some topics remain which might influence further development of the game. To ensure they are on the right path, scientists needs input from coaches and players. But not only from them, since national associations, their representatives, referees, team leaders and the highly important spectators are those who are able to give some clues to scientists about which direction we should go in.

Too many of the findings that fill the academic space are the outcome of shoddy experiments or poor analysis. We want to avoid such situations when talking with interested partners. Sports science is not there simply to prove something, but to bring results to life in practice. Sports science still commands enormous – even if sometimes bemused – respect. But its high status is built on the capacity to be right most of the time and to correct its mistakes when it gets things wrong.

Academic publishing is seeing major changes as it makes the transition from print to electronic. It is today much easier to cooperate with scientists abroad than before, and table tennis should regard this as an advantage. We are the biggest international federation and collaboration between scientists around the world should also lead to more valuable research on table tennis. As chairman of the ITTF Sports Science and Medical Committee, I am still not satisfied with the presence of scientific papers on table tennis published in most prestigious journals.

In the last few years, we have improved our input, yet it remains far from excellent. The gathering of the JTTA SSMC and the ITTF SSMC should bring up new ideas, projects and research proposals

Special Program

SPORTS NUTRITION SYMPOSIUM

Michiyo KIMURA
Takasaki University of Health and Welfare

To the Tokyo Olympic Games in 2020, the expectation for the sports nutrition is increasing more and more. In this symposium, we will have 3 presenters, who will speak about the recent topics and progress in nutritional strategies, nutritional support and food environment in sports. I hope this symposium will be a good opportunity for exchanging knowledges of the recent advances in or close to the sports nutrition field.

SPORTS NUTRITION SYMPOSIUM 1

Present Activities of Certified Sports Dietitian in Japan

Kazuko ISHIKAWA-TAKATA
Head, Department of Nutritional Education and Shokuiku
National Institutes of Biomedical Innovation, Health and Nutrition
President of Japan Sports Nutrition Association

There is an increased need for nutritional support for athletic individuals/associations and education for athletes, and the provision of a qualified dietary environment.

The Japan Sports Nutrition Association (JSNA) was established to improve athletic performance, promote public health, and develop sports through supporting research on sports nutrition, sharing information, and educating professionals. We begin operations in 2007 as a non-profit organization. We now have about 1,400 members of JSNA.

Certified Sports Dietitians are accredited from both the Japan Sports Association (JASA) and the Japan Dietetic Association (JDA). The JSNA involves accreditation course and renewal credit course for Certified Sports Dietitians. To my knowledge, this is the first certification system for sports dietitians in the World that is certified by the collaboration of associations for sports and dietitians. The JASA already has certification systems for sports instructors who have qualified by their knowledge and technique in the field of sports medicine and science. Certified Sports Instructors include Instructors for Competition, Fitness, Medical (Sports Doctor and Athletic Trainer), and Sports Management. The Certified Sports Dietitian is one of these certified Sports Instructors. The training course for Certified Sports Dietitians is also authorized as a future education course by the JDA.

Now, 212 sports dietitians have now been certified. Most of them are working mainly or partly as certified sports dietitians. There were working at universities, hospitals, companies for sports food and food services, schools and local governments. Recently, they have been working at National Sports Federations and Prefectural Sports Associations as a member of Sports Science or Sports Medicine committees. It takes a long time to find an effectiveness of participation of Certified Sports Dietitians however we believe our activities support athletes' health and performance.

SPORTS NUTRITION SYMPOSIUM 2

Recent progresses in Nutritional strategies to promote post-exercise recovery and adaptations

Shin TERADA

The University of Tokyo, Graduate School of Arts and Sciences, Japan

Muscle glycogen represents important fuel source during moderate- to high-intensity exercise. For athletes involved in multiple training sessions or competitions on the same day, muscle glycogen stores need to be replenished more rapidly between games or training sessions. To maximize the post exercise muscle glycogen repletion, it has been recommended that consuming carbohydrate immediately after exercise (within 30 min after exercise) at a rate of 1.0 – 1.2 g /kg body weight/hour. Recently, we have reported that 1) only 30-min delay in administering carbohydrate resulted in a slower rate of muscle glycogen recovery after exercise and 2) milk ingestion in combination with carbohydrate potentiated glucose-induced insulin secretion via gut-derived hormone GIP (glucose dependent insulinotropic polypeptide) and, thereby, enhanced muscle glycogen recovery after exercise. The co-ingestion of carbohydrate and milk may also be an effective strategy to stimulate post-exercise muscle tissue repair and adaptation, because milk contains a good amount of protein and essential amino acids and insulin plays a key role in promoting muscle protein synthesis and inhibiting protein degradation.

In this presentation, I will introduce recent progress in nutritional strategies to promote post-exercise recovery and maximize sports performance and look forward to discussing the future perspectives with coaches, dietitians and scientists.

SPORTS NUTRITION SYMPOSIUM 3

Nutritional service for the Japanese national badminton team

Nagisa MATSUMOTO[1)], Taro IIZUKA[2)]
[1)]Japan Institute of Sports Sciences, [2)]Nippon Badminton Association

Since the Japanese national badminton team players continuously travel worldwide for tournaments, providing them nutritional knowledge and practice to obtain adequate nourishment to maintain their condition regardless of location and food environment is important. Therefore, to help the players improve their condition throughout the year. We first administered surveys to clarify any nutritional problems of the players. Next, based on the results of the surveys, we established individualized recommendations for nutrient targets and provided nutritional education to solve the identified problems.

Through these services, the players acquired adequate nutritional knowledge and practice, resulting in a significant increase in lean body mass and a tendency of decreased body fat percentage. Taken together, these outcomes suggest that our nutritional service may be one important factor contributing to the recent results of the team in international tournaments, including in the Rio de Janeiro 2016 Games.

Special Lecture

A Scientometric Study about Badminton applied to Sports Science Research

Layla Maria CAMPOS ABURACHID *, Luciana Midori SASAI MORIMOTO *, Schelyne RIBAS DA SILVA, David CABELLO-MANRIQUE**
**Federal University of Mato Grosso, Brazil - laylabur@gmail.com*
***University of Granada, Spain – dcabello@ugr.es*

This study aims at learning about world research publications related to Badminton on Sports Science. We intend to learn about (1) which areas of Sports Science are reporting about Badminton; (2) the publication years; (3) the publication time intervals; (4) the continent where they come from; (5) the bibliographical sources; (6) the authors; (7) the size, competition level, gender information and age the sample publication refers to. From our analysis, efforts are being directed to sports performance and that, after 2013, the studies increased significantly when compared to 1991-2012. The applied method was a bibliometric and scientometric study applied to the theme “Badminton”, limited to English, Spanish and Portuguese. Data was collected from databases of the Sport Science research area, from April to August of 2016, by searching the word “Badminton” on the paper title. 175 published papers were recovered from the SCOPUS database on 75 Journals, by 381 authors. The largest number (32 papers) was published in 2015; the largest number of papers (12) was in the Journal of Sports Sciences (Taylor&Francis); most publications (43) were about Health; and Health, Biomechanics and Sports Training accounted for the largest scientific production on the 2013-2016 interval, mostly in Europe.

Keywords: Bibliometry, Scientometric, Badminton

[1]

The development of sports clubs for Germany

Volker BOUVAIN

University of Paderborn

German Table Tennis Association, Germany,

More than 90,000 sports clubs contribute significantly to public welfare in Germany. By that, the clubs represent an imperative foundation for the areas of elite, mass, recreational, and health sports in different kinds of physical activity as in table tennis, for instance.

Within the wide range of objectives, it is especially important that sports clubs transmit values such as fair play and tolerance and offer an affordable opportunity to practice sports. Further, clubs promote the equal participation of girls/ women and boys/ men, set high value on the qualification of coaches and aim to be governed only by volunteers. Moreover, sports clubs manifest their role for democracy by including their members in important decision- making processes. Furthermore, clubs seem to quickly adjust to new challenges since they rate the commitment and support of refugees as an important issue.

Even though there are plenty of positive attributions made to sports clubs and how they affect our daily lives, it occurs that the number of people participating seems to be decreasing due to a minor
feeling of unity and a lack of leisure time. On top of that, a major problem is the members' commitment to the club on a voluntary basis: most members only want to participate in activities instead of either offering or supporting others giving them.

Keywords: sports clubs, participation, public welfare, objectives, values, commitment, support

[2]

Social influence on attracting spectators to table tennis game

Poon Soon CHEONG

National University of Malaysia, Malaysia

A large literature exists that suggests people's decisions across many aspect of their life are influenced by other people. The purpose of this presentation is to identify several forms of social influence on attracting spectators to attend table tennis match. In two experiments, i attempt to manipulate sources of social influence in the workplace. In my first experiment, participants are sent an email by the head of the department asking them to attend a table tennis competition. When this email is personalised, being addressed to "Dear Michael" rather than "Dear Colleague", participation rate significantly increases. In the second experiment, I provide some participants with information about how many of their colleagues who are willing to attend the table tennis competition. In this case, the participation rate increases too. These finding suggest that instead of spending huge amount of money

in marketing and advertisement, Table Tennis Association that lack of funding, can also apply these two forms of social influence to promote table tennis.

[3]

Is talent written in the stars?- The relative age effect in table tennis

Irene FABER[1,2,3], Liu MEIHAN[4], Valerian CECE[5], Guillaume MARTINENT[5], Marije ELFERINK-GEMSER[6]

[1]Saxion University of Applied Sciences, Faculty of Physical Activity and Health, Enschede, The Netherlands

[2]Radboud university medical centre, Radboud Institute for Health Sciences, IQhealthcare, Nijmegen, The Netherlands

[3]International Table Tennis Federation, Lausanne, Switzerland

[4]Shanghai University of Sports, China Table Tennis College, Shanghai, China

[5]Univ Lyon, University of Claude Bernard, Lyon

[6]University of Groningen, Centre for Human Movement Sciences, University Medical Centre Groningen, Groningen, The Netherlands

Talent development in table tennis is influenced by a lot of factors. Besides the personal characteristics of a player, also the player's context has great impact on the possibility to fulfil the player's potential (Faber, 2016). One of the contextual influences that has been recognized in a lot of sport is the relative age effect (Musch & Grondin, 2001). The relative age effect in sports refers to the chronological age differences between players within annually age-grouped cohorts (Barnsley, Thompson, & Barnsley, 1985).

The mechanism of the relative age effect in sports is regularly described as the result of setting a reference date for each birthyear cohort and/or age categories which is strengthened by the accompanying consequences (Delorme, Boiché, & Raspaud, 2010; Musch & Grondin, 2001). By setting a reference date, players that are just born after this date generally have an advantage over their age peers that are born later in the same year. They are generally more mature, taller, have a higher body mass and might have more experiences in the sports. Especially at a young age these differences between players of the same birthyear cohort can differ quite a lot. Additionally, the early born players having such advances often win relatively more matches and experience more successes which are cheered by the direct surrounding. Consecutively, these players are generally supported to a higher extent and have better chances to be selected for training and competitions opportunities on a higher level with often better guidance by expert-coaches. The difference between the early-born and late-born players will probably increase. The late-born players might even drop-out from table tennis or even sports participation.

Nevertheless, the existence of a relative age effect in table tennis is not straightforward. The reference dates, age categories covering two or more birthyear cohorts, a high number of players in certain countries, the early identification and selection of young players for talent developmental programs and the national and international championships organized for relatively young players are factors that

might enhance the probability of a relatively age effect. Moreover, the complexity of the techniques and tactics that need to be developed might also cause delayed successes and prevent late born players to carry through. On the other hand, physical dominance gained from higher height and body mass might not be most important in table tennis as it is a non-contact meticulous sport. Moreover, the often-vertical organization of training and competition, i.e. including players from different age (categories), and a low number of players in certain countries could prevent the existence of the relative age effect.

This study aimed to investigate the relative age effect in table tennis since no conclusive evidence is available about its existence. The design of the study was two-fold. First, a cross-sectional analyses was conducted to reveal the distribution of birth quartiles of the players on the

latest youth and senior world's, European and two national ranking lists (France and the

Netherlands). Second, longitudinal in-depth analyses were conducted based on longitudinal data of two nations, France and the Netherlands, to identify growth curve of performance to evaluate the birth quartile distribution for the adaptive and mal-adaptive curves. Preliminary results will be presented during the conference.

Delorme, N., Boiché, J., & Raspaud, M. (2010). Relative age effect in elite sports: Methodological bias or real discrimination?. *European Journal of Sport Science, 10*(2), 91-96.

Faber, I. R. (2016). Diamonds in the rough. Searching for high potential in youth table tennis players (Doctoral dissertation, Radboud University Nijmegen).

Musch, J., & Grondin, S. (2001). Unequal competition as an impediment to personal development: A review of the relative age effect in sport. *Developmental review, 21*(2), 147-167.

[4]

A first step to create an international benchmark for talent development in table tennis – a pilot study

Goran MUNIVRANA[1,2], Irene FABER[2,3,4]

In cooperation with the other members of the Table Tennis Talent Consortium

[1]University of Split, Faculty of Kinesiology, Croatia

[2]International Table Tennis Federation, Lausanne, Switzerland

[3]Saxion University of Applied Sciences, Faculty of Physical Activity and Health, Enschede, The Netherlands

[4]Radboud university medical centre, Radboud Institute for Health Sciences, IQhealthcare, Nijmegen, The Netherlands.

Table tennis is a complex sport in which players need to develop tremendously in several fields to excel. Consequently, talent development is multidimensional by nature *(Elferink-Gemser et al., 2011)*. Both physical and mental aspects need to be considered during the development and monitoring of players to have better idea

about their potential and development (Faber, 2016). To create an international benchmark for elite youth table tennis players a first pilot study was conducted to evaluate the use of a multidimensional test battery. This test battery was developed by the members of the Table Tennis Talent Consortium in 2016.

Twenty-seven elite youth players (♀ = 10, ♂ = 17, age 9-12 years) from 16 different European countries were evaluated with the multidimensional test battery during the European Selection Camp in Otocec in October 2016. This camp belongs to the European Table Tennis Union Development Program. The test battery included test items covering anthropometrics (weight, standing height, sitting height), body composition (fat mass, fat free mass, muscle mass), perceptuo-motor skills (eye hand coordination, sprint, agility), physical fitness (endurance, upper extremity strength, leg power, flexibility) and executive functions (inhibition, working memory, switching ability). The age to peak height velocity could be determined by the outcomes of the anthropometric measurements. Moreover, a sports history questionnaire was used to map personal characteristics and the milestones of the player's table tennis career regarding among other things training and competition. Finally, two coaches were asked to evaluate the performance level for each individual player in comparison with their age peers using a visual analogue scale. For this purpose, a 10 cm line was used; the beginning of the line (left) referred to average level and the end of the line (right) to absolute top level. The coaches were instructed to indicate the level by putting a mark on this line.

Preliminary results of this first pilot will be presented during the conference. Besides the results of the multidimensional assessment attention will be paid to the experiences during testing and the proposals for improving the assessment.

References

Elferink-Gemser, M. T., Jordet, G., Coelho-E-Silva, M. J., & Visscher, C. (2011). The marvels of elite sports: how to get there? British Journal of Sports Medicine, 45, 683-684.

Faber, I. R. (2016). Diamonds in the rough. Searching for high potential in youth table tennis players (Doctoral dissertation, Radboud University Nijmegen).

[5]

Will Visuo-Spatial Working Memory Differentiate Skill Levels in Table Tennis Players: an ERP study

Kuan-Fu Chen[1], Chung-Ju Huang[2], Tai-Ting Chen[1], Ting-Yu Chueh[1], Tsung-Min Hung[1]

[1]*National Taiwan Normal University, Department of Physical Education*

[2]*University of Taipei, Graduate Institute of Sports Pedagogy,*

Recent studies have found that sports training, particularly in racket sports, might enhance cognition particularly those with higher visuo-spatial demand. For example, Wang, Guo and Zhou (2016) showed that table tennis players exhibited better visual attentional performance than non-athletes. However, whether performance differences in visuo-spatial cognition can be observed in athletes with different skill

levels remain unknown. Furthermore, given the utility of event-related potential for revealing the implicit cognitive processes during visuo-spatial cognition tasks, the main purposes of this study are to compare the differences in performance of visuospatial working memory task at the behavioral and neuroelectrical levels in table tennis players with different skill levels. Three groups of participants (i.e., highly skilled table tennis players, less skilled table tennis players, and novices) will be recruited for this study. All participants will be administered a 3s delayed and non-delayed visuospatial working memory task while their behavior and event-related potential (ERPs) were recorded. Comparison of the dependent variables such as reaction time, response accuracy, P3 components of ERPs will be conducted using ANOVAs.

Keywords: ERPs; Working memory; P300; athlete

[6]

Importance of Shoulder in Playing Table Tennis: Skill Visualization Using Fuzzy Rules Acquired by TAM Network

Isao HAYASHI[1], Honoka IRIE[1], Toshiyuki MAEDA[2], Masanori FUJII[2] and Tokio TASAKA[3]

[1]Kansai University, Faculty of Informatics, Japan

[2]Hannan University, Faculty of Management Information, Japan

[3]Doshisha University, Faculty of Health and Sports Science, Japan

The Topographic Attentive Mapping (TAM) network is a biologically-inspired classifier that bears similarities to the human visual system. When used in a TAM network, the proposed pruning algorithm improves classification accuracy and allows extracting fuzzy skill knowledge as represented by the network structure.

In this paper, difference of skill level in playing table tennis is analysed by TAM network, and importance of shoulder is visualized by fuzzy rules. The trajectory pattern of forehand strokes of table tennis players is analysed with nine sensor markers attached to the right upper arm of players. With the fuzzy rules acquired from TAM network, technique rules are extracted by learning algorithm in order to classify the skill level of players of table tennis from the sensor data. In addition, the difference between the elite player, middle level player and beginner is visualized, and how to improve skills specific to table tennis from the view of data analysis is discussed.

