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EDITORIAL

Welcome to issue 70 of the ITF Coaching and Sport Science Review, the final issue of 2016. In this issue, the topics range from; applying mindfulness into tennis performance, the benefits of working with sport psychology practitioners in a high-performance setting to concepts that tennis players and their support teams can utilise to gain successful sponsorship deals.

This issue follows the conclusion of another successful year in which the ITF Regional Coaches Conferences by BNP Paribas were held in: China, Colombia, Republic of South Africa, Mexico, Trinidad, Belgium, Iran and Algeria with support from Olympic Solidarity. The conferences received significant attendances of over 1100 coaches in total. A highlight across the conferences was the West and Central Asian Coaches Conference which saw a noteworthy 130 female coaches in attendance, a figure in which ITF President David Haggerty remarked was “very impressive”. This year’s Southern African and South American conferences successfully hosted an official conference app following well received feedback at the 2015 ITF Worldwide Coaches Conference by BNP Paribas.

In November, the ITF Development Officers met for a series of meetings at the ITF Headquarters in London to review the tennis activity in each respective region over the past 12 months and further plans for the upcoming year in line with the new ITF Development Strategy. During their week spent with the ITF Development Department, President Haggerty also presented his vision for the role of Development in the ITF 2024 strategy to a warmly received reaction from the Development Officers.

The ITF Junior Tennis Initiative (JTI) has had another successful year creating more opportunities for tennis participation across the globe. In 2016, the ITF distributed 5,260 rackets, 3,830 bats and 106,104 balls to more than 114 JTI nations. As of the end of August 2016, the Junior Tennis Initiative (based on 107 nations reporting) has:



- Engaged 1,291 Primary Schools and 1,337 tennis clubs delivering Tennis10s activity;
- Had 429,330 players taking part in Tennis10s, cumulatively;
- Had 2,703 14-and-under players training in a national high performance environment.

In 2016, Tennis iCoach has published more than 70 new resources for its worldwide members. Several presentations have been published from the 2015 ITF Worldwide Coaches Conference by BNP Paribas and 2016 LTA National Coaches Conference as well as tactical tutorial videos with footage from the professional tours, which have proven popular particularly across social media, and further contributions from international experts. You can view this content and register for Tennis iCoach membership [here](#).

We hope that you will value the information presented in this 70th edition of the ITF Coaching and Sport Science Review. We would like to thank all the authors for their contributions and those who sent proposals. We also hope that you will continue to make use of all the other coaching resources provided by the ITF which can be viewed on the ITF Coaching webpage.



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Mindfulness: Applications in tennis

Merlin Van de Braam (GBR) and Cian Aherne (IRL)

ITF Coaching and Sport Science Review 2016; 70 (24): 3 - 5

ABSTRACT

This article gives the reader an introduction to mindfulness, a way of 'being' that has been shown to have significant performance effects when translated to a sporting context. Well known for its application in tennis by world number one, Novak Djokovic, this article explores how coaches and players can begin to integrate mindfulness into their everyday lives and subsequently when performing on court.

Key words: Mindfulness, psychology, meditation, flow, performance

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INTRODUCTION

The practise of mindfulness has been used in the East for centuries as a form of meditation and was brought into Western culture in the past number of decades as part of treatments for clinical difficulties such as chronic pain, anxiety and depression. Mindfulness refers to an open-minded and nonjudgmental awareness of oneself and their environment (Aherne, Moran & Lonsdale, 2009). An individual practising mindfulness approaches everyday thoughts, feelings and behaviours with acceptance that they are naturally occurring events. The practice of mindfulness helps to let go of such events in order to focus on what is within their imminent field of action - the here and now.

In tennis terms, that can mean accepting the frustration we feel when we make an error or double fault at a key point for example. By accepting the feeling as normal and moving on in a non-judgemental way, the mistake (and subsequent reaction) have been left in the past and the player has a better ability to focus on the next shot or point. Another example may be accepting positive/negative thoughts about the end of the match (such as victory/defeat) but not getting caught up in such thoughts. Instead, one can notice these thoughts as a natural aspect of a competitive tournament season, take a breath and refocus on what can be done to improve (which is the only thing within one's control at that moment).