Keywords: neural networks, fuzzy rules, skill visualization, table tennis

[7]

Importance of healthy training and healthy development of young table tennis players focusing on the performance tests

Emre AK

Sports Scientist & Manager of Sports Operations Gloria Sports Arena, Belek, Antalya, Turkey

Table tennis has become a sport with very fast and explosive movements. Therefore, players started to undergo very intense trainings at very early ages. This puts high pressure on the body and if this is done without controlling the effects on the body, could be very negative for overall health. It is important to maximize not only performance, but also health and well-being of young athletes. The physical and physiological development of young athletes has to be tracked carefully. Long Term Athlete Development program has been accepted as one of the best option to attentively improve athletic performance and prepare young athletes for latter stages. It is also important to monitor athletic development using scientific assessment methods. This includes not only the table tennis specific and basic physiological performance parameters but also general health and well-being. Body Composition, posture, balance, musculoskeletal status & gait are some of the important parameters that might affect table tennis performance and overall health. These neglected parameters should be controlled regularly to avoid serious injuries. In this study, I will try to explain important parameters that has to be tested regularly and discuss their effects on table tennis performance.

Keywords: LTAD, young athletes, healthy development, physical and performance tests

[8]

Introduction for Prevention of Injuries in Table Tennis

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Table tennis is a non-contact sport. Overuse injuries are more often than acute injuries. Most overuse injuries let table tennis athletes continue to train and compete with pain and dysfunction which may influence negatively their performance and aggravate the injury itself. To implement an injuries prevention program in table tennis, we need to collect a reliable data (exposure, acute/overuse injuries and illnesses during training and competition), analyze it and propose practical preventives measures according to the study findings.

We started to collect the data for Qatari table tennis athletes … Our expectation is to identify the main acute and overuse injuries and also the main illnesses, with and without time loss, and their effect on athlete health and performance.

Keywords: prevention, injuries, table tennis.

[9]

Training load and injury incidence in youth table tennis players: A pilot study

Samuel A. PULLINGER, Abdallah REJEB, Evodkia VAREMENTI, & Marco CARDINALE
Aspire Academy

Despite the wealth of research documenting the training-injury relationship in elite sport, there is a lack of research and evidence linking training load and injury in junior table tennis athletes. The lack of research surrounding injury epidemiology in table tennis highlights the need for more research to be conducted. Therefore, the purpose of this study was to analyse and report the training load and the injury incidence over a season in highly trained youth table tennis athletes.

Injury data and training loads were collected from eight male adolescent national team table tennis players [age (mean ± SD) 14.5 ± 1.4 yr, stature 166.7 ± 6.6 cm and body mass 53.6 ± 7.9 kg and PHV -0.48 ± 1.65] of Arabic origin in this one-year prospective study. The total training time over the observed 12 months period was 237 h 42 min ± 44 h 30 min and the total games played were 35 ± 23 games.

All injuries received an assessment by a physical therapist) with experience of working within youth Table Tennis. A total of 17 injuries were identified, of which 9 (53%) were time-loss and over-use injuries. The overall injury incidence was 8.3 (95% CI: 4.6–12.0), accounting for 2.1 injuries per athlete. Time-loss injuries showed an incidence of 4.4 (95%CI: 1.9–6.9) and growth conditions 2.0 (95% CI: 0.6–3.3) per 1000h of exposure. Overuse injuries accounted for 56%, from all the TL injuries. Edwards training loads were significantly different between training weeks ($P = 0.001$), with training loads lowest around competition period ($P < 0.05$). The majority of injuries occurred during the 1st quarter of the year (65%), when training loads were significantly higher.

In conclusion, the results of this preliminary study showed that training loads increase during a season until competition period. The content and characteristics of training activities indicate a low to moderate cardiovascular demand which is a reflection of competitive demands in this age group. The rate of overuse injuries and injuries as a result growth-related conditions in our adolescent table tennis athletes was higher than previously reported in adolescents in other sports. Considering the peculiarity of youth adolescent athletes, it is important to improve the planning of training activities improving the understanding of the link between training load and injury occurrence.

Keywords: Racquet sport; Training monitoring; Performance; Injury incidence; Training Load

[10]

Investigation of mechanical factors related to osteochondral lesions at the elbow joint in table tennis players

Yoichi IINO[1], Hiroyoshi OGASA[2]

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[2]*Yamaguchi University*

Osteochondral lesions at the elbow are often observed in youth athletes such as baseball players. Although table tennis players suffer from fewer injuries than other racket sports players[1], there are cases that lead to serious injury. It remains unclear why table tennis activity that does not accompany overarm throwing motion leads to the lesions at the elbow such as osteochondritis dissecans, which is often observed in baseball. Since mechanical loading on the upper limb would differ between offensive and defensive strokes, the location of the lesion is expected to be different between offensive and defensive players. Although the mechanism of the osteochondral lesions at the elbow is multifactorial, we investigated the mechanical loads applied at the elbow in table tennis strokes which may help us understand the causes of the lesions.

Participants were two male collegiate table tennis players (age: 22 years and 21 years). They were defensive players with nine years of training experience. They provided written informed consent before the experiment. The experimental procedure was approved by a local ethics committee. They performed cross-court forehand and backhand drives and forehand and backhand chops against a collegiate player with maximum effort. A motion capture system was used to collect 3D coordinates of the markers attached to body landmarks. The net force acting on the upper arm segment at the elbow was determined using inverse dynamics. The joint reaction force acting on the upper arm was determined using a musculoskeletal model[2].

The maximum proximal force applied by the forearm to the upper arm at the elbow joint was larger in the chops than in the drives. The maximum proximal force appeared just after the beginning of forward swing in forehand and backhand chops. On the other hand, the lateral and medial forces applied to the upper arm were larger in the drives than in the chops. The joint reaction force at the elbow joint will be presented at the meeting.

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[11]

Problem phenomena faced by Japanese elite junior table tennis players and its psychological background

Mizushima SADAYUKI

Japan Table Tennis Association

In case of doing psychological support for athletes who have been faced on problem phenomena, approach of educing sport psychology textbook to the athletes has only limited effect. Why is effect limited? The one of reason why is that sport psychology textbook is written generalization matter and is not written unique psychological world of the athlete who is in front of us. Because of similar reason, general Sport Mental Training short course is sometime useless to the athlete suffering from something.

Some elements of psychological background of the particular problem phenomena faced by Japanese elite junior table tennis players are universal one, and some elements of it are extremely unique of the athlete. Those elements are often interleaved. In order to make more effective coping, I think I need to deepen understanding relationship between problem phenomena and those elements. So, in this study, I try to reveal the structure of "problem phenomena" faced by Japanese elite junior table tennis players and its "psychological background" inductively. By doing so, I will suggest viewpoints for understanding psychological background more deeply to athletes, coaches, and support staffs who face various problem phenomena in their competitive sport days.

Analysis subject in this study are my 365 psychological support sessions with 28 Japanese elite junior table tennis players in 2016 fiscal year. Because various contents are included in the 365 psychological support sessions, in the beginning, I do screening all sessions to select sessions that are suitable to purpose of this study. From my memos of selected sessions, I extract "problem phenomena" and "psychological background", and I make matrix table of those. Similar "problem phenomena" are categorize as same group, and "psychological background" are classified into "universal element" and "unique element".

At the time of my presentation, I will show you the matrix table and refer to way of use. The matrix table will not be fixed, but has always possibility of renewal. By continuing renewal, I expect that we can understand relationship between "problem phenomena" and its "psychological background" more deeply.

Keywords: problem phenomena, psychological background, matrix table

[12]

TUM.TT Software – New Feature and Practical Experiences

Michael FUCHS

Technical University of Munich, Performance Analysis and Computer Science in Sport, Germany

Introduction: TUM.TT – a tool for table tennis match analysis – includes a tool for data collection (TUM.TT Scouter) and a tool for data evaluation (TUM.TT Viewer). The latter one is the tool for players and coaches to analyse matches. In addition to the possibility of doing video analysis by using specific filters, a feature for the creation of personalised reports was developed. These reports can help to get an overview about typical behaviours, strengths and weaknesses of opponents.

TUM.TT Report: In general, the report tool gives the opportunity to export different statistics as a PDF document. That possibility enables a sort of an "offline" functionality of the TUM.TT analysis tool. The reports themselves can be created due to individual requirements of players and coaches. Besides general information about the match, different statistics about placement and stroke technique incl. winning probabilities are available for the serve, receive, third stroke, fourth stroke and the last winning stroke. Additionally, the user can select the player as well as the sets (or combination of sets) which the different statistics should be created for.

Practical Experiences: The TUM.TT analysis tool is used in a current project of the German Federal Institute of Sports Science (BISp) to support the German Para National Team. First experiences were gained during the Slovenia Open 2017 and the World Team Championships 2017 with very positive feedback from players and coaches. Especially the immediate visual feedback and the tactical analysis by the use of systematic and efficient video analysis guided by supporting staff was a new experience for coaches and players. A lot of them confirmed the importance of video analysis but due to very tight schedules during tournaments or training camps it was not possible for them to do video analysis in the past without supporting staff and a time-saving tool like TUM.TT.

Keywords: Table tennis, software tool, video analysis, practical performance analysis, analysis report

[13]

Statistical Analysis of Decision Making of Table Tennis Service

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[1)]Meio University, Japan

Introduction

Service has strong impact on the following shots in table tennis rallies. If one has good serving skill, they can hold the high ground in their serving rallies. Service,

therefore, is regarded as an important topic and many researchers trying to clarify what the good serving skill is.

The research interest of the current study is decision making of service. The effect of service may vary with the context; good service is not always good. Therefore, players may consciously or unconsciously consider multiple factors to understand the context to select an effective service at the time. The factors of the decision making, however, are not researched enough so far and unclear. The purpose of this study is to clarify the effect of some factors on decision making of service.

Method

Match samples

In the current study, five matches played by a world class female player, which hereinafter will be referred to as `Player A', were selected from the matches in international competitions. Player A was a left-handed player and used shake hand racket.

Analysis

Data Collection

Following six data were collected; (1) point score, (2) hitting side of a racket (forehand or backhand), (3) kind of rotation (vertical spin, normal horizontal spin, or inverse horizontal spin), (4) placement of the first rebound, (5) placement of the second rebound, (6) hitting position. (1) was converted into the six phases of a rally, which was defined with the sum and the difference of point scores. The combination of (2) and (3) were referred to as `kind of service' in this paper. (5) was converted into one of six subareas of court and referred to as `placement of service'.

Statistics

Fisher's exact test was conducted to test the effect of opponent or point score. When significant biases were found, Fisher's exact test was conducted for multiple comparisons. Every test was conducted at a 95% confidence level.

Results & Discussion

Effect of opponent

Distributions of the kind and placement of services were significantly different between different opponents. Player A changed her service when she played with different opponent. In order to conduct more detail analysis, a comparison between matches was conducted. As a result, it was found that the distribution of the kind of service was significantly different between the matches played by the same player. In addition, the distribution of the placement of service was not significantly different when Player A played the same player. The results imply Player A tends to change her services when opponents lead and the same opponent, except for the placement of the service.

Effect of point score

The difference between phases of a rally approached significance (kind: $p < 0.09$; placement: $p < 0.09$). For example, Player A tended to select different kind of service

when the opponent leads her, and the rally is in later phases (total points is surpassed 10). The results imply Player A tends to change her services depending on the point score.

Future issues

Additional data analysis of other players is required to enhance the generality of the research.

[14]

Development of system of table tennis game analysis using ultrasonic sensor

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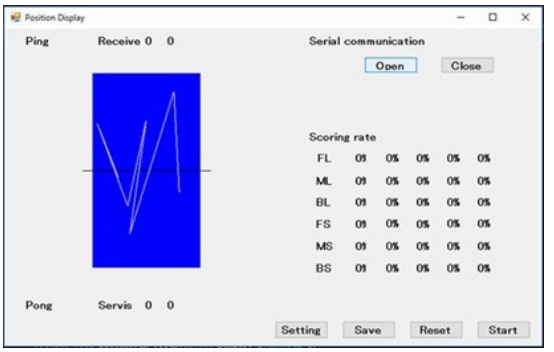
It is a common perception that reconsideration of games after making statistical analysis based on game records is important for future games. It has been desired in table tennis to get data of every bound of the ball on the table for statistical analysis. However, it is not easy to collect such data, because table tennis is a speedy sport. Several methods have been proposed in previous studies, but not yet in practical use.

In this work, we tried to develop a system and software of recording the bound points by using ultrasonic sensors. This system is called “Ultrasonic Sensor Globe Characteristics Analysis System ". The principle of measurement is to make use of difference in arrival time of collision sound waves coming from different sensors set up at different places. The coordinate of the bound point can be calculated from those signals.

The reason to use the ultrasonic sensor, not audible sound sensor, is that the collision sound has high frequency and the accuracy of the ultrasonic sensor is superior to that of the audible sound sensor. We developed the software which connects bound coordinates and displays a locus of rally by white lines.



We conducted an accuracy verification experiment in which an ultrasonic sound sensor was installed on a table and games were played and the difference between the bound coordinate position obtained from the sensor and the bound position obtained by video camera shooting was compared. As a result, the average error is 20.8 cm in the x-axis direction, 22.5 cm in the y-axis direction, the minimum error is 0 cm in the x-axis direction, 0.1 cm in

the y-axis direction, the maximum error is 131.5 cm in the x- It was 102.1 cm. In the future, we will improve the sensitivity of the ultrasonic sound sensor and the program of the falling position display system and want to bring it closer to practical use.

[15]

The Impact of the Net Height in Table Tennis

Drago TORKAR[1], Matej SUPEJ[2], Miran KONDRIČ[2]

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[2]*University of Ljubljana, Faculty of Sport, Slovenia*

Introduction

In order to determine the influence of the net height to table tennis game the following parameters were measured: ball-to-net distance, net errors, net balls, set duration, net serve errors, and lets. The measurements took place in laboratory conditions for three different net heights: 15,25 cm, 16,25 cm and 16.75 cm. For each net height the following actions were performed:

- male vs. male match,
- male vs. female match,
- male vs. male playing different strokes.

The three players involved were selected from top ranking men, middle ranking U15 boys and middle ranking women on national level.

Methods

The laboratory setup consisted of a high speed camera system recording at 1000 frames per second (Mikrotron MotionBlitz LTR), two powerful Fresnel light sources, a full HD camera recording at 50 frames per second from above the table, a table tennis table, a black textile shield for filtering out the background and to intensify the ball contrast, a calibration chessboard.

For each net height the following steps took place:

1. The net height was set as precisely as possible along the whole net length.
2. The high speed video camera was aligned (as well as possible) in a way that the world coordinate system with origin at the top of one net holder was aligned with camera coordinate system with origin in focal point (centre of lenses) so that the two frames were translated only in *z* direction and have the same orientation. This means that:
   - The camera was positioned away from the net, so the table tennis table width is within the depth of view of camera lenses.
   - The net top line was seen as a cluster of points in the centre of the image – the camera optical axis was collinear with the net top. This was achieved by tripod adjustment.
3. The chessboard calibration pattern was placed in front of the camera near the middle of the table and was slowly rotating while the camera was recording.
4. The ball size was precisely measured.

5. The table tennis games were played and recorded simultaneously with the high speed video camera and the full HD video camera.

After the recording, in the offline phase, for every net height the following steps took place:

1. The camera was calibrated using recorded images of the chessboard pattern resulting in establishing
   - the projection matrix elements,
   - the radial and the tangential distortion coefficients.
2. The fully automatic image processing took place to:
   - locate the ball within predefined area above the net,
   - undistort the image using distortion parameters, and
   - measure the ball – net distance in pixels.
3. Using the calibration data and the known ball size the ball – net distance was computed in mm.
4. Using full HD video data the remaining parameters (net errors, net balls, lets, net serve errors and set duration) were determined.

Preliminary results

For each category of players (male, female) and type of action (match, playing strokes) we compared the measured parameters for all three net heights. The ball-to-net distance was measured between the net top and the centre of the ball and is expressed with two parameters: actual average distance (height) and standard deviation of this distance.

In category male vs. male player playing matches we recorded 2 matches best of five at net height 15,25 cm (6 sets played), 2 matches at net height 16,25 cm (6 sets) and 1 match at 16,75 cm (3 sets). In category male vs. female player playing matches we recorded 1 match at net height 15,25 (3 sets), 2 matches at net height 16,25 cm (6 sets) and 1 match at 16,75 cm (3 sets).

In category male vs. male player playing strokes we recorded 30 seconds of play for each stroke at each net height. We measured average serve ball-to-net distance only at net height 16,75 cm.

Conclusion

Regarding the small amount of measured data no conclusion can be drawn yet and no statistical significance can be shown. We collected only a prototype data showing and testing the procedure to be used in further measurements on a much larger scale.

Keywords: table tennis, net height, machine vision

[16]

The influence of Chinese Taipei national team training toward table tennis ball change

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International Table Tennis Federation made a number of new rules in order to increase spectating rates. Under the new rule of ball change, which is increase ball size and change its material, it causes ball slower the spin and speed during ball travelling. Therefore, the purpose of this study was to understand the influence of Chinese Taipei national team training toward table tennis ball change to understand how players and coaches to cope with this rule change.

Participants of this study were 6 national team players and 3 national coaches who were training in the National Sports Training Center. Interview was used in this qualitative study. Content analysis was chosen in the result analysis. The results indicated: (1) Regulation change rapidly, physical, psychological and tactics adjustment were feedbacks from players and coaches on table tennis ball change; (2) Tactic strategy, receiving and sustained rally were important influence on training after ball change; (3) Receiving attack, early contact point and tactics competition patterns were changing on techniques after ball change; (4) Strengthen weight training, core condition and multi-ball training were changing on physical fitness after ball change.

Suggestions of this study were as follow: (1) To become top athletes, they need to change concepts quickly, develop innovative method and lead self-breakthrough to become winner in table tennis field; (2) There is a need to improve and innovative technical skills in order to cope with table tennis ball change; (3) Players need to increase weight training to enhance their muscular strength in order to overcome table tennis ball change; (4) The findings of this study should be taken into consideration in developing strategies for players and coaches; and (5) There is a need for further studies on table tennis ball change.

Keywords: table tennis ball change, technique and tactics, weight training, 40+ plastic ball

[17]

Case Study on Effective Skills of Service in Table Tennis to Conceal Spin, Course, and Speed of the Ball from the Receiver

Kazuto YOSHIDA[1,6], Yoichi IINO[2,6], Sho TAMAKI[3,6], Yuki INABA[4], Koshi YAMADA[5,6]

[1]*Shizuoka University,*
[2]*University of Tokyo,*
[3]*Meio University,*
[4]*Japan Institute of Sports Sciences,*
[5]*Table Tennis Friendship Club,*
[6]*Sports Science and Medicine Committee, Japan Table Tennis Association*

The purpose of this study is to clarify effective skills of table tennis service to conceal the spin, course, and speed of the ball from the receiver.

Five former Japanese top players including four Olympians (Top Group) and nine college student players (Standard Group) participated as subjects in this study. They performed three kinds of services which they considered highly effective. The order of the three kinds of services was random, and the staff member told the type of service for each time using random tables. These services were received by a table tennis coach. Immediately following each service, the server and receiver separately assessed its quality on a five-point scale and gave a reason for the rating.

The stroke motion of the server and the movement of the server's racket were captured by the three-dimensional motion capture system (200 Hz). The rotation of the ball was measured by three high speed cameras (2000 Hz). The ball trajectory was captured by two high speed cameras (120 Hz).

Data of 308 services by the fourteen players were obtained. From these, data of high quality services in each server's assessment were selected for the following analyses: (1) The speed of the racket, angular velocity of the racket, and spin rate of the ball were calculated. (2) The ball trajectory was drawn. Subsequently, the relationship between these results and the receiver's assessment regarding quality of service was investigated.

This study, which aims to obtain practical knowledge regarding table tennis skills, is still in progress. At the meeting, the characteristics of some effective "killer services" of the players in the Top Group will be presented.

This work was supported by JSPS KAKENHI Grant Number JP15K01556.

[18]

Development of stroke assessment application for table tennis strokes using an inertial sensor

Yoichi IINO
The University of Tokyo

Inertial sensors are a unit system of accelerometer and gyro sensor. They have been applied to the assessment of gait[1], golf and tennis motions. Inertial sensors have many advantages such as small-size, portability, and low-cost, compared to an optical motion analysis system. However, the system that uses inertial sensors to assess table tennis strokes is not available. Therefore, inertial sensors have much possibility that players use them in training rooms for gaining useful information on their stroke motions such as racket speed. This study aims to develop a stroke assessment application for table tennis strokes using an inertial sensor.

A 9-dof inertial sensor (Logical Product, Japan) had three axes accelerometers with a range of 75G, and three axes gyro sensors with ranges of 1500-6000 deg/s. The size of the sensor was 40mm × 30mm × 20mm and was attached to the grip end of the racket. Stroke parameters assessed in this study were resultant racket velocity at ball impact and maximum power (rate of change in mechanical energy) of the racket. Both parameters are thought to affect performance level in table tennis.

For the development of assessment application software, we used LabVIEW 2016 (National Instruments) and a Windows mobile device. The application was designed as follows: the main screen has two buttons" Connect" and "Disconnect" to the sensor; there are four panes

"Measurement," "Analysis," "Settings," and "Files." In Measurement pane, one can press "start" button to start 1 minute of recording the sensor signals and view raw signals. For later analysis to proceed successfully, a player must put the racket on table tennis table at least first 1 second before performing strokes. In Analysis pane, one can select the file to be analyzed and put the "analysis" button to display the number of strokes recorded, the resultant racket speed at ball impact, and the maximum racket power for each stroke. In Setting pane, one can input the name of a player, and his/her handedness. In Files pane, one can view the files saved.

Reference

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[19]

Kinetic Analysis of Forehand Strokes in Elite Table Tennis Players

Yuki INABA[1], Shuji KIDOKORO[1], Koshi YAMADA[2], Hiroki OZAKI[1], Kazuto YOSHIDA[2,3]

[1]Department of Sports Science, Japan Institute of Sports Sciences

[2]Sports Science and Medicine Committee, Japan Table Tennis Association

[3] Shizuoka University, College of Education, Academic Institute

[20]

The time profile of the spin of the table tennis ball in play

Suguru ARAKI

Tohoku Fukushi University, Department of Information Science, Japan

With the advent of WebGL[1] and Three.js[2] the fast and realistic rendering on web applications has significantly contributed to the inexpensive construction of virtual physics laboratories. Applying such technological advances in the last several years to the dynamics of the table tennis ball in play has enabled us to simulate not only the attenuation of its spin during the flight in the air but also the change in spin over its collisions with the table or the racket[3]. The collisional change in spin is known to be a major factor to most competitive players in winning any rally, but even the spin attenuation may play a significant role in predicting the correct ball trajectory, and thus comparative studies of the two are due.

The present study enables us to visualize the detailed change in spin on the ball in play, which helps to analyze the abrupt change in spin during services and subsequent returns, including Young Generation services and Chiquita receives, as well as to simulate the trajectories and estimate the impulse during the counter rallies.

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List of the participants at 2017 annual JTTA SSMC and ITTF SSMC meeting

JTTA – SSMC members and their guests

Nr.	*Name*	*Institution*
1	Shiro MATSUO	Japan Table Tennis Association anti-doping committee
2	Kazuto YOSHIDA	Shizuoka University, Faculty of Education
3	Hiroyoshi OGASA	Yamaguchi University
4	Yoichi IINO	The University of Tokyo
5	Mizuho ADACHI	Nippon Sport Science University
6	Hiroyasu AKAGI	Nagato Memorial Hospital
7	Suguru ARAKI	Tohoku Fukushi University
8	Takashi GUSHIKEN	Hakuai Hospital
9	Naomi IINO	Higashiyokono Elementary School
10	Junichi KASAI	Waseda University
11	Michiyo KIMURA	Takasaki University of Health and Welfare
12	Maimi MARUYAMA	Takasaki University of Health and Welfare
13	Shigeaki MATSUURA	Osaka University
14	Sadayuki MIZUSHIMA	Japan Table Tennis Association
15	Takeshi NISHIKAWA	Shizunai Dermatological Clinic
16	Kazuhide OGINO	Tottori University
17	Megumi OOISHI	Palliative care DAICHI
18	Akimitsu SHIOIRI	Niigata University
19	Sho TAMAKI	Meio University
20	Tsuyoshi TOYOTA	Nagano Matsushiro General Hospital
21	Koshi YAMADA	Table Tennis Kouryukai
22	Takahiro YAMAUCHI	Fukui University
23	Youji YOSHIZAWA	Nagoya University of Economics
24	Isao HAYASHI	Kansai University
25	Yuki INABA	Japan Institute of Sports Sciences
26	Shuji KIDOKORO	Japan Institute of Sports Sciences
27	Takeshi MORI	Emeritus professor of Waseda University
28	Yutaka TSUJI	Emeritus professor of Osaka University

ITTF – SSMC members and their guests

Nr.	*Name*	*Institution*
1	Miran KONDRIČ	University of Ljubljana, Faculty of Sport, Slovenia
2	Tsung-Min HUNG	National Taiwan Normal University, Taiwan, R.O.C.
3	Irene R. FABER	Saxion University of Applied Sciences, Faculty of Physical Activity and Health, The Netherlands
4	**Kazuto YOSHIDA*	Shizuoka University, Faculty of Education, Japan
5	**Shiro MATSUO*	Japan Table Tennis Association doping control committee
6	Michael FUCHS	Technische Universität München, Performance Analysis and Sport Informatics, Germany
7	Fethi REGAIEG	Aspetar, Orthopedic and Sports Medicine Hospital, Qatar
8	Emre AK	Sports Scientist & Manager of Sports Operations Gloria Sports Arena, Belek, Antalya, Turkey
9	Drago TORKAR	Jozef Stefan Institute, Ljubljana, Slovenia
10	David CABELLO MANRIQUE	University of Granada, Spain
11	Volker BOUVAIN	University of Paderborn, Germany
12	Samule PULLINGER	Aspire Academy, Qatar
13	Mei Jen HUANG	National Kaohsiung Normal University, Taiwan, R.O.C.
14	Poon Soon CHEONG	National University of Malaysia, Malaysia

** already at JTTM SSMC list.*

2018


JTTA SSMC and ITTF SSMC
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May 20th, 2018

Dear Prof. Kondric

Invitation letter for the Japan Table Tennis Association Sports Science and Medicine Committee International Meeting 2018

We will have the Japan Table Tennis Association Sports Science and Medicine Committee International Meeting 2018 in AJINOMOTO National Training Center in Akabane, Tokyo from September 15th to September 16th 2018 . I am writing to invite you to participate in this meeting. Since you are an expert in table tennis sciences, I believe your presence and our conversation would make this meeting very successful.

I am pleased to confirm that we will be able to fund the following expenses:

- round trip flight
- connection costs between Narita/Haneda airport and the hotel
- 4 nights' hotel accommodation, including breakfast
- lunch at the training center each day

I do hope you will accept this invitation, and would appreciate your RSVP by email on or before July 1st. For more information, please see the attached event schedule and notes.

Please feel free to contact me should you have any questions or comments.

Sincerely yours,

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Event schedule

September 13th /14th: Arrival in Narita/Haneda, Japan* **
September 14th: free time ; I'll show you around Tokyo if you'd like.
September 15th: am ITTF SSMC meeting
pm JTTA SSMC International Meeting (in English) Welcome Party at the National Training Center
September 16th: am JTTA SSMC International Meeting (in English)
pm ITTF SSMC meeting
September 17th: Departure from Narita/Haneda, Japan* **

* We will send you a round trip economy class e-ticket for the flight from your city to Narita.
** Please wait to be picked up by our staff at Narita/Haneda Airport on September 13/14th and you will also be taken back from your hotel to Narita/Haneda Airport on September 17th.

Venue

AJINOMOTO National Training Center
http://www.jpnsport.go.jp/corp/english/tabid/382/Default.aspx
Zip code; 115-0056 Address : 3-15-1 Nishigaoka Kita-ku, Tokyo, JAPAN
Japan Institute of Sports Sciences
http://www.jpnsport.go.jp/corp/english/activities/tabid/393/Default.aspx

Hotel

Hotel Met Akabane
http://www.jrhotelgroup.com/en/152.html
Zip code; 115-0045 Address : 1-1-76 Akabane, Kita-ku, Tokyo, JAPAN
TEL; 81-3-5939-0011

Please note:

As sponsor of this conference, the Japan Sports Council asks that all participants strictly comply with the following rules:

1) The e-ticket must only be used by the named person and it is not possible to change the flight details.
2) Please do not extend your stay in Japan for any reason, even if you are willing to bear the additional costs. [Sorry. Our sponsor did not accept our request.]

Thank you for your cooperation

Japan Table Tennis Association

Sports Science and Medicine Committee International Meeting 2018

PROGRAMME

AND

ABSTRACTS

15 - 16 September 2018,

National Training Center,

Tokyo, JAPAN

スポーツ振興くじ助成事業

Supported by Sports Promotion Lottery

JTTA Presidents Greetings

On behalf of the Japan Table Tennis Association (JTTA), I am pleased to be able to invite the members of International Table Tennis Federation Sports Science and Medical Committee (ITTF SSMC) and other Sports Science researchers to "JTTA Sports Science and Medicine Committee International Meeting 2018" which will be held from 15th to 16th of September 2018 at Ajinomoto National Training Center, Kita-ku Tokyo.

We have held this international meeting every year since 2014 in Tokyo, and it is the 5th meeting this year. In these four years, the ITTF SSMC and JTTA SSMC researchers have shared the results of our activities and our research in the field of medicine, nutritional science, psychology, and sports science. I have heard that some joint research has begun among the ITTF and JTTA members. I want to commend you for your contributions in helping to improve the sport of Table Tennis.

Finally, I am delighted to be able to hold such a distinguished international meeting here in Tokyo, where the next Olympic and Paralympic games will be held in 2020. I wish for this meeting, which will be held over the course of 2 days, to be the most fruitful for all participants. This will be possible only with your understanding and support.

Japan Table Tennis Association
President
Sadayoshi FUJISHIGE
藤重 貞慶

Greetings

I am pleased that we can hold this annual meeting again in 2018. Thank you for your attendance.

It is of great importance to us to hold this meeting again in Tokyo. In 2020, Tokyo will hold Japan's 2nd Olympics and Paralympics Games. The Olympic Games in 1964 ignited high economic growth of Japan. We, Japanese hope that the next Olympic Games will also change Japan for the better and this change will create a long lasting legacy.

Now, in Tokyo, preparations are already underway for the 2020 Olympic Games.

Construction of venues and improvement of various urban infrastructures have begun. In regard to table tennis, the Japan Table Tennis Association is continuing efforts to achieve gold in 2020. However, our purpose is not only a victory. JTTA has planned various things until 2020.

They have asked us to activate more sports science research and to advance the internationalization of Japanese sports scientists in order to leave a 2020 legacy. We would like to achieve this with you, so, we planned this meeting for this purpose.

I am sure that publishing our research and presenting our results will be helpful for domestic and foreign researchers. I hope you will leave this meeting with new knowledge, new skills, new expertise and a network of new friends and colleagues.

Japan Table Tennis Association
Sports Science and Medicine Committee

Shiro MATSUO
松尾 史朗

Organizing committee

Shiro MATSUO (Bessho Medical Clinic, JTTA SSMC)
Kazuto YOSHIDA (Shizuoka University, JTTA SSMC)
Hiroyoshi OGASA (Yamaguchi University, JTTA SSMC)
Yoichi IINO (The University of Tokyo, JTTA SSMC)

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Yuji MAENOHARA
Sei UEDA
Megumi OOISHI

Doping Control Committee

Takuro OKADA

PROGRAMME

Welcome

Sat. 15 September 1:00 pm-

Shiro Matsuo
JTTA sports science and medicine committee

Key note lecture

Sat. 15 September 1:10 pm-

Current status and future of racket sports scientific research

Miran Kondrič
ITTF Sports Science and Medical Committee, Lausanne, Suisse
University of Ljubljana, Faculty of Sport, Ljubljana, Slovenia

Session 1: Research presentations & Activity reports

Sat. 15 September 2:00 pm-

Chair: Hiroyoshi Ogasa
Vice chairman of JTTA sports science and medicine committee

1. ***Stress Fracture***
Fethi Regaieg
Aspetar, Orthopedic and Sports Medicine Hospital, Qatar

2. ***Optimal mental state associated with service in racket sports***
Tsung-Min Hung
National Taiwan Normal University, Department of Physical Education

3. ***Orchestrating a neurofeedback-mindfulness intervention in table tennis: An interactive demonstration from a Swedish sport psychology practitioner***
Arne Edvardsson
Halmstad University, Sport psychology lecturer, Sweden
Board member of the Swedish Sport Psychological Association

4. **First steps in creating an international benchmark for talent development in table tennis**
Irene Faber[1,2] & Goran Munivrana[2,3]
[1]University of Oldenburg, Institute of Sport Science, Oldenburg, Germany
[2]International Table Tennis Federation, Lausanne, Switzerland
[3]University of Split, Faculty of Kinesiology, Split, Croatia.

Session 2: Poster presentations

Sat. 15 September 4:30 pm –

Chair: Kazuto Yoshida
Chairman of JTTA sports science and medicine committee

P-1. Development of Sports Integrity Education Program, Preparing for Becoming a Good Athlete A New Perspective for Raising the Moral Awareness of Youth

Motoki Fujii
Shizuoka University, School of Education

P-2. Functions of "Multichannel Style Psychological Support" for elite table tennis player and his concerning staffs on making his own table tennis story.

Sadayuki Mizushima
Japan Table Tennis Association

P-3. Development of Image Processing System to Realize Table Tennis Strategy Board

Isao Hayashi
Kansai University, Faculty of Informatics, Japan

P-4. A computer program to track a ball for researchers

Sho Tamaki
Meio university, Japan

P-5. Estimating the fall position of table tennis balls using a broadband AE sensor

Kei Kamijima
Niigata Institute of Technology, Division of Fundamental Education and Liberal Arts, Department of Engineering

P-6. Effect of parameters of force-velocity relationship in the lower limb muscles on muscular effort during table tennis forehand

Yoichi Iino, JTTA SSMC,
The University of Tokyo

Session 3：Research presentations & Activity reports

Sun. 16 September 10:00 am –

Chair: Yoichi Iino
Vice chairman of JTTA sports science and medicine committee

5. Quiet Eye in Improving Table Tennis Player Performance
Poon Soon Cheong
Table Tennis Association of Malaysia

6. Tests to detect imbalances & return to sport criteria in table tennis
Emre AK
Sports Scientist & Manager of Sports Operations
Gloria Sports Arena, Belek, Antalya, TURKEY

7. Substance use at para table tennis players
Nicolae Ochiana
University "Vasile Alecsandri", Faculty of Health Sports and Human Movement Sciences, Bacau, Romania

8. Match Statistics in Para Table Tennis
Michael Fuchs
Technical University of Munich, Chair of Performance Analysis and Sports Informatics, Germany

Session 4：ITTF & JTTA joint meeting

Sun. 16 September 1:30 pm –

Keynote Lecture

Current status and future of racket sports scientific research

Miran KONDRIČ[1,2]
[1]*ITTF Sports Science and Medical Committee, Lausanne, Suisse*
[2]*University of Ljubljana, Faculty of Sport, Ljubljana, Slovenia*

The desire and willingness for major racket sports to cooperate has always existed, yet unfortunately not many attempts have been made to bring this about. In the last few years, the situation has changed, and we are witness to events and publications showing us the future directions of sports science and medicine among all major racket sports.

Three major events have been organised since 2015 to strengthen the cooperation between table tennis, tennis and badminton. To date, two world racket sports congresses have been held (Suzhou 2015 and Bangkok 2018) as well as the very well attended conference in Halmstad in 2018 (The Science and Practice of Racket Sports for Improved Performance and Health). In their development, racket sports have consistently sought ways to improve the game, and sports science has always been a part of those efforts. In earlier years, the trial-and-error method was mainly used whereas these days ever more coaches are adopting a scientific approach. Unfortunately, in the past we did not sufficiently follow the developments and research studies conducted by researchers of different racket sports. The question thus arises when talking about the communication among scientists of various racket sports: How to implement the results of sports science research from different sports into the one we are dealing with? Coaches are looking for the best possible training process, but today this process can only reach a truly high level with the support of sports science. On top of that, we can learn a lot from each other and not need to repeat research studies if they have already been performed in other racket sports.