In recent years, mindfulness has also been used in a sports performance context as a method for helping athletes reach a state of flow and becoming more in tune with their physical performances. Eleven time NBA Championship winning coach, Phil 'Zen Master' Jackson, has spoken at length about the performance benefits of employing mindfulness practice. Current English Premiership and European Champions Cup winners, Saracens Rugby Club, have also taken on mindfulness as a worthwhile practice for their players. At an individual level, super-elite athletes such Lionel Messi (soccer), LeBron James (basketball) and Derek Jeter (baseball) are said to have extensive meditative practice as part of their daily routines.

Specifically related to tennis, world number one Novak Djokovic discussed openly in his book 'Serve to Win' that implementing mindfulness "is as important to me as my physical training" (Djokovic, 2013, p86).

While mindfulness is essentially a way of living, it can be developed and trained to be applicable in a sporting context. Specifically, mindfulness may be useful for dealing with intrusive thoughts, concentrating on the task at hand and being more aware of the different actions you are performing in the moment. To be mindful takes practice. Meditations that involve sitting or lying down and becoming aware of one's body are recommended for developing one's levels of present-moment awareness. Further useful exercises may incorporate mindful breathing, mindful walking or mindful yoga.

The feature film 'Peaceful Warrior' provides coaches and athletes with a useful representation of how mindfulness can be applied to sport performance. Here is a particularly relevant scene that conveys the essence of mindfulness and present-moment awareness.

HOW CAN I START INTEGRATING MINDFULNESS INTO MY DAY?

Here are a few key components of practicing mindfulness that key practitioners have identified, set in the context of tennis:

- At change of ends: Pay close attention to your breathing, especially when you're feeling intense emotions, nerves or frustration. Use the breath as an anchor to come out of your mind and into the body. Re-centre yourself on the present. Decide to accept the feelings you have, let them go, don't judge or rebuke yourself. Once you do this you will be able to smile and enjoy the situation you find yourself in - embrace the challenge.
- When about to serve: Notice - really notice - what you're sensing in a given moment, the texture of the court below you, the sound of the ball, and the smells that ordinarily slip by without reaching your conscious awareness.
- At match point up: Recognise that your thoughts and emotions are fleeting and do not define you. Accept they will happen and let them go. Having this insight can free you from negative thought patterns.
- When running a drill with your players: Tune into your body's physical sensations, from the cool breeze on your skin to the way your feet feel against the ground when you feed in a ball.

SITUATIONS WHERE MINDFULNESS CAN HAVE A POSITIVE IMPACT

For a coach - when dealing with a confrontational parent

When faced with a tense and difficult conversation with a parent, imagine a divider between the situation and yourself; give yourself space. This space provided will give you room to focus on your body and relax the areas that are tense or tight. Do this while staying present in the situation i.e. don't rush ahead and compose your





CONCLUSION

Mindfulness is a way of ‘being’ that has been shown to have significant performance effects when translated to a sporting context. Well known for its application in tennis and other sports, this article has summarised the key tenets and given some practical applications for coaches and players.

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response or argument, simply breathe and stay with the moment. Get out of your own head and listen intently to the parent while still keeping an eye on your body’s reactions. Accept the emotions you are feeling as normal. Take time with your response and be empathetic so as not to let the situation escalate. Indeed, evidence in prison settings suggests that mindfulness can reduce anger, hostility, and mood disturbances (Samuelson et. al, 2007) implying similar improvements in everyday settings for a tennis professional/coach who encounters situations of tension are certainly applicable.

For a player - when nervous before serving out a match

Focus on your breath (or any part of your body that you feel most natural to focus on). Use this focus to bring you back into the present. What is controllable for you? Your breath, this point, and how you are going to play it tactically. Focus on what is controllable and gently guide your attention back to this.