During the 6th World Congress of Racket Sports Science held in Bangkok this year, a new initiative was unveiled with the intention to make racket sports science more visible. It is only with combined forces that racket sports can achieve greater visibility in highly ranked journals. Accordingly, the idea of establishing a racket sports science society and publishing a journal on racket sports was a 'hot topic' at the Bangkok gathering. In the near future, working group from the ITTF, ITF and BWF will provided with the new approach to cooperation in sports science and medicine.

New challenges lie before the ITTF, BWF and ITF. During the JTTA SSMC and ITTF SSMC gathering in September this year in Tokyo, we will be presented with a lot of results established by researchers from Japan and abroad. Last year, we invited Prof. Cabello-Manrique from the BWF to the meeting. This year, local scientists from badminton and tennis will also share their knowledge and research results with us. We will discuss ways to put those results into the practice of players and coaches – and also how to connect researchers from different racket sports. But there are still more questions that need to be answered. Special attention must be paid to players' prevention and health. In all racket sports, we still encounter too many injuries

(trauma and overuse) that could be avoided if the results of scientific and medical research were to be followed by players and coaches. To ensure they are on the correct path, scientists require input from coaches and players.

Many of the findings that fill the academic space are the outcome of shoddy experiments or poor analysis – this can be improved with the cooperation of all major racket sports. Sports science does not exist simply to prove something but to bring results to life in practice. Sports science still commands enormous – even if sometimes bemused – respect. But its high status is built on the capacity to be right most of the time and to correct its mistakes when it gets things wrong.

Academic publishing is seeing major changes as it makes the transition from print to electronic. It is today much easier to cooperate with scientists abroad than before, and racket sports should regard this as an advantage. The ITTF is the biggest international federation and collaboration between scientists from other racket sports is also expected to lead to more valuable research on the interaction of the contents being researched. We are still not satisfied with the quality, comprehensiveness, robustness and presence of scientific papers on table tennis published in the most prestigious journals – this is something we can improve on if we have more comparisons with other racket sports. In the last few years, we have improved our input but it remains far from excellent. The gathering of the JTTA SSMC and the ITTF SSMC should see new ideas, projects and research proposals being raised where scientists from all major racket sports can combine their efforts.

Research presentations & Activity reports

[1]

Stress Fracture

Fethi REGAIEG

Aspetar, Orthopedic and Sports Medicine Hospital, Qatar

A stress fracture is an overuse injury due to repetitive sub-maximal load and occurring mainly in high impact sports. It happens when bones are weakened by remodeling-related porosity which is the primary stage in the adaptive response of bone to changes in patterns of loading.

Many extrinsic and intrinsic risk factors contribute to the incidence of stress fractures:

Training volume and variations (frequency, duration, intensity), doing “too much too soon” is a common cause of stress fractures. Improper equipment (shoes) and hard surface.

Muscle inflexibility, weakness and excessive muscle strength, lower limbs alignment anomalies, previous history of injury. Female triad: anorexia, amenorrhea and osteoporosis.

Diagnosis: load-dependent pain and tenderness are typical symptoms. Radiology investigations (x-ray, CT scan and MRI) are useful to confirm the diagnosis and the stress fracture grade.

Stress fractures are mainly located in the lower limbs. They typically occur in weight-bearing bones such as the tibia, tarsals and metatarsals.

There are no statistics of stress fracture in table tennis…

The problem of stress fractures depends on how we look at this problem… Respect or not!?

The are no major problems with a regular stress fracture, but potential problems with stress fractures in the major risk areas (anterior tibia, femoral neck, tarsal navicular, 5th metatarsal). Many stress fractures in athletes must be handled with extra-respect. Healing problems and delayed union must be appropriately treated/experienced surgeon.

A poorly treated stress fracture may hinder the athlete's career…!

Prevention is the most appropriate management approach, best achieved through an appropriate training load - graduated training increments -

The goal of stress fracture treatment is to facilitate the natural progression of bone remodeling by reducing loads on the injured site to the greatest extent. Thus, rest from pain-provoking activities remain the most effective.

Keywords: stress fracture, sport, prevention, treatment.

[2]

Optimal mental associated with service in racket sports

Tsung-Min HUNG, Ph.D., FNAK

National Taiwan Normal University

Half of the game in racket sports starts with the service. Therefore, successful service could be critical for the results of the game. Research has indicated that the few seconds prior to motor skill execution are critical for the performance because athletes are undergoing mental preparation such as attention, emotion, and arousal regulation during this short period of time. Several psychophysiological measurements such as EEG have been applied to investigate the mental processes underlying the optimal mental states due to their nonintrusive nature. Specifically, frontal midline theta, left temporal alpha, somatosensory rhythm, and frontal alpha asymmetry have shown its sensitivity to differentiate performance. The presentation will review studies in this line of research and provide suggestions for possible study of optimal mental states in racket sports.

[3]

Orchestrating a neurofeedback-mindfulness intervention in table tennis: An interactive demonstration from a Swedish sport psychology practitioner

Arne EDVARDSSON

Halmstad University, Sport psychology lecturer, Sweden

Board member of the Swedish Sport Psychological Association

Table tennis is a high-speed sport where fast reactions and ability to refocus after each point are essential.

Finding new and innovative methods for improving attentional focus is in both players' and coaches' interests.

Neurofeedback training (NFT) is way to change an individual's brain activity for the better (e.g., improving attention). It has been described as "a method to self-regulate one's own brain activity to directly alter the underlying neural mechanisms of cognition and behavior." (Enriquez-Geppert et al., 2017). NFT strengthens the brain's own ability to regulate itself through adaptive neuroplasticity. It has been found to be beneficial for both healthy and clinical populations. The field of NFT is developing rapidly and can be applied using a variety of technological equipment. Initial NFT interventions in sport and performance have given support for positive training outcomes (Mirifar, 2017). However, due to the use of many different NFT protocols it is hard to get a systematic overview of the research field.

One way of using NFT is to teach athletes the skills to move back and forth from an internal to an external focus. By educating athletes what different focus states "feel like" and "look like" on the computer screen, many have shown an increased ability to stay in the present moment and to change focus. This way of using NFT has been described as "a Western way of mindfulness."

Mindfulness has been defined as "awareness that arises through paying attention, on purpose, in the present moment, non-judgementally" (Kabat-Zinn, 2017). The mindfulness approach has, in the last decade, begun to have a major influence on Western sport psychology theory and practice.

In this NFT-mindfulness presentation, live brain wave activity will be shown to illustrate how NFT works. A NFT-mindfulness model based on the literature, some NFT pilot case studies, and experiences with a former Swedish table tennis world champion will be presented. NFT programs have been shown to improve attention, lower anxiety, and help regulate sleep patterns.

Bridging knowledge from different scientific, sport, and performance domains can increase our understanding of psychophysiological, psychological, and cultural factors interact. Discussing intervention models and learning from different fields is essential to creating future health and performance interventions.

Keywords: Neurofeedback, mindfulness, sport psychology, focus, attention, table tennis.

[4]

First steps in creating an international benchmark for talent development in table tennis

Irene FABER[1,2], & Goran MUNIVRANA[2,3]

[1]*University of Oldenburg, Institute of Sport Science, Oldenburg, Germany*

[2]*International Table Tennis Federation, Lausanne, Switzerland*

[3]*University of Split, Faculty of Kinesiology, Split, Croatia.*

In cooperation with the Table Tennis Talent Consortium:

Prof. Miran Kondrič (Slovenia), Prof. Tsung-Min Hung (Taiwan), Dr. Marije Elferink-Gemser

(The Netherlands), Dr. Guillaume Martinent (France), Dr. Nicoloa Ochiana (Romania), Michael Fuchs (Germany)

An evidence-based international benchmark for elite youth table tennis is proposed to support table tennis talent development programs worldwide. First steps to create such a benchmark have been conducted by the Table Tennis Talent Consortium. These included the development and evaluation of an innovative multidimensional assessment to indicate the characteristics of international youth elite table tennis players.

Table tennis is a complex sport in which players need to develop tremendously in several fields to be able to excel. Talent development is multidimensional by nature (Elferink-Gemser et al., 2011); both physical and mental aspects need to be considered during the development and monitoring of players to have better idea about their status, development and also their potential (Faber et al., 2015). Besides this, it is important to take into account the environment and the interaction between the players and his/her environment (Faber, 2016). For that reason, a multidimensional test battery was developed including tests for physical and mental aspects as well as the player's opportunities with regards to training and competition.

The presentation will outline the rationale for the development and the content of the multidimensional assessment and two first explorative studies. This includes a state-of-the-science overview with regard to field of sports talent (i.e. table tennis talent) and a detailed overview of the tests included. Moreover, the results of a small pilot-study which was conducted in Scotland (2016) (Doherty et al., 2018) and the results of an explorative study during the Euro-Talent Selection Camps of 2016 and 2017 in cooperation with the European Table Tennis Union will be presented. Finally, future perspectives will be proposed for discussion.

References:

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Faber I.R., Bustin P.M.J, Oosterveld F.G.J., Elferink-Gemser M.T., & Nijhuis-Van der Sanden M.W.G. (2015). Assessing personal talent determinants in youth racquet sport players: A systematic review. Journal of Sports Sciences, doi: 10.1080/02640414.2015.1061201.

Faber I.R. (2016). Diamonds in the rough. Searching for high potential in youth table tennis players (Doctoral dissertation, Radboud University Nijmegen).

Doherty S.A.P., Martinent G., Martindale A., & Faber I.R. (2018). Determinants for table tennis performance in elite Scottish youth players using a multidimensional approach: A pilot study. High Ability Studies, doi: 10.1080/13598139.2018.1496069.

[5]

Quiet Eye in Improving Table Tennis Player Performance

Poon Soon CHEONG

Table Tennis Association of Malaysia

Neuroscientists and Psychologists identified some of the common mental processes that differentiate elite athletes from non-elite athletes. And one of the most interesting features appears to be a phenomenon known as the “quiet eye”(QE). QE refers to the amount of time you spend fixating on a particular location before initiating movement. QE is an improved visual perception that allows the athlete to remove any distractions as they plan their next move. And helped to improve outcomes in various tasks requiring human visual attention.

QE has a role to play in table tennis. Since table tennis requires in depth control of physical movements and vision is crucial in providing the information to the movement systems to perform at a high level.

Thus, the purpose of this research is to study the potential application of “quiet eye” in improving table tennis player performance. The participants of this study are the players who currently take part in Malaysia Table Tennis League. Participants divide in to two groups, which Group A receive “quite eye” training compare to the Group B who did not receive “quite eye” training. Preliminary results and the quite eye training method will be presented during the meeting.

Keywords: Quiet eye, gaze, table tennis, concentration and reflexion.

[6]

Tests to detect imbalances & return to sport criteria in table tennis

Emre AK

Sports Scientist & Manager of Sports Operations Gloria Sports Arena, Belek, Antalya, Turkey

Table tennis is one of the sports which involves repetitive asymmetric movements. This is the main cause of the overuse injuries on elbow, shoulder, knee and hip. Before an injury occurs, there might be some signs on the body showing the risk of injury. These can be postural asymmetries, bilateral strength deficits or ROM differences on joints. Therefore, it is important to find out these postural problems to be able to minimize the risk of injuries. There are many scientific methods to test the athletes in order to find out these problems. Some of them are, posture analysis,

ROM tests, Functional Movement Screen (FMS), Isokinetic Strength Tests, etc.. It is also important to know what has to be done to correct these problems. Since, table tennis has become more physical, the risk of injuries due to heavy training and intense matches increases. Therefore, it is important to detect risk factors before an injury occurs and include necessary corrective exercises to fix these issues.

Once an injury occurs, it is as important as the rehabilitation to decide when the player should start practicing again. If the player is not ready for intense workout, the risk of re-injury is very high and this results in longer time to recover.

Keywords: Imbalances, postural asymmetries, Isokinetic Testing, Return to Sport

[7]

Substance use at para table tennis players

Tina MATJAŠIČ[1], Nicolae OCHIANA[2], Miran KONDRIČ[1,3]

[1]*University of Ljubljana, Faculty of Sport, Ljubljana. Slovenia*

[2]*University "Vasile Alecsandri", Faculty of Health, Sports and Human Movement Sciences, Bacau, Romania*

[3]*International Table Tennis Federation, Lausanne, Switzerland*

Physical activity has nowadays become an important factor for reducing and troubleshooting problems, which surface as a consequence of modern, mostly seated lifestyle, excessive use of electronic devices and unhealthy eating habits. Modern trends tend to increase the amount of physical activities due to its positive effects, regardless the capabilities of the individual.

Anyone that engage in sports have many options, whether on recreational or professional level. A lot of people choose playing table tennis as it provides many possibilities for adjustment, considering different physical abilities and possible disabilities of one. This is often the reason why a high amount of physically disabled sportsmen choose this discipline and later excessively extend the amount and intensity of training as means to reach the goals.

With this research we wanted to find out how many and how much professional para table tennis players are using prohibited and harmful substances as means to reach the goals. We were researching to whom do they trust, regarding their use, and if they are aware of their side effects in case of excessive use. Our sample consisted of 92 professional para table tennis players from all around the world that were participating at international championships. We got the necessary information's from a standardised questionnaire.

We were trying to link the usage of prohibited and harmful substances and classification class of a player and whether their usage is distinguished by the level of success of the para player. In conclusion, we came to a discovery that non-prohibited substances are present among para table tennis players, unlike doping. Using of the latter is, as anticipated, influenced by classification class of a player and his/her successfulness. Regarding advices about using the prohibited and harmful substances, respondents trust mostly their physicians and coaches.

Keywords: table tennis, physically disabled, prohibited and harmful substances

[8]

Match Statistics in Para Table Tennis

Michael FUCHS

Technical University of Munich, Performance Analysis and Sports Informatics, Germany

In recent years an increasing professionalisation in many Paralympic sports has been observed, including para table tennis. One part of this professionalisation is the application of systematic match analysis. The aim of this currently running study is to use systematic match analysis to analyse the impact of gender and disability class on various match statistics in para table tennis.

The database contains both women's and men's single matches of the disability classes 1 to 10. At least ten matches of each combination of sex and disability class are analysed to collect a representative data sample. The database contains matches from the Paralympic Games 2016, the World and European Championships 2017 and World Tour tournaments since the Paralympic Games 2016 in Rio.

To collect the data and to generate the statistics, the self-developed TUM.TT video analysis tool is used which is able to generate a report for each match analysed. These reports contain several statistics on rally length, winning probabilities of rallies for the serving/receiving players, and specific performance indices (e.g. usage/scoring rate and technique effectiveness of specific strokes).

For statistical analysis (ANOVAs and t-tests) SPSS is used.

With the data obtained, the study will give an overview of specific characteristics of each disability class and gender which could be a foundation for future training or for upcoming changes in the classification system.

Keywords: Para table tennis, match statistics, video analysis, practical performance analysis

Poster presentations

[1]

Development of Sports Integrity Education Program, Preparing for Becoming a Good Athlete A New Perspective for Raising the Moral Awareness of Youth

Motoki FUJII, Kazuto YOSHIDA

Shizuoka University, School of Education

Purpose - The purpose of this study is to introduce a new type of lesson plan, called Athlete Moral Education (AME) and examine how it could raise the awareness of sports integrity in Japanese youth.

Background - After the recent serious moral hazard cases in the sports world, our laboratory has developed and conducted AME, which is used to demonstrate dilemmas that we experience in sports games and activities, and also examine critically the traditional Japanese moral education in order to apply it to sports education.

Design - The lesson consists of three types of classes: 1) A class on basic understandings of sports integrity, 2) A class to examine the dilemmas in sports games and activities, and 3) A class on value clarifying discussion related to sports. The lessons are given basically only to fifth-grade classes or older since it involves rather high-level discussions. AME is also aimed to teach basic knowledge about various sports as well as to encourage students to learn and think.

Findings - In AME, students learned to think autonomously about various topics given, share their opinions, and listen to the others in the class. And the discussion was not limited to the class but spread to the coach, the family, and the community. Such communication enhanced everyone's awareness toward both sports and its integrity, and their complementary relation was intensified. Practical Implications – Japanese moral education have placed importance on transferring conventional values, and the lessons are still conducted in a game-like way in which students guessed the "correct" answer the teacher expected to hear. Sportsmanship education has also been a ritual where the teachers or coaches conveyed the manualized "correct" information to the students or players. The way students ponder the conflicts at sports games or activities and verbalize their answers to the problems in the AME shows a great possibility of new moral education and sports integrity education.

Social implications/Value - AME is a new style of teaching materials and lesson plans at elementary and junior high school levels, which covers not only school education but also non-formal education, such as regional sports clubs.

Keywords: Sports Integrity, Moral education, Moral dilemma, Values clarification

[2]

Functions of "Multichannel Style Psychological Support" for elite table tennis player and his concerning staffs on making his own table tennis story

Sadayuki MIZUSHIMA

Japan Table Tennis Association

Psychological support activities in sport based on Sport Mental Training or Sport Counseling often take styles of "1 on 1" or "lecture". In case a professional of psychological support is located on a sport team or a sport association, many "1 on 1" relationships are occurred in the team or the association. In this Case Study, I call the situation that the professional support informal team members including athlete A and his concerning staffs (ex. coach, physical staff, parent, etc.) by 1 on 1, "Multichannel Style Psychological Support".

Yonemaru (2017) said that to get psychological and practical knowledges which are useful in competitive field, we need study based on relationships between athlete (subject) and professional (researcher), and he referred to importance of Case Study as one of way to understand psychological support practice based on personal relations. Kawai (2002) said that in the world of psychotherapy Case Study which pursue one person's case deeply is more useful for listener than Study of scientific and objective one. As for psychological support from which we can't remove human relation, meaning of Case Study is large, I guess.

In past Case Study of psychological support in sport, there is no Case Study of "Multichannel Style

Psychological Support" as far as I know. So, purpose of this Case Study, I show a case of "Multichannel Style Psychological Support" and reveal that how "Multichannel Style Psychological Support" function on making athlete's own table tennis story, and what significant matters are there in those.

<Outline of the Case> *including fake to avoid specifying athlete's name

① athlete A: male, high school 1st, right hand, drive attack type, shake, pimples in/pimples in

② athlete A centered informal team: athlete A, Local team manager, Local team coach (2), Local team physical coach, outside coach, national team coach, parent of A

③ purpose of psychological support: to make possibility of walking by athlete's own legs with drawing own story for dream raise

④ outline of the "Multichannel Style Psychological Support":

a) term: April 201x -July 201x+3
b) number of sessions (for 8 persons): 157
c) percentage of voluntary sessions: 84.7%

On that day of poster session, I will show you "turning points" which occurred in the case, and "phenomena" which occurred in direct and indirect psychological support for athlete A.

[3]

Development of Image Processing System to Realize Table Tennis Strategy Board

Isao HAYASHI[1], Masaki OGINO[1], Honoka IRIE[1], Sho TAMAKI[2], Kazuto YOSHIDA[3], Miran KONDRIČ[4]

[1]*Kansai University, Faculty of Informatics, Japan*

[2]*Meio University, Faculty of Human Health Sciences, Japan*

[3]*Shizuoka University, College of Education, Academic Institute, Japan*

[4]*University of Ljubljana, Faculty of Sport, Slovenia*

When the coach gives advices to the player in table tennis match, the coach will inform the player some of the strategies accumulated in his past experiences. However, the data of past matches he/she gave advices is not always analyzed enough objectively. On the other hand, many artificial intelligence models which analyze the image data automatically have been proposed.

In this paper, we propose automatically constitutes the input data from the video image of table tennis matches, and extract rule knowledge of strategy from the input data by the learning type clustering method. We aim to realize the table tennis strategy board. We call this system as AI sports, AI table tennis. We first develop the image processing program that extract the input data from the video image by manual. With the image processing program, the data of the rally attributes are entered in a window that pops up step by step according to the trajectory of the ball. We discuss here the relation between the characteristics of the player and the ball coordinates based on the input data. We analyzed the video of 16 matches from the third round to the final match in the table tennis women's singles tournament of the Rio de Janeiro Olympics held in 2016. The number of rallies was 372 and the ball trajectory was 6862. In particular, we analyzed the video at women's table tennis singles semi-final and discussed the player strategy using the relationship between the characteristics of the players and the coordinates of the ball.

Since the final purpose of the system is to extract rule knowledge from the video image by the learning type clustering method, in the future it is necessary to formulate ddi-Boosting as the learning type clustering method using fuzzy clustering.

Keywords: Table Tennis Strategy Board, Image Processing, Learning Type Clustering Method, AI Sports

[4]

A computer program to track a ball for researchers

Sho TAMAKI

Meio University, Japan

Introduction

Three-dimensional measurement of a ball is not easy task for table tennis researchers. There are three main reasons why the measurement is unavailable in

many cases. First, enormous time is required to digitize the position of a ball in every single frame in a match when classical methods are used. Although the results should be general, the required time makes it impossible to analyze a lot of matches. Second, there are no commercial computer programs to track a table tennis ball. If researchers need it, they have to develop it by themselves, which is impossible for many researchers. Although motion of a ball is important to analyze table tennis matches, it is difficult to conduct for researchers.

The current study proposes a computer program which tracks a table tennis ball. The proposed computer program consists of two approaches to track a ball; automatic ball detection using computer vision technologies and manual ball detection using circle fitting. The combination of two approaches makes the ball tracking more robust and more efficient. In this presentation, the detail of the two different functions and the performance are described.

Proposed program

Automatic ball detection using computer vision technologies

Automatic ball detection was achieved by the five steps; background subtraction, ball like segments extraction, ball segment detection, contour tracking, and circle fitting. First, frame differentiation is adopted as background subtraction. Frame differentiation requires small computation time and outputs the foreground image contains a ball because a ball is always moving during a rally. Second, the color (saturation and brightness) and the area of segments are used to extract ball like segments. A white ball has low saturation and high brightness compare to other segments and the area is small. In addition, ROI (region of interest) is used to limit the searching area of an image. Although ROI is manually selected at the beginning of the detection, it is automatically updated after detection. Third, the segment that contains the median position of ball like segments are detected. The detected segment should be a ball because the ball is the biggest segment in the ROI. Fourth, the contour of the ball segment is tracked. At last, the circle model (center, radius) is estimated with the contour of the ball. These steps realize automatic ball detection.

Manual ball detection using circle fitting

Manual ball detection is achieved with circle fitting. Five points on the circle, which are digitized by user's clicking, are used to estimate circle model. Clicking points on the circle enables the ball detections when a ball is occluded with other objects. In addition, circle fitting reduces the error of manual digitizing.

Experiment

Match sample & Method

Men's final of All Japan table tennis championships 2017 was recorded with two cameras. A ball imaged on two cameras was tracked with the proposed program. Count the number of frames where a ball was automatically detected and the number of frames where a ball was manually digitized. In addition, Chi square test was conducted to investigate the effect of ball impact on the ball detection.

Results & Discussion

A ball was automatically tracked on 95.6% (20,867 / 21,833) of frames in a camera and 98.2% (20,325 / 20,697) of frames in the other camera. A ball was manually digitized on the rest frames, namely 4.4% and 1.8% of frames. The

detection rate of automatic ball detection became lower when the frame was near the frame where an impact occurred ($p < 0.05$). In frames that were 18 or greater than 18 frames away from frames when an impact occurred, detection rate were higher than entire detection rate, 97.4% and 98.8% respectively.

The results demonstrated the proposed program reduces the large portion of digitizing time. Manual digitizing is required for 1.8-4.4% of frames. The results also shows ball impacts make it difficult to track a ball automatically. The most plausible reason why ball impacts has negative effect on ball detection is occlusion between a ball and a player; a ball is often overlapped with players right before and after ball impacts If the motion of a ball around impacts is not required, manual digitizing is only required for 1.2-2.6% of frames. The experimental results shows the proposed method can substantially reduce the time of ball detection and boost the research that requires the motion of a ball.

[5]

Estimating the fall position of table tennis balls using a broadband AE sensor

Kei KAMIJIMA[1], Kenichi ITO[2]

[1]Division of Fundamental Education and Liberal Arts, Department of Engineering, Niigata Institute of Technology, Japan

[2]Division of Intelligent Machine, Department of Engineering, Niigata Institute of Technology, Japan

In competitive sports, objective analyses based on scientific data collection has become important in improving skills. In ball games, analyzing play characteristics and patterns with which an opponent returns the ball in advance would be effective preparation for a game.

In the past, the authors have been developing a system in which a small acoustic emission (AE) sensor is used to instantly gather fall positions of table tennis balls, and qualitatively analyze patterns with which a player returns the ball. In this study, we used a broadband AE sensor to measure AE wave generated when balls fall on the table over a wide range, and examined whether fall positions of balls can be efficiently estimated.

The result showed that fall positions of table tennis balls could be estimated in all 42 points. In addition, by using contour data with the AE sensor at the center, estimate precision of the area where balls fall improved. Error in the distance was 28.18 cm, 97.06 cm being the maximum.

[6]

Effect of parameters of force-velocity relationship in the lower limb muscles on muscular effort during table tennis forehand

Yoichi IINO

JTTA SSMC, The University of Tokyo

Introduction

The maximum isometric strength and maximum shortening velocity in the muscle's force-velocity relation are important mechanical parameters that can affect sports performance. Both parameters can be improved by strength training. Thus, clarifying the effect of both parameters on performance in table tennis may be helpful for designing strength-training programs especially suitable for individuals. Although endurance is not the primary goal of hitting motions in table tennis, the ability to perform a motion with less effort and high endurance would be beneficial because the motions are usually repeated many times in a match. Thus, the purpose of this study was to investigate the effect of the maximum isometric forces and the maximum shortening velocities of the lower limb muscles on the muscular effort during the table tennis forehand.

Methods

Participants were four male collegiate table tennis players. All participants were recruited from a

Division I collegiate table tennis team. Mean (s) age, height and body mass were 20.1 (1.4) years, 1.75 (0.03) m and 61.5 (4.2) kg. The task of the participants was to hit cross-court forehand drives against backspin balls with maximum effort. Balls were projected by a ball machine. We performed simulations with the open-source OpenSim software package ver. 3.3 (Delp et al., 2007; Seth e al., 2011). The model was driven by 80 Hill-type muscle tendon units (MTUs) (Millard et al, 2013). First, we created participant-specific musculoskeletal models by scaling the generic musculoskeletal model to each participant's anthropometric dimensions. For each forehand trial, we generated joint angle trajectories using OpenSim's inverse kinematics algorithm. We used OpenSim's inverse dynamics algorithm to determine the joint torques of the lower limbs.

We used OpenSim's static optimization algorithm to estimate the activation patterns of muscles. The cost function was the sum of squared muscle activations for all lower limb muscles, which we will refer to as the muscular effort. We repeated the estimations with the maximum isometric forces or

the maximum shortening velocities of each muscle group changed by ±10% of their original values. We divided the lower limb muscles into 10 muscle groups; the hip adductors, abductors, flexors, extensors, internal rotators and external rotators, knee flexors and extensors, and ankle plantar flexors and dorsi-flexors.

Results & Discussion

The muscular effort of the lower limbs was reduced most when the maximum isometric forces of the hip extensors were increased by +10%. The second largest reduction of muscular effort was observed for the 10% increase of the maximum isometric forces of the hip adductors, followed by those of the knee extensors, hip

flexors, and knee flexors. Increases of muscular efforts were observed for 10% decrease of the maximum isometric forces of these muscle groups. The magnitude of the change in the muscular effort was larger for 10% decrease in the maximum isometric forces than for the 10% increase. The changes in the maximum isometric forces of other muscle groups had negligible effects on the muscular effort. The results suggest that increasing the maximum isometric forces of the hip extensors and adductors may be most effective to reduce the muscular effort of the lower limbs during the forehand. Although increasing the maximum shortening velocities of these muscles was also effective to reduce the muscular effort, the effect was much smaller than the effect of increasing the maximum isometric forces.

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Seth, A., Sherman, M., Reinbolt, J. a., & Delp, S. L. (2011). OpenSim: a musculoskeletal modeling and simulation framework for in silico investigations and exchange. Procedia IUTAM, 2, 212–232.

List of the participants at 2018 annual JTTA SSMC and ITTF SSMC meeting

JTTA – SSMC members and their guests

Nr.	*Name*	*Institution*
1	Shiro MATSUO	Japan Table Tennis Association anti-doping committee
2	Kazuto YOSHIDA	Shizuoka University, Faculty of Education
3	Hiroyoshi OGASA	Yamaguchi University
4	Yoichi IINO	The University of Tokyo
5	Mizuho ADACHI	Nippon Sport Science University
6	Hiroyasu AKAGI	Nagato Memorial Hospital
7	Suguru ARAKI	Tohoku Fukushi University
8	Motoki FUJII	Shizuoka University, Faculty of Education
9	Takashi GUSHIKEN	Hakuai Hospital
10	Michiyo KIMURA	Takasaki University of Health and Welfare
11	Shigeaki MATSUURA	Osaka University
12	Sadayuki MIZUSHIMA	Japan Table Tennis Association
13	Takeshi NISHIKAWA	Shizunai Dermatological Clinic
14	Kazuhide OGINO	Tottori University
15	Takuro OKADA	Kameda Medical Center
16	Megumi OOISHI	Palliative care DAICHI
17	Sho TAMAKI	Meio University
18	Tsuyoshi TOYOTA	Nagano Matsushiro General Hospital
19	Ousei TSUJI	Asahino General Hospital
20	Koshi YAMADA	Table Tennis Kouryukai
21	Takahiro YAMAUCHI	Fukui University
22	Youji YOSHIZAWA	Nagoya University of Economics
23	Kazuko FUJII	Japan Table Tennis Association
24	Isao HAYASHI	Kansai University
25	Yuki INABA	Japan Institute of Sports Sciences
26	Kei KAMIJIMA	Niigata University
27	Hiroki OZAKI	Japan Institute of Sports Sciences
28	Yutaka TSUJI	Emeritus professor of Osaka University

ITTF – SSMC members and their guests

Nr.	*Name*	*Institution*
1	Miran KONDRIČ	University of Ljubljana, Faculty of Sport, Slovenia
2	Tsung-Min HUNG	National Taiwan Normal University, Department of Physical Education, Taiwan, R.O.C.
3	Irene R. FABER	University of Oldenburg, Institute of Sport Science, Oldenburg, Germany
4	Goran MUNIVRANA	University of Split, Faculty of Kinesiology, Croatia
5	Emre AK	Gloria Sports Arena, Belek, Antalya, Turkey
6	Fethi REGAIEG	Aspetar, Orthopedic and Sports Medicine Hospital, Qatar
7	Nicolae OCHIANA	University Vasile Alecsandri of Bacau, Romania
8	Michael FUCHS	Technische Universität München, Performance Analysis and Sport Informatics, Germany
9	**Kazuto YOSHIDA*	Shizuoka University, Faculty of Education, Japan
10	**Shiro MATSUO*	Japan Table Tennis Association anti-doping committee
11	Arne EDVARDSSON	Halmstad University, Sweden
12	Poon Soon CHEONG	Table Tennis Association of Malaysia

** already at JTTM SSMC list.*

2019

Japan Table Tennis Association http://www.jtta.or.jp
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1-1-1 Jinnan, Shibuya-ku, Tokyo 150-8050 JAPAN
Fax:+81-3-3481-2373
e-mail:table-tennis@japan-sports.or.jp

May 20th, 2019

Dear Prof. Kondric

Invitation letter for the Japan Table Tennis Association Sports Science and Medicine Committee International Meeting 2019

We will have the Japan Table Tennis Association Sports Science and Medicine Committee International Meeting 2019 in AJINOMOTO National Training Center in Akabane, Tokyo from September 14th to September 15th 2019 . I am writing to invite you to participate in this meeting. Since you are an expert in table tennis sciences, I believe your presence and our conversation would make this meeting very successful.

I am pleased to confirm that we will be able to fund the following expenses:

- round trip flight
- connection costs between Narita/Haneda airport and the hotel
- 4 nights' hotel accommodation, including breakfast
- lunch at the training center each day

I do hope you will accept this invitation, and would appreciate your RSVP by email on or before July 1st. For more information, please see the attached event schedule and notes.

Please feel free to contact me should you have any questions or comments.

Sincerely yours,

吉田 和人 Kazuto YOSHIDA
Chair of the JTTA SSMC
Member of the ITTF SSMC
email: Yoshida.kazuto@shizuoka.ac.jp

松尾 史朗 Shiro MATSUO
Executive Director of the JTTA

前原 正浩 Masahiro MAEHARA
Executive Vice President of the JTTA
Executive Vice President of the ITTF

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e-mail:table-tennis@japan-sports.or.jp

Event schedule

September 12rd /13th: Arrival in Narita/Haneda, Japan* **
September 13th: free time ; I'll show you around Tokyo if you'd like.
September 14th: am ITTF SSMC meeting
pm JTTA SSMC International Meeting (in English) Welcome party at the National Training Center
September 15th: am JTTA SSMC International Meeting (in English)
pm ITTF SSMC meeting
September 16th: Departure from Narita/Haneda, Japan* **

* We will send you a round trip economy class e-ticket for the flight from your city to Narita.
** Please wait to be picked up by our staff at Narita/Haneda Airport on September 12th/13th and you will also be taken back from your hotel to Narita/Haneda Airport on September 16th.

Venue

AJINOMOTO National Training Center
http://www.jpnsport.go.jp/corp/english/tabid/382/Default.aspx
Zip code; 115-0056 Address : 3-15-1 Nishigaoka Kita-ku, Tokyo, JAPAN
Japan Institute of Sports Sciences
http://www.jpnsport.go.jp/corp/english/activities/tabid/393/Default.aspx

Hotel

Hotel Met Akabane
http://www.jrhotelgroup.com/en/152.html
Zip code; 115-0045 Address : 1-1-76 Akabane, Kita-ku, Tokyo, JAPAN
TEL; 81-3-5939-0011

Please note:

As sponsor of this conference, the Japan Sports Council asks that all participants strictly comply with the following rules:

1) The e-ticket must only be used by the named person and it is not possible to change the flight details.

Thank you for your cooperation

Japan Table Tennis Association

Sports Science and Medicine Committee International Meeting 2019

PROGRAMME

AND

ABSTRACTS

14 - 15 September 2019,

National Training Center,

Tokyo, JAPAN

スポーツ振興くじ助成事業

Supported by Sports Promotion Lottery

JTTA President's Greetings

On behalf of the Japan Table Tennis Association (JTTA), I am pleased to welcome the members of International Table Tennis Federation Sports Science and Medical Committee (ITTF SSMC) and other Sports Science researchers to "JTTA Sports Science and Medicine Committee International Meeting 2019" on 14th and 15th of September 2019 at Ajinomoto National Training Center, Kita-ku, Tokyo.

This international meeting began in 2014, and has been held annually in Tokyo. This year marks our 6th meeting. In the past five years, the ITTF SSMC and JTTA SSMC researchers have shared the results of their research and activities in the fields of medicine, nutritional science, psychology and sports science. Some joint international research has begun among the ITTF and JTTA members. I want to commend you for your contributions to the development of table tennis.

Finally, I am delighted to hold such a distinguished international meeting here in Tokyo, the site of next year's Olympic and Paralympic Games. I am confident that, with your full support, this meeting will be fruitful for everyone. I am most grateful for your participation.

Japan Table Tennis Association
President
Sadayoshi FUJISHIGE
藤重貞慶

JTTA SSMC Chairman's Greetings

We are honored to have so many of you convene for our "Japan Table Tennis Association Sports Science and Medicine Committee (JTTA SSMC) International Meeting 2019". As Chairman of JTTA SSMC, I would like to give my sincere thanks to all participants. I also want to express my appreciation for the many people who worked hard to make this possible.