USEFUL REFERENCES FOR DEVELOPING MINDFULNESS SKILLS

As stated previously, mindfulness is a practice. That means that to be truly mindful, one must incorporate the practice into their daily routine. There are several free resources available online where audio material can be accessed for mindful breathing, mindful yoga and mindful body scan exercises. Jon Kabat Zinn’s work, in particular, has been applied to a variety of different settings and can be helpful in developing your practice.

Useful phone apps that offer mindfulness tutorials and quickly accessible audio material include “Headspace”, “Stop, Think & Breathe” and “Smiling Mind.”

Hard knocks: Concussion injuries in tennis

Alan J Pearce (AUS) and Janet A Young (AUS)

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ABSTRACT

Concussions in tennis are rare, but they do occur. As recent case reports have highlighted, players who sustain concussions in tennis can be affected for much longer than expected. This article, written for the coach, outlines the signs of concussion, concussion awareness in tennis, and the coach's role in mitigating risk and managing concussions in their players.

Key words: Concussion, Injury, Post concussion syndrome

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INTRODUCTION

Concussion in sport is a rapidly growing issue world-wide, not only in contact sports where concussion is now a major issue, but also in non-contact sports such as tennis. In contact sports, investigation of concussion has focussed on the long-term consequences of repeated head injuries during a professional athlete's career (Pearce et al., 2014). Concern has also been raised about players continuing or returning to play following impact to the head where the likelihood of further injury is significantly increased (Nordström et al., 2014).

Concussion and tennis are not normally words that would be used within the same sentence. Concussion rates in tennis are statistically negligible (Pluim et al., 2006). Recently however, several highly ranked players have been public with their struggles recovering from this injury, that we thought it was prudent to discuss concussion in tennis, particularly with regards to understanding what a concussion is, how to recognise the signs of concussion on the tennis court, when is a player ready to return to training and playing, and finally understand the issue of post-concussion syndrome.

Recognising the signs of concussion

Sports-related concussion constitutes approximately 20% of mild traumatic brain injury cases, which itself makes up nearly 80-90% of all traumatic brain injuries (Langlois et al., 2006). The consensus statement following the 4th International Conference on Concussion in Sport defined concussion as a brain injury involving pathophysiological processes induced by biomechanical forces (McCrory, Meeuwisse, Aubry, Cantu, Dvoák, et al., 2013). Table 1 illustrates key causes and warning signs of concussion.

Causes of concussion	Onset of symptoms	Noticeable symptoms
Direct impact to head (i.e. from tennis ball)	Immediate	Loss of consciousness only in 5-20% of cases (Finch et al., 2013; Meehan et al., 2010).
Head hitting hard surface (i.e. tripping during warm up or play)	Delayed – by minutes or sometimes by hours or days.	Headache; nausea, blurred vision, fatigue.
Indirect force to upper body causing whiplash action		Cognitive signs: loss in memory; confusion; ability to think; inability to focus. Motor signs: slowness in reaction; slurred speech; impaired balance.
		Descriptions: “...not quite right”, “...having my bell rung”, or “I couldn't see anything for a couple of seconds” (Ropper, 2008)

Table 1. Causes and noticeable signs of concussion (McCrory et al, 2013).



CONCUSSION IN TENNIS

Although rare, concussions in tennis players have occurred. Reports of players sustaining concussions indicate these are the result of falls, which is the most common reason for concussion injuries (Ropper, 2008). For example, Victoria Azarenka suffered concussion at the 2010 US Open when warming up and catching her foot at the bottom of her sweatpants. Azarenka went onto play her match but collapsed on court 30 minutes into the match. In the same year, British player Sarah Borwell was playing a doubles match when one of her opponents hit a smash impacting directly into Borwell's head (Myles, 2015). Feeling fine, Borwell continued to play, winning the match. However following the game symptoms appeared:

As soon as the adrenaline wore off I was a mess. I was feeling sick. I was dizzy, and my face swelled up on the left hand side... They monitored me for the evening, kept checking every hour and the next day, I had an MRI in San Francisco and they saw a bruise on my brain (Myles, 2015).