At this, our sixth and concluding meeting, we will share creative insights from recent studies. Since the first meeting in 2014, participants have presented their research results and exchanged ideas. By holding this meeting every year, we have strengthened and expanded our network of table tennis researchers from many countries, including members of the International Table Tennis Federation Sports Science and Medical Committee (ITTF SSMC).

Our 2019 meeting is especially significant, because it is the year before the 2020 Tokyo Olympics & Paralympics. In addition, the number of participants, invitees from overseas, and speakers is the largest to date. This unique opportunity to meet face to face with outstanding table tennis researchers from all over the world is expected to inspire us more than ever.

As in the past, we anticipate that this meeting will contribute greatly to the progress of sports science and medicine in table tennis. We believe the cumulative achievements of JTTA SSMC international meetings will be a legacy, not only for JTTA SSMC members, but also for all participants, and will continue long after 2020 Tokyo.

I cordially welcome all of you, and I hope that our overseas guests enjoy Japan during their stay. I am sure that we will have a thought-provoking and beneficial time. May you leave this meeting with fresh ideas, new friends and warm memories.

Thank you.

Japan Table Tennis Association
Sports Science and Medicine Committee
Chairman Kazuto YOSHIDA
吉田和人

Organizing committee

Kazuto YOSHIDA (Shizuoka University, JTTA SSMC)
Hiroyoshi OGASA (Yamaguchi University, JTTA SSMC)
Yoichi IINO (The University of Tokyo, JTTA SSMC)
Michiyo KIMURA (Takasaki University of Health and Welfare, JTTA SSMC)
Sho TAMAKI (Meio University, JTTA SSMC)
Koshi YAMADA (Japan Table Tennis Association, JTTA SSMC)
Sadayuki MIZUSHIMA (Japan Table Tennis Association, JTTA SSMC)
Takuro OKADA (Kameda General Hospital, JTTA doping control committee)

ITTF Sports Science and Medical Committee

KONDRIC Miran (Chairman)
ZHANG Xiaopeng (full member)
MUNIVRANA Goran (full member)
MATSUO Shiro (Anti-doping chief)
YOSHIDA Kazuto (full member)
FABER Irene (full member)
HUNG Tsung Min (full member)
FUCHS Michael (corresponding member)
OCHIANA Nicolae (corresponding member)
REGAIEG Fethi (corresponding member)
AK Emre (corresponding member)

JTTA Sports Science and Medicine Committee

Kazuto YOSHIDA
Hiroyoshi OGASA
Yoichi IINO
Nariaki MATSUURA
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Koshi YAMADA
Hiroaki SAKAKIBARA
Ayato TANAKA
Sadayuki MIZUSHIMA
Motoki FUJII
Hiroyasu AKAGI
Maimi MARUYAMA
Naomi IINO
Yasunobu HOSHINO
Ko YAMANAKA
Hitomi INOUE
Sei UEDA

Anti-Doping Committee

Takuro OKADA

PROGRAMME

Welcome

Sat. 14 September 1:00 pm-

Kazuto Yoshida

Chair of the JTTA sports science and medicine committee

Session 1: Research presentations & Activity reports

Sat. 14 September 1:05 pm-

Chair: Sho Tamaki

JTTA sports science and medicine committee

1. **Logistic and multinomial regression approach; "forgotten" statistical analyses in identification of predictors of racket sport performance**

Damir Sekulić

University of Split, Faculty of Kinesiology, Split, Croatia

2. **Evaluating Tactics Quantitatively in Competitive Table Tennis**

Xiaopeng Zhang

Chinese Table Tennis Association

3. **Data Analytics in Table Tennis with Interactive visualisation**

Megha Gambhir

Stupa (Sports Training Under Performance Analytics), Delhi, India

Pinnacle Table Tennis Academy, Sonipat, Haryana

4. **First steps in creating an international benchmark for talent development in table tennis**

Irene Faber[1,2] & Goran Munivrana[2,3]

[1]University of Oldenburg, Institute of Sport Science, Oldenburg, Germany

[2]International Table Tennis Federation, Lausanne, Switzerland

[3]University of Split, Faculty of Kinesiology, Split, Croatia.

Session 2: Short Oral Presentations

Sat. 14 September 3:05 pm –

Chair: Takuro Okada
JTTA anti-doping committee

P-1. Game Analysis supporting by AI in Table Tennis
Minoru Mastumoto
Japan Institute of Sports Science

P-2. Impact characteristics of three different topspin forehands in Japan elite table tennis players
Shuji Kidokoro
Japan Institute of Sports Sciences

P-3. A case study: Exploring method of forming goal setting frame in table tennis World tour
Mizushima Sadayuki
Japan Table Tennis Association

P-4. Outcomes and challenges of scientific research on table tennis in The JTTA Sports Science and Medicine Committee International Meeting (2014-2019): Categorising past and present and research results, and returning research outcomes to enhance athletic and competitive capabilities
Hiroaki Sakakibara
University of Teacher Education Fukuoka, Japan

P-5. Effect of change in ball material from celluloid to plastic on the rotation speed of table tennis service for elite players in actual competitions
Kazuto Yoshida
Shizuoka University,Japan

P-6. Ball speed and shot intervals in a table tennis match: a case study
Sho Tamaki
Meio University, Japan

P-7. Recent Treatments of Ingrown Nails and Pincer Nails
Takeshi Nishikawa
Medical Corporation Kessikai
Sapporo Medical University, Faculty of Medicine

P-8. Effect of muscle mechanical properties on the lower limb muscle activation during table tennis backhand drives
Yoichi Iino
The University of Tokyo, Japan

Symposium

Sat. 14 September 4:15 pm-

Injury prevention & medical support issues in racket sports

Chair: Hiroyoshi Ogasa
Vice chairman of JTTA sports science and medicine committee

1. **Real-time Quantitative Assessment of Physical Activity and Heart Rate using IoT Wearable Sensor Device and Cyber Sports Complex (CSC) in Tennis**
   Ken Nakata
   Osaka University Graduate School of Medicine, Department of Sport and Health Sciences, Osaka, JAPAN

2. **Efforts to prevent sports injuries in Japan Soft Tennis Association**
   Masahiko Morishige
   Japan Soft Tennis Association

3. **Approach and problem of injury prevention in Japan Table Tennis Association.**
   Hiroyoshi Ogasa
   Yamaguchi University Hospital, Department of Orthopedic Surgery

4. **Injuries Registration and Prevention in Table Tennis.**
   Fethi Regaieg
   Aspetar, Orthopaedic and Sports Medicine Hospital - Qatar. International Table Tennis Federation - Sports Science and Medical Committee

5. **Shoulder injuries in table tennis**
   Vedran Hadžić
   University of Ljubljana, Faculty of Sport, Department of Sports Medicine

Session 3: Poster Presentations

Sun. 15 September 8:45 am –

Chair: Takuro Okada
JTTA anti-doping committee

Same as “Session 2: Short Oral Presentation” P1 – P8
Presenters are asked to stand beside their posters from 9:00 am until 9:45 am

Keynote lecture

Sun. 15 September 9:50 am-

Table Tennis can be best possible therapy for individuals with Parkinson's Disease… but also for patients with other modern diseases

Miran Kondrič
ITTF Sports Science and Medical Committee, Lausanne, Suisse
University of Ljubljana, Faculty of Sport, Ljubljana, Slovenia

Special lecture

Sun. 15 September 10:30 am-

6 years of progress, we will never stop reaching for more

Shiro Matsuo
JTTA sports science and medicine committee
ITTF Sports Science and Medical Committee Chief of anti-doping

Session 4 : Research presentations & Activity reports

Sun. 15 September 11:15 am –

Chair: Michiyo Kimura
JTTA sports science and medicine committee

6. Efficiency of the shockwave therapy in reducing pain of cervicalgia
Nicolae Ochiana
University "Vasile Alecsandri", Faculty of Health Sports and Human Movement Sciences, Bacau, Romania

7. Lower limb biomechanical effects of two performance levels during cross step
Yaodong Gu
Ningbo University, Faculty of Sports Science, Ningbo, China

8. *Speed and Spin Differences between the Old Celluloid versus New Plastic Table Tennis Balls and the Impact on the Responses of Elite versus Sub-Elite Players*
Wan Xiu Goh
Singapore Sport Institute, Singapore;

9. A Study of the Development Trend of PTT from Rome 1960 to Tokyo 2020 "Strengths and opportunities"
Sima Limoochi
Alzahra University, Department of Motor Behavior, Table Tennis lecturer, Tehran, Iran
ITTF PTT L1 Coaching Course Conductor

10. Growing *popularity of table tennis in Malaysia: Approach and Way Forward*
Poon Soon Cheong
Table Tennis Association of Malaysia

Closing Remarks

Sun. 15 September 0:55 pm-

Hiroyoshi Ogasa
Vice chairman of JTTA sports science and medicine committee

Keynote Lecture

Table Tennis can be best possible therapy for individuals with Parkinson's Disease… but also for patients with other modern diseases

Miran Kondrič[1,2]

[1]*ITTF Sports Science and Medical Committee, Lausanne, Suisse*

[2]*University of Ljubljana, Faculty of Sport, Ljubljana, Slovenia*

Parkinson's disease (PD) is one of the most threatened disease of modern times – it is common and debilitating disorder. In PD affected are nerve cells in a part of a brain that produce dopamine. Worldwide population is getting older as generations before, so now so called "modern diseases" needs far more attention from research centres at universities and medical institutions.

There is increasing evidence that learning-based exercises could be neuroprotective in aging individuals and those with neurodegenerative disease (National Parkinson Foundation, 2019). Learning-based memory exercises can also help keep our memory sharp. Practicing table tennis challenges the individual to change playing situation, tempo, speed, movement activity, or direction - what is in table tennis referred to as "random practice" exercises. Individual's brain builds connections when an activity (TT ball) crosses from one side of the field of vision to the other. As people get older, these connections start to break. Always changing situations in table tennis practice and tournament still benefit people with Parkinson's disease. Individuals are also forced to anticipate where the TT ball is going, which help keeps their mind working and aids in the therapeutic properties.

For people with Parkinson's disease also the social element of sports activity is important because depression is a common symptom of the disease, which causes a loss of dopamine-producing brain cells. Among other's table tennis is one of the rare activities that individuals with PD and their families can do together. The idea to recommend table tennis as a best sport for patients with PD it is to encourage neuroplasticity, which means the brain creates new connections between neurons to compensate for deficits elsewhere.

Research from the Parkinson's Outcomes Project, the largest-ever clinical study of Parkinson's, found that people with PD who engaged in at least 2.5 hours of exercise a week had a better quality of life than those who didn't exercise at all or started exercising later (National Parkinson Foundation, 2019).

Dr. Wendy A. Suzuki, Professor of Neural Science and Psychology in the Center for Neural Science at New York University stated: "In table tennis we have enhanced motor functions, enhanced strategy functions, and enhanced long-term memory functions." Table tennis works parts of the brain that are responsible for movement, fine motor skills and strategy (Kloeffler, 2011).

Kloeffler (2011) at the end of his presentation challenges researchers with his call: "If science one day proves a connection between table tennis and an increase in mental strength, ping pong could graduate from the basement to the classroom." Hopefully ITTF and other universities and medical institutions worldwide will find resources to slow down PD with table tennis activities.

Table tennis is expected to exert a prevention effect on Parkinson disease.

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Special Lecture

6 years of progress, we will never stop reaching for more.

Shiro MATSUO
Japan Table Tennis Association Executive Director
ITTF Sports Science and Medical Committee Chief of anti-doping

I would like to look back on the last 6 years during which we have held this international meeting.

In September 2013, it was decided that the 32nd Olympic Games will be held in Tokyo. This decision gave great hope to those Japanese who were affected by the 2011 Tohoku earthquake, and greatly encouraged those Japanese who participate in sports. Triggered by the decision, National Federations made various proposals for the Olympic Games.

The Japan Table Tennis Association also planned various things. The JTTA set up a new framework aimed at achieving gold for our national team in 2020. However, our purpose was not only success. The JTTA asked us to activate more sports science research and to promote the involvement of Japanese sports scientists on an international level in order to leave a 2020 legacy.

Fortunately, since the World Table Tennis Championship was due to be held in Tokyo in 2014, we decided to have an international scientific meeting just before the WTTC.

Consequently, the 1st meeting was held in Tokyo on 26th April, 2014. 11 foreign researchers including the ITTF Sports Science and Medical Committee members, and 33 Japanese researchers participated in the meeting. There were 13 presentations/discussions. This meeting received high evaluations from the participants and the ITTF. So, a 2nd meeting was requested.

Fortunately, in 2015, the Japanese government decided to increase the annual budget for sport promotion until the Olympic Games, and this allowed us to fund the international sports conference. So, we were able to hold the 2nd meeting on 20th September, 2015. There were 51 participants at the meeting and there was one keynote lecture, one special lecture, and 18 presentations. Although there have been slight changes, this style has been continued until 2019.

	2014	2015	2016	2017	2018	2019
participants	33	49	52	43	37	53
(ITTF and foreign guests)	9	11	10	12	10	13
key note lecture		1	1	1	1	1
special lecture		1	2	1		1
symposium				1		1
presentation	15	18	18	19	14	17

We have achieved many results over the last six years thanks to these meetings. In addition, they also facilitated the establishment of good relationships between Japanese researchers and ITTF SSMC members.

1) Some international joint studies were started.

2) A Japanese anti-doping committee member stayed in the Lausanne ITTF office for eight months, and worked with ITTF staff.

3) Three Japanese committee members took charge of educational seminars at two WTTCs.

4) We sent two proposals by a Japanese sports dietitian to the ITTF to improve the food environment of young players. One proposal was accepted by the ITTF.

5) In this September, a Japanese sports scientist will go to Slovenia for one year.

From the bottom of my heart, I am grateful for your cooperation and effort. Finally, I would like to emphasize, this is only the first step and we have a long journey ahead of us in order that we can achieve even better results. I hope that the legacy of this international meeting will continue many years to come.

Symposium

Injury prevention & medical support issues in racket sports

Hiroyoshi OGASA
Yamaguchi University
Vice chairman of JTTA sports science and medicine committee

Prevention of injury is one of the major priorities for all sports organizations. As medical staff, we have the duty to provide effective medical advice and care for the athletes. We have to learn how to support the athletes and join our efforts to ensure the best performance for all the athletes from each other in racket sports. Therefore, we plan the symposium on “Injury prevention and medical support issues in racket sports”, and we would like to discuss what we should do about protecting the health of the athletes in future.

SPORTS INJURIES SYMPOSIUM 1

[1]

Real-time Quantitative Assessment of Physical Activity and Heart Rate using IoT Wearable Sensor Device and Cyber Sports Complex (CSC) in Tennis

Ken NAKATA[1], Teruki YOKOYAMA[1], Hiromi TAKAHATA[1], Takuji ICHIYAMA[2], Tadahisa KIDO[2], Kota FURUYA[2], Tikaharu KONDA[1], Yuko UEDA[1], Issei OGASAWARA[1]
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In order to achieve higher performance, injury or illness prevention, and safe and quick return-to-play after injury or illness in sports, Cyber Sports Complex (CSC) for sports has been investigated and developed towards and beyond 2020 Tokyo Olympic and Paralympic Games. In collaboration with coaches, players, medical staff and researchers in JISS/NTC, universities and industries, novel IoT wearable sensor devices with wireless transmitter were applied to tennis players to evaluate players’ physical activity and heart rate and these data were uploaded to the cloud computing server and analyzed. Analyzed results were then downloaded to monitor players’ physical and cardio-function.

The CPS for sports is expected to open the window for further applications in health promotion globally in Society 5.0 project.

[2]

Efforts to prevent sports injuries in Japan Soft Tennis Association

Masahiko MORISHIGE

Japan Soft Tennis Association

Soft tennis is a sport which originated in Japan after regular tennis was introduced to Japan in 1880 and has been played since 1884 using rubber balls unique to Japan. Most of the rules are the same as for regular tennis, and there are both singles and doubles matches. The player who has won either four games first (in a 7-game match), or five games first (in a 9-game match) will be the winner of the match, and the duration of time for the match is usually shorter than that of the regular tennis. The unique qualities of the ball lead to the development of techniques different from those of regular tennis, which makes the match flow more tactical.

Japan boasts a soft tennis population of 540,000 and is promoting its international penetration together with South Korea and Taiwan. With the sport originating in Asia, it has not yet spread outside Asia, which means that unfortunately it has not become an Olympic sport.

Within Japan Soft Tennis Association, our medical team operates under the Board of Medical Science. Currently, there are 6 doctors who belong to our medical team: 3 orthopedics, 2 internal medicine, and 1 gynecology. The medical team also includes three nutritionists as well, and they actively support the nutrition of our athletes. The doctors of the team participate in the training camp for the national team and the understudy team at the beginning of the fiscal year and carry out the medical check in orthopaedics region and medicine gynecology region. The orthopedic medical check-up explores the current state of injuries and physical conditions, and shares methods for treatment with the trainers and players of each team.

Common sites of soft tennis injuries are ① lower back, ② shoulders, ③ elbows, and ④ foot joints. Ligament injuries of the foot joints can be the most serious failure. With the unique style of soft tennis, the players' roles are often divided into a back player, who hits a large number of balls near the baseline, and a forward player, who has few chances to hit a ball near the net but needs a wider range of techniques. Back players, who hit more balls have a higher rate of hand injuries. It was suspected that forward players, who have more overhead movements, would have a higher rate of shoulder joint injuries, but there was no difference between forward and back players. In regular tennis, the injury rate is higher in men or no gender difference, but in soft tennis, women are more likely to be injured.

The efforts to prevent sports injuries in our medical team is to carry out the guidance which relieve the tightness of the upper and lower limbs of the athletes in cooperation with the trainer team. During the medical check, an increase in range of shoulder external rotation and a decrease in the range of shoulder internal rotation were observed in the upper limbs, showing a tendency similar to that of baseball players. In the future, based on the knowledge obtained by the national team, the

approach to prevent sports injuries will be enlightened through the Japan Soft Tennis Association website and instructor seminars.

As a new approach, ultrasound scanning has been introduced in a part of medical check since this fiscal year. The condition of the ligament of the foot joint is to be evaluated in this fiscal year, and the attention will be payed to the foot joint ligament damage which is easy to become serious. We hope to establish the medical examination by ultrasound scanning in the future.

Injury prevention efforts in soft tennis are still quite lagging, in part because there are few examples of serious injuries than in other sports. We would like to improve the environment surrounding soft tennis players by referring to other sports.

[3]

Approach and problem of injury prevention in Japan Table Tennis Association

Hiroyoshi OGASA

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Table tennis is generally a safe sport, while shoulder disorders are often recognized by high-level athletes. Furthermore, the obstacles to be noted in table tennis differ depending on the age and the level of competition.

Japan Table Tennis Association (JTTA) established a national team of elementary school players from 2001 with the development of young players as an important issue for competency improvement. In recent years, most of the elite athletes in table tennis have started playing before entering elementary school. As a result, there are many elementary school players who have not only acute trauma but also chronic injuries. These players are likely to have deteriorated their symptoms and not be able to practice satisfactorily after becoming junior high school or high school students, and table tennis in Japan may lose promising players in the future. Therefore, it is an important task to strengthen the competition that how quickly we find out the failure of promising players and do not make it worse, as there are many young talented athletes in the current Japan National Team.

In this presentation, we will introduce our efforts to prevent injuries that JTTA is conducting, and comment on the cases of frequently occurring obstacles and obstacles that we consider problematic.

1) Injury prevention activities in JTTA:
   a. Physical examination using ultrasound in elementary school players' training camp.
   b. Injury consultation and nutrition consultation at All Japan Championships.
2) Injuries to be emphasized by young players in table tennis competitions:
   a. Ankle sprain
   b. Foot and toe deformity
   c. Lumbar spondylolysis
   d. Osteochondritis Dissecans of the elbow

[4]

Injuries Registration and Prevention in Table Tennis

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The first step of any sports injuries prevention strategy-program is the data collection of injuries to identify the extend of the problem (injuries incidence, prevalence, severity...). A prospective data collection will provide precise information about injuries (mechanisms, aetiology, severity...) and the exposure (training sessions, competitions) which are very important for the injury's prevention program. A retrospective data collection is also important, but the exposure will be missing or can be estimated. During ITTF sports events, it is possible to collect data about previous acute injuries, acute injuries during the sports event and overuse injuries.

The rate and the severity of sports injuries (acute and overuse) are closely correlated with the athlete's performance. Table Tennis is a non-contact sport. Overuse injuries are more frequent than acute injuries. The severity of acute injuries is linked to the time loss. Most overuse injuries allow Table Tennis athletes continue training and competing with pain and dysfunction which may affect negatively their performance and aggravate the injury itself. A multidisciplinary team (medical staff, technical staff, sports scientists) will collaborate and elaborate an "injuries prevention program" according to the injuries data collection findings and Table Tennis physiological and biomechanical requirements. Common preventives measures will be implemented for all Table Tennis athletes and additional personal preventive exercises may be applied according to personal previous injuries and the findings of the clinical examination and the functional tests (imbalances, weaknesses, discrepancies, lack of range of motion, lack of flexibility…). Then the effectiveness of the preventive measures will be assessed and the "injuries prevention program" might be improved.

Keys words: table tennis, injuries, data collection, prevention.

[5]

Shoulder injuries in table tennis

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Table tennis is generally a safe sport with reported low injury incidence rate of 0%- 3% even at the highest (Olympic games) level (7). Shoulder injuries represent up to 20% of all injuries in table tennis players (5). This is an interesting finding considering that table tennis is not an overhead sport where shoulder injuries are frequent and well-studied. However, table tennis does require rapid forceful and extreme movements with high accelerations and decelerations that may result in certain shoulder adaptations that are known to increase risk for shoulder injury. Investigation of possible risk factors for shoulder injuries in table tennis players is therefore necessary to plan and implement effective preventive measures.

So far, several biomechanical studies have shown that shoulder internal rotation torque exerted by advanced players is significantly larger than that exerted by the intermediate players. Owing to a larger shoulder internal rotation torque, the advanced players transferred mechanical energy from the trunk of the body to the upper arm at a higher rate than the intermediate players could (2). It was also shown that the activation level of the shoulder external rotators is considerably high in the table tennis backhand regardless of the racket mass (3). Those studies have pointed that shoulder loading in table tennis is high, but there was no investigation of possible clinical correlation between shoulder load and shoulder injuries. Cross sectional studies have shown the existence of gleno-humeral internal rotation deficit (GIRD) in healthy table tennis players (4). GIRD is a well-known risk factor for shoulder impingement syndrome in other sports (1) but prospective cohort studies are needed to explain its role in table tennis. One of the latest studies has investigated the EMG activity of shoulder and scapular muscles in table tennis players with and without shoulder impingement(6). The results indicated that the activity levels of the serratus anterior and supraspinatus muscles significantly decreased; however, the activity level of the upper trapezius significantly increased in the impingement compared with the healthy group. The serratus anterior was activated significantly later, but the upper trapezius was activated significantly earlier in the impingement group.

In conclusion, data about shoulder injuries in table tennis are still scarce and there is a need for multicentre prospective cohort studies to investigate possible intrinsic and extrinsic risk factors for shoulder injuries in table tennis.

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Research presentations & Activity reports

[1]

Logistic and multinomial regression approach; "forgotten" statistical analyses in identification of predictors of racket sport performance

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Identification of predictors of sport performance(s) is frequent problem in scientific papers within the field of sport science, even in racket sports. Logically, experts and scientists are often interested in evaluation of associations which may exist between certain predictive factors, and some specific criterion which explains characteristic sport-related performance (i.e. performance level, game achievement, final competitive result, number of successful shoots, result on relay). However, even when authors successfully explain the criterion variable (the outcome), the question which arises is; which of the studied predictors is "the best" determinant of the measured outcome? Conventional and mostly used statistical procedures such as linear correlation, univariate or multivariate regressions, and/or different models of analysis of variance allows one to identify the "predictive validity" of the observed predictors, but rarely highlight the "relative validity" for each of the studied predictors. On the other hand, biomedical and public health studies elegantly use logistic- and multinomial-regression analyses which allow clear and effective identification not only of the "predictive validity", but also "applicability" of the studied predictors in identification of the final result on outcome variable. What is also intriguing, these statistical procedures are often used even in sport science journals, but almost exclusively in studies where authors explain certain "medical outcomes" (i.e. injury occurrence, doping behavior, dietary supplement use). Indeed, sport performance(s) as an outcome are in most cases expressed in specific values (i.e. seconds, scores, number of points) which rarely fulfil the most necessary prerequisite for logistic and multinomial regression calculations. In other words, sport performances are rarely presented "nominally" (i.e. Yes vs. No, Absence vs. Presence, Positive tendency – Neutral tendency – Negative tendency) which is the main requirement for usage of these statistical procedures. However, simple and convenient modifications of outcome variables allow one to adapt the criterion accordingly, and to exploit numerous benefits of these convenient statistical procedures. Herein, the applicability of logistic and multinomial regression analyses will be explained and presented using the "real sport" examples. Potential misinterpretations of the data will also be discussed. Finally, directions for future studies in the field of racket sports will be offered.

[2]

Evaluating Tactics Quantitatively in Competitive Table Tennis

Xiaopeng ZHANG

Chinese Table Tennis Association

Tactical effectiveness can be regarded as one of reasons of Chinese Table Tennis Team success in the Olympic Games and World Championships.

Analysis is acted as a premise to get tactical applications better, by which the development of training for the athletes can be mastered for the improvement of their performance.

Literature, investigation, statistics, experiments and logics were used in the paper. Some ways to diagnose table tennis tactics were given for the service to the Chinese Table Tennis Team. The followings are the results of this paper.

1. On the basis of practice, an idea for the tactics was given that consistent actions are in use with placement, rhythm, position for the sake of the constrain of rivals.

2. Time and space, attack and defense and positive and passive were classified in the viewpoint for the diagnosis of tactics.

3. Under the principles of diagnosis, a model of tactical diagnosis was built for the guiding of the operation in practice including concerning ball's games.

4. The methods for the diagnosis on tactics in this paper were proven feasibly in the service for preparation of the Chinese Table Tennis Team for Olympic Games and the World Championships.

5. Competitive ability affected by the new rules has been studied in support of searching for winning strategy being used by Chinese Table Tennis Team in the world competitions.

6. The idea and ways regarding the diagnosis used in this paper is characterized with dynamic process. With the change of competitions, it should be improved to the need of training aiming to getting the better strategy for the Chinese Table Tennis Team and others.

[3]

Data Analytics in Table Tennis with Interactive visualisation

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With more and more science and technology permeating sports, Notational Analysis is an empirical method that collects objective data, analyses player's performance and helps coaches to work on specificities. Franks and Millers, during research (in 1986,1991), stated that post a match, coaches can recollect only 30% of the key factors that determine performance. Thus, capturing objective data and analyzing a match plays a pivotal role in determining an athlete's performance.

The aim of this presentation is to explain how advance data analytics is applied to notation analysis for creating "in-depth match analysis" solution and "athlete profiling". The in-depth "match analysis" solution, delves into every minuscule aspect of an athlete's performance, be it technical or tactical. Many matches have been analyzed for amateur and professional athletes from India, Junior & youth primarily during this study. The results from this match analysis were remarkable and the feedback from coaches was very encouraging. Further, a collection of the large set of athlete's data converges to "athlete profiling" that asserts trends, track patterns, errors and progress. This helps coaches in understanding the profound mistakes and anomalies of the players and planning a very specific training program accordingly. Additionally, player's reviews were also captured post their matches to substantiate discrepancies, if any. It is not strange but interesting that 80% of the players had presumptions about their performance that don't conform with match analysis. Such disparities clearly depict a strong role of in-depth match analysis and athlete profiling in redressing player's presumptions and apprehensions.

Of course, the real value of notational analysis is not only in being able to measure performance but in delivering a blueprint to develop a specific training plan with a clear roadmap. Unlike traditional coaching, it is indispensable in assisting coaches and players in developing measurable improvements in their game skills.

Keywords: Notational Analysis, Match analysis, Table Tennis analysis, Racket sports analytics, Athlete Profiling.

[4]

Exploration of early performance advantages in youth table tennis

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Many governments and national sports association developed talent identification and development programs to keep up with the global medal race. These talent programs intend to find and support young players aiming for the elite level. Generally, the government and associations try to build an effective, but also efficient program as the scarce (financial) resources can only be used once. For that reason, efforts are put into the adequate estimation of a young player's potential for the elite level. Latent bias for talent identification i.e. selection procedures for the talent programs should be diminished. Factors that can cause an advantage in the early development of players might cause this bias. Examples of early advantages proposed in various sports are: early growth and maturation (Malina et al., 2005; Silva et al., 2010), being relatively older (Musch & Grondin, 2001; Wattie et al., 2015), have more (quantity) and better (quality) experiences (i.e. training and competition) (Faber, 2016), left handedness (Loffing et al., 2012) and an early more supportive and competitive environment (Côté et al., 2006; Schorer et al., 2010).

Up till now, we can only speculate to which extent these factors influence a player's performance at a young age and bias the estimation of a player's potential in youth table tennis. For that reason, this study explored the associations between these factors and 1.) the players' current and future table tennis performance levels and 2.) the player's motor skills level. The latter is suggested to reflect a player's potential regarding the motor domain.

Data was collected at the Dutch national talent days from 2010-2015 and included: birthdate, sex, standing height, weight, sitting height, handedness, club, department, training volume, current training hours and the qualification of the trainers. Moreover, all participants were tested by means of a motor skills assessment for gross motor function and ball control during the national talent day. Finally, table tennis performance rating scores were collected from the online open access archives of the Netherlands Table Tennis Association. First results will be presented during the conference.

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[5]

Efficiency of the shockwave therapy in reducing pain of cervicalgia

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The increasing frequency of people with cervical pain, irradiation at the level of the neck, upper limb, shoulder blade and often accompanied by paresthesia in the arm, forearm, hand and even motor deficit, determine us to use the most efficient techniques, methods and therapeutic means for relaxing the contracted muscle groups, restoring cervical lordosis restoring the muscular balance and implicitly for reducing the pain. Table tennis players by their specific position, by their displacements and the high number of executions in the time frame spent at the playing table, are predisposed to early appearance or after they finish their performance activity, to cervical pain.

The hypothesis from which we left was to investigate to what extent shockwave therapy applied to the contracted muscles of the neck can contribute to the reduction and disappearance of cervical pain. Shockwave is a new technology that uses shock waves for the treatment of chronic pain in the musculoskeletal system. Shockwave is based on generating very intense energy in a very short time (10 milliseconds), the shock wave streaming the tissues at a speed higher than the speed of sound.

The study was conducted on 18 subjects, former table tennis players aged 35-60 years, diagnosed with cervicalgia of various causes: rectitude, cervical spine, cervical arthritis, etc. Subjects were divided into 2 groups; an experimental group of 9 patients using shockwave therapy to relaxing tense and painful muscles from the scruff (upper trapezium, middle trapezium, rhomboid, paravertebral) and a control group to which classical therapy was applied using the TENS current and ultrasound. The study was conducted over a period of 4 months at a private physiotherapy clinic and each patient received 10 therapy sessions. For evaluation we use, the visual assessment of the spine (frontal and sagital), VAS scale for measuring pain intensity (values 0-10, where 0 = absence of pain and 10 = maximum pain) palpation for detection of muscle contractions and pain irradiation, presence of paresthesias, cervical spine radiograph (sagittal and front open mouth) as well as scanning the cervical area using the hand-scanner.

The results show a pain decrease on the subjects who used shockwave therapy at values of 2 and 3, which is a reduction of pain until mild discomfort, while in the control group where the TENS current and ultrasound were applied, pain stagnated at values of 4 and 5. That represents a decrease of pain intensity by 20% higher in the experimental group compared to the control group. In conclusion, shockwave therapy has a high efficiency in reducing muscle contractions, restoring agonist/antagonist muscular balance, significant pain relief as well as cervical

lordosis recovery. By reducing muscle contractions, cervical rectal correction is improved, posture improves, and irreducible hernias are prevented.

Keywords: recovery, cervical spine, muscle contraction, mobility, muscle balance

[6]

Lower limb biomechanical effects of two performance levels during cross step

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As a social activity, table tennis has become one of the most popular sports with over 300 million adherents in the world. The agile footwork is a basic but important skill, how to efficiently grasp and improve its performance has always interested coaches and athletes, beginners particularly. The purpose of this study was to investigate the differences in kinetics and kinematics of the cross step between professional players (PP) and novice trainees (NT) using the Oxford Foot Model (OFM). 22 male participants (professional player, 11; novice trainee, 11) with dominant right feet participated in the table tennis cross step test. A Vicon motion analysis system and a Novel Pedar insole plantar pressure measurement system were used to record kinematic and kinetic data, respectively. Professional athletes showed significantly smaller forefoot plantarflexion and abduction, but larger hallux dorsiflexion at the cross step ending. In addition, they also showed significantly larger forefoot dorsiflexion and adduction but smaller forefoot eversion as well as rearfoot inversion than the novice trainees at the forward-end of the step. Compared with the novice trainees, professional athletes showed higher peak pressure under the medial and lateral rearfoot with faster angle change rate during the chasse step phase. Greater peak pressures were also recorded for professional athletes in the other toes and lateral forefoot during the forward swing phase. In the entire motion, professional athletes performed significantly smaller joints range of motion (ROM), especially the hindfoot with respect to tibia angles. Concerning plantar relative load, professional athletes were significantly greater than that of novice trainees in the other toes, lateral forefoot and rear foot. Professional athletes possessed higher footwork agility and greater foot motor technique. The findings on the internal mechanisms of the cross step could help coaches and novice trainees understand the mechanical efficiencies in stroke finishing leading to improvements in performance.

Keywords: Oxford Foot Model, footwork, kinematic chain, internal mechanisms

[7]

Speed and Spin Differences between the Old Celluloid versus New Plastic Table Tennis Balls and the Impact on the Responses of Elite versus Sub-Elite Players

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This study measured the 1) speed and spin differences between the old celluloid versus new plastic table tennis balls at three time-points; (i) exit from machine (ii) pre and (iii) post ball-table impact; when projected with topspin at 7.56m/s, and investigated 2) the effect this has on the kinematic responses of 5 elite versus 5 sub-elite players' forehand drive in response to topspin and backspin. Plastic was slower in both speed and spin post flight at pre ball-table impact, and at post ball-table impact compared with celluloid balls. Furthermore, the magnitude of change in speed and spin for each ball material differed between the two time-points. Post flight, plastic balls lost 3.98% more speed and 1.24% more spin than celluloid balls. Post ball-table impact, the speed increment and spin decrement were similar for both ball materials. Kinematic differences in response to the different ball materials were found only when players returned backspin shots. Players supinated their racket more by 2.23% at ball-racket contact and produced 3.37% less ball spin when returning plastic compared with celluloid balls; an indication of early adaptation to the lower spin rate of plastic balls by supinating the racket face more to impart greater horizontal velocity. The lack of movement difference in response to topspin may be due to the similar kinematic change of both balls at ball-table impact. Changes in ball kinematics at ball-table impact may evoke more differences in movement responses from the players and could be explored in future studies.

[8]

A Study of the Development Trend of PTT from Rome 1960 to Tokyo 2020 - "Strengths and opportunities"

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This sport began its trend of development with 35 athletes (20 men & 15 women) from 10 countries in 11 Medal Events along with 8 other disciplines at the first Paralympic Games in Rome 1960, being one of the original eight sports. And now, after about 60 years, in Tokyo 2020, Para Table Tennis with 280 athletes and 31 medal events is going to display the third biggest representation (after Athletics & Swimming) among the 22 participating sports, which is a significant turning point for Table Tennis in general and for PTT in particular.

The data of this study was gathered through library research, magazines & periodicals, websites, and some other research papers. The purpose of this study was to find out the challenges and problems that have led PTT to receive little attention from the researchers and scholars, while PTT entered the events at the highest levels 30 years ahead of Olympic Table Tennis.

PTT involves many important issues and variables such as different disability groups, the large population of athletes and players, medal events, classifications (11 classes for men and women), class specifications, tactical & technical requirements, special equipment, prostheses & sports medicine, etc. All these subjects can provide abundant scientific research projects to invite scholars to this field. It is worth to mention that PTT athletes, for a variety of reasons, are eligible to benefit comprehensive humanitarian supports, especially in the areas of scientific research.

Considering the strengths and opportunities that exist in PTT for research, I suggest devising research strategies and defining PTT as an important issue can boost the scientific development of this field to a considerable extent.

Keywords: PTT, strengths, opportunities, scientific challenges

[9]

Growing popularity of table tennis in Malaysia: Approach and Way Forward

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Table Tennis Association of Malaysia

Table tennis is one of the most popular racquet sports in the world and ranked second overall in terms of participation. The number of Table Tennis followers on social media platforms has increased about to 3,131,741 in January 2019 from 2,458,800 in 2018. As the popularity of table tennis sport is spreading all around the world. Table tennis gains most popularity in China, *reported 83 million people play table-tennis regularly (at least two times per week).*

However, Table tennis in Malaysia is not yet popular enough to be a full-blown professional sport. Hence, the objective of this study is to explore the possible approaches to grow the popularity of table tennis in Malaysia. Qualitative interview method was conducted with experts (sport officer/administrator, sport marketer, players and etc.) *to explore their experiences and views on how to grow popularity of table tennis in Malaysia.* The presentation will review the suggested approaches.

Poster presentations

[1]

Game Analysis supporting by AI in Table Tennis

Minoru MASTUMOTO[1], Hiroki OZAKI[1], Yuki INABA[1], Shuji KIDOKORO[1], Miho TAKAHASHI[1], Kazuto YOSHIDA[2], Koshi YAMADA[3]

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[2]

Impact characteristics of three different topspin forehands in Japan elite table tennis players

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[3]

Exploring method of forming goal setting frame in table tennis world tour

Mizushima SADAYUKI

Japan Table Tennis Association

1. Background and Purpose

Psychological support activity during a game (World Tour, Junior circuit, and international Championships...), that have been carrying out by JTTA, is rare activity in the world of table tennis. Even CHINA Team, no.1 Team of the world, currently takes alone some professionals of strength & conditioning, but not professional of psychological support. In order to be no.1 of the world instead of CHINA Team 10 years later, one of way JTTA can choice is making the psychological support activity into more superior and unique activity in the world.

Mizushima (2019) explored activity principles of psychological support during a game through a case study "Psychological support for TEAM JAPAN in world junior table tennis championships". I discovered one of activity principles of psychological support during a game as follow.

① making goal setting frame
② supporting basic of table tennis
③ watching over the whole of TEAM JAPAN

We need hereafter developing contents of the principles by piling up case studies and finding out high effectiveness points. Therefore, purpose of this case study is to explore method of forming goal setting frame in table tennis World Tour about "① making goal setting frame".

2. Method

In a certain year, professional of psychological support (=author) went to 4 continuous World Tour with TEAM JAPAN. I will show some support cases of the 4 continuous World Tour about who was appraised by National Team coach that the player's game contents become better than before certainly or that the player showed his/her real ability satisfyingly in the games, and I will reveal method of forming goal setting frame for them through the cases.

Keywords: psychological support, goal setting frame, table tennis world tour

Reference:

Mizushima (2019), A Case Study: Psychological support for TEAM JAPAN in world junior table tennis championships -Exploring activity principles of psychological support during a game-, poster presentation at 16th ITTF Sports Science Congress in Hungary Budapest, 2019

[4]

Outcomes and challenges of scientific research on table tennis in The JTTA Sports Science and Medicine Committee International Meeting (2014-2019): Categorising past and present and research results, and returning research outcomes to enhance athletic and competitive capabilities

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This study aimed to trace the footsteps of researchers who have engaged in the scientific study of table tennis with reference to the on table tennis in JTTA Sports Science and Medicine Committee International Meeting(2014-2019), to learn what types of studies have been carried out, and what sorts of outcomes were produced; and, by so doing, identify the outcomes and future tasks/challenges. The fields of study conducted at international meetings by the International Table Tennis Federation's Sport Science Committee which began during the 1990s included (1) physiological and physical ability studies, (2) biomechanical studies, (3) research pertaining to psychological support, (4) kinematic and coaching science studies, (4) a study on supporting athletes' nutritional intake and its improvement, and (5) surveys and research on athletes' sports injuries and their prevention. The subsequent progress of these studies led to the development of a scientific method of analysing the actions and movements of athletes during play and gaining a quantitative understanding of the skills and level of physical activity in actual game-playing situations. They later expanded to cover a broad range of topics such as (1) scientific analysis of various elements that led to the development of balls, rackets and other equipment, (2) records of sport physicians accompanying the players in away games, and reports of medical prescriptions issued, (3) mental training and conditioning, and (4) the formulation of guidelines to serve as a model for the athletes' ideal nutritional intake. In overviewing such research trends as these, we feel that

attempting to categorise its outcomes (perform, watch, support, and learn) will likely lead to considering returning research outcomes that will enhance athletic and competitive capabilities, and to broadly disseminate such outcomes to society. We therefore feel that this will clarify research tasks and challenges even further.

The following items, A through D, may be considered the criteria for categorisation.

Category A: An Table Tennis athlete engaging in a sport

A-1: Development and innovation of the athlete's skills, and development of facilities and equipment

A-2: Athletes' tactics, and the thoughts and methods of analysis concerning such tactics

A-3: The current status of athletes' physical strength and composition (including the current state and challenges concerning nutritional intake) and measures to raise them to optimal levels

Category B: Watching Table Tennis Play and analysing videos

B-1: Observation of games and development of analytical methods

B-2: Development of shooting and recording methods, and development of simulations and analytical methods

B-3: Methods of video-viewing and developing 3-D models

Category C: Assisting Table Tennis athletes

C-1: Coaching and mental support

C-2: Taking along staff members and provision of medical support

C-3: Physical and nutritional intake support

Category D: Items related to knowledge and education/awareness-raising on Table Tennis

D-1: Education/raising of awareness relating to knowledge of scientific research

D-2: Integrity and anti-doping activities related to strengthening the athletes, as well as development of suitable teaching and educational materials

D-3: Disclosure and gathering of information

Categorisation leads to actualization of the general significance of research and research outcomes. Research tasks and challenges facing us in the near future are also clarified. We can say that, because researchers who carry out studies publicly funded by the Japan Table Tennis Association are held accountable for explaining the outcomes of such research, they are called on to remain aware of these responsibilities.

[5]

Effect of change in ball material from celluloid to plastic on the rotational speed of table tennis service for elite players in actual competitions

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Since 2014 plastic balls have been used instead of celluloid balls at major table tennis tournaments. This study examined the effect of the change in ball material on the rotation speed of services for elite players in actual table tennis competitions.

Ball services were recorded at the All Japan Table Tennis Championships venue (Tokyo Gymnasium) held every January, in 2013, 2014 and 2015. Since 2015 plastic balls have been used in the championships. A high-speed video camera and a standard video camera were used for recording. The high-speed video camera was for the calculation of rotation speed, the frame rate was 1200 fps, the exposure time was 400 - 830.75 μs, and the image size was 640 × 480 pixels. The standard video camera (30 fps) was for distinguishing players and aces (including ones touched by the receiver). The objects of the analysis were services that were recorded by both the high-speed video camera and the standard video camera. The rotation speed of each service was calculated by measuring the number of frames during one rotation of the mark on the ball from the first hit of the server to the first bounce on the server's court in the images captured by the high-speed video camera.

In the three championships, the rotation speeds of 1144 services (617 for men and 527 for women) were calculated. There was no significant difference in the average rotation speed of the table tennis services in the All Japan Championships before and after the adaption of plastic balls ($p > .05$). At this meeting, the evaluation of the ball material change will be considered, based on the data of this study and other research results.

Key words

Ball material change, rotation speed of service, All Japan Table Tennis Championships

[6]

Ball speed and shot intervals in a table tennis match: a case study

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Introduction Ball speed and shot intervals are essential factors to score in a match of table tennis. The playing area of table tennis is smaller than many other sports and players are required quick reaction to return a ball within a small amount of time. High ball speed and short shot intervals are effective to make opponents fail to return a ball. It is common for table tennis players to practice hitting a fast shot or returning a ball at closer position from the opponent's court because they know the importance of ball speed and short intervals. While the importance of ball speed and shot intervals is commonly known, the exact number of ball speed and shot intervals were unknown because of the difficulty in three-dimensional measurement of a table tennis bal. The biggest reason why the measurement is unavailable in many cases is enormous time required to digitize the position of a ball in every single frame in a match. It is conventionally impossible to analyze a lot of matches because of time-consuming issues. Although many people understand the importance of ball speed and shot intervals, it is difficult to know them in quantitative way. Three-dimensional measurement can become easier if some automatic ball tracking technologies are available. In some sports, there are automatic ball tracking system practically used in competitions. For example, Hawk-eye, which is a vision-based system that tracks a ball and reconstructs three-dimensional trajectory of a ball, assists officials on line calls or deliver insights of world class tennis to tennis fans. Although a system that tracks a table tennis ball is not available for now, the authors developed an automatic computer program which tracks a table tennis ball using a machine learning technology (Tamaki, 2019). Three-dimensional measurement of table tennis becomes possible by using the developed program. In this presentation, we show the very first results of the fact of ball speed and shot intervals in a table tennis match.

Method Data sources A match of men's singles of All Japan table tennis championships 2018 was analyzed in this research. The match was recorded with three cameras at the venue. The resolution and frame rate of the cameras were 1920 x 1080, 120 fps respectively. Data collection Three-dimensional coordinates of a ball then calculated with triangulation. First, Projection matrix of each camera was calculated with 40 control points around placed the table. Next, the coordinates of a ball in image space were automatically measured by the developed program (Tamaki, 2019). Finally, three-dimensional coordinates of a ball were then calculated with triangulation. OpenCV, a library for computer vision, was used for the calibration and the triangulation. The origin of the coordinate system was a corner of the table. The x, y, and z axis of the coordinate system were end-line direction, side-line direction, and the direction of normal vector of the table plane respectively. Data Analysis

Three-dimensional trajectories of a ball were quadratically reconstructed by the least square method. The trajectories were separated at a collision, between a ball and a racket or a table, because the abrupt change in traveling direction around the collisions cannot be expressed quadratically. Velocity of a ball was used to detect collisions in trajectory, change in sign of the y-element of the velocity as hitting and change in sign of the z-element of the velocity from minus to plus as rebounding.

Results will be shown in the poster presentation.

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Sho Tamaki, "Tracking a table tennis ball using AdaBoost: a case study", 16th ITTF Sports Science Congress, 2019.

[7]

Recent Treatments of Ingrown Nails and Pincer Nails

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Abstract

Many patients visit a clinic of Dermatology complaining of feet disorder, especially ingrown nails or curved nails. Many athletes also suffer from these diseases. In these 15 years, treatments of Ingrown nails have been developed. Old fashioned treatments have been popular since more than 30 years before.

Of course, a daily care of ingrown nails is very important such as lifting the ingrowing nail edge and place cotton to reduce the pressure of the nails. And the most popular treatment by doctors who don't majored in Dermatology is to trim or remove the ingrown portion of the nail. But, in some case, this cut therapy will bring worse result.

In the initial stage, a treatment with acrylic affixed gutter splints is the first choice. But if patients have the problem repeatedly on the same toe, removing a portion of the nail along with the underlying tissue (nail bed) is one of the most recommended treatment. This procedure may prevent that part of your nail from growing back. The most popular treatment now in Japan is to straighten the ingrown nail by using shape memory wire (memory alloy nail braces). In addition, plastic plates are also available tools attaching the surface of the nail to brace and straighten.

In this presentation, I show the methods of these treatments and present the advantages and disadvantages in each treatment.

[8]

Effect of muscle mechanical properties on the lower limb muscle activation during table tennis backhand drives

Yoichi IINO

Japan Table Tennis Association

Introduction

Table tennis players are recommended to incorporate weight training into their conditioning programs. The maximum isometric force and the maximum contraction velocity of the muscle are the parameters that one can improve by strength training. When the muscle activation needed for a movement is lower, one can perform the movement effortlessly. Thus, the purpose of this study was to determine the amounts of reduction in the total lower limb activations by increasing both parameters of the lower limb muscle groups.

Methods

Participants were eight advanced male collegiate players. The task of the participants was to hit cross-court backhand drives against backspin balls at maximum effort. A twelve-camera motion capture system was used to collect 3D positions of the markers attached to the body surface. Ground reaction forces were recorded using two force plates.

Lower limb muscle activations during the backhand drives were estimated using Static Optimization Tool of OpenSim software. The model published by (Lai, Arnold, & Wakeling, 2017) was modified such that the knee joint has two additional degrees of freedom; abduction/adduction and internal/external rotation. Furthermore, we created the models in which the maximum isometric force and the maximum contraction velocity of the lower limb muscle groups were changed by ± 10% of the reference values. We estimated muscle activations of the lower limbs for those models and determined the percent changes of the total lower limb muscle activations.

Results & Discussion

An increase in the maximum isometric forces of the hip extensors and adductors by + 10% substantially reduced the total lower limb muscle activations. In contrast, the amounts of the reduction by increasing the maximum isometric forces of the ankle plantar-flexors and hip abductors were relatively small. Table tennis players may be recommended to prioritize improving the maximum strength of hip extensors and adductors than that of other lower limb muscles in strength training.

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List of the participants at 2019 annual JTTA SSMC and ITTF SSMC meeting

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22	Takeshi NISHIKAWA	Shizunai Dermatological Clinic
23	Takuro OKADA	Kameda Medical Center
24	Hiroki OZAKI	Japan Institute of Sports Sciences
25	Hiroaki SAKAKIBARA	University of Teacher Education Fukuoka
26	Sho TAMAKI	Meio University
27	Yutaka Tsuji	Emeritus professor of Osaka University
28	Yukihiko USHIYAMA	Niigata University
29	Koshi YAMADA	Japan Table Tennis Association

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12	Poon Soon CHEONG	National University of Malaysia, Malaysia
13	Sima LIMOCHI	Alzahra University, Department of Motor Behavior, Iran

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PART 2

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Photo gallery from the meetings

2014

Since the World Table Tennis Championship was due to be held in Tokyo in 2014, we decided to have an international scientific meeting just before the WTTC. The 1st meeting was held on 26th April, 2014.

JAPAN TABLE 2014

2015

We had a special program in 2015. High-speed Image Processing and Its Applications in Sports Science.
We had a demonstration capturing the rotation of the table tennis ball using a dynamic vision system.

2016

Another demonstration was carried out in 2016, too. Two young Japanese players assisted at our meeting. They hit balls and the presenter captured their rotation using Dynamic Image Control technology.

One of the young players is Tomokazu Harimoto. He was 13 years old and his WR was 74 at that time. The other is Miu HIRANO. She was 16 years old. Now, they are world top ranked players.

2017

In 2017 we invited David Cabello Manrique from the Badminton World Federation. He gave us a lecture about Sports Science Research in the BWF. The cooperation with researchers of other racket sports is very important.

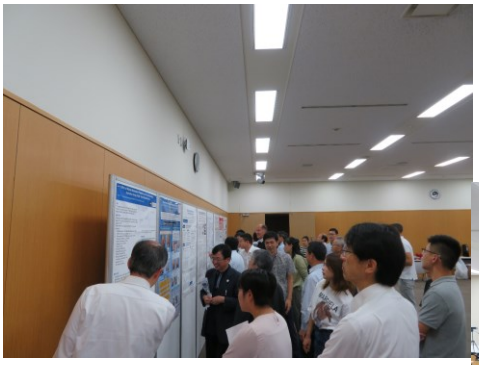
2018

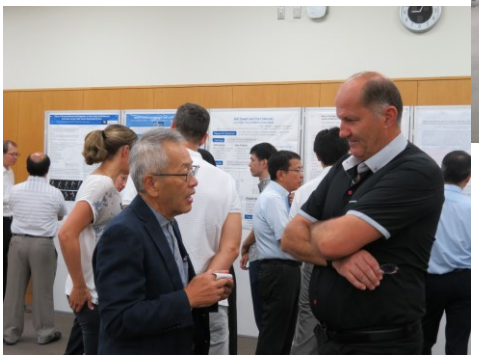
In 2018, we changed Japanese researchers' presentation style from oral to poster. As a result, they had more discussion time than previous years.

2019

ITTF SSMC Meeting

Sports Injury Symposium





Poster session

The JTTA presented a letter of thanks with the lacquer vase to Prof.Miran Kondric. The lacquer vase is a product of Narakawa village. Narakawa village is hometown of the former ITTF President Mr.Ogimura. We present this to our most important friend.

感謝状

ミラン　コンドリッチ殿

あなたはJTTA-ITTF国際会議の運営に多年にわたり尽力し、卓球のスポーツ医科学発展に寄与されました。
その貢献は多大です。
よってその功績を讃え記念品を贈りここに深く感謝の意を表します。

令和元年9月15日

公益財団法人日本卓球協会
会長　藤重　貞慶

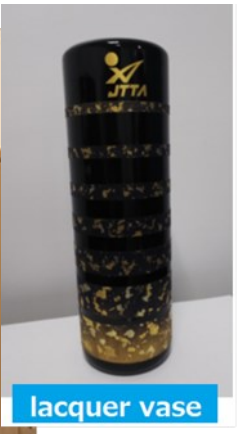
Certificate of Appreciation

Mr. Miran Kondric

We would like to express our heartfelt thanks to your active engagement in the organization of JTTA-ITTF International Meeting and contribution to the development of Sports Science and Medicine.
We hereby present this certificate in recognition to praise your achievement

Presented this 15th of September, 2019

Sadayoshi FUJISHIGE, President
Japan Table Tennis Association



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