Despite the MRI findings, Borwell was told that she would be fine within seven days. Still feeling the effects of concussion (fatigued, photophobic and unsteady) Borwell continued to the next tournament and given a clearance that she could play. However, Borwell could not actually undertake any physical activity, finding difficulty in simple motor tasks such as walking straight and keeping her balance (Myles, 2015). It took nearly one year for Borwell's symptoms to dissipate. More recently Eugene Bouchard and Casey Dellacqua showed ongoing symptoms following their concussions after falls. Bouchard, falling in a change room accident, took over three months to recover from concussion (Henley, 2015). In October 2015 Dellacqua, falling on the court during a match in Beijing, missed the 2016 Australian summer season (Henley, 2015).

Importance of concussion awareness in tennis

In the USA, it is estimated that there are, per year, 1.6-3.8 million hospitalisations for sports- and recreation-related head injuries (Langlois et al., 2006). However, it is well known that sports

concussion is often unrecognized, downplayed or dismissed and therefore goes unreported to doctors or a hospital, with the true incidence of concussion being estimated at a factor of 6 to 10 times more than what is officially recorded (Langlois et al., 2006). Although concussions in tennis are unlikely, it is possible that some players could be hit in the head with a ball or fall during play. Therefore it is important for coaches to be aware of how concussion can occur, ways to assess a concussion, how to manage a concussion, and to also be aware of the signs of post-concussion syndrome or PCS (as highlighted in the examples of PCS with Borwell, Dellacqua, and Bouchard).

In contact sports, concussions can occur following a direct hit to the head, but this is not always the case with many concussions occurring from a violent bump or check to the upper body that can cause a whiplash action of the head (front to back, or side to side). However for tennis, concussions are likely to occur following a direct hit to the head (from either a tennis ball or head hitting the ground after falling). If a player is suspected of a concussion, they should be assessed using the Sports Concussion Assessment Tool-Version 3 (SCAT-3) by the tournament doctor (McCrory, Meeuwisse, Aubry, Cantu, Dvořák, et al., 2013). The SCAT-3 comprises of eight sections covering symptom evaluation, cognitive and working memory evaluation, neck, balance and upper limb examination (for further information regarding the SCAT-3 the reader is referred to McCrory et al (2013).

Current guidelines regarding the management of concussion, at present, suggest physical and cognitive rest should be prescribed until the acute symptoms resolve (McCrory et al., 2013). However data is limited on the efficacy of complete rest after concussion, with some researchers questioning if rest is the best possible treatment (DiFazio et al., 2015). However there is consensus with regards to the suitability for individuals in returning to training and play, via a graded program of physical exertion, each stage completed without symptom present, required prior to medical clearance (McCrory et al., 2013).

For a small number of individuals, concussion symptoms may not resolve. The cases of Borwell, Dellacqua, and Bouchard demonstrate that post-concussion syndrome (PCS) is a serious issue that can affect a player's career. In particular, the cases of Borwell and Bouchard highlight the importance of return-to-play guidelines prior to returning to the court, with both players passing concussion assessments, yet were unable to play competitively. Table 2 lists the common symptoms of PCS that coaches can be aware of, the timeline that PCS can last for, and potential treatment options that can be prescribed by a medical practitioner or clinical psychologist.

Symptoms reported	Duration of symptoms (20% of those following concussion)	Treatment options
<ul style="list-style-type: none"> • Headaches • Dizziness • Fatigue (inability to exercise) • Irritability • Unable to concentrate • Visual disturbances • Memory impairment • Sensitivity to noise • Depression and anxiety 	<ul style="list-style-type: none"> • Weeks to months • Sometimes up to year 	<ul style="list-style-type: none"> • Medication • Psychological support • Cognitive-restructuring

Table 2. Characteristics of post-concussion syndrome

Tennis coach's role in concussion awareness

Coaches can play a significant role in mitigating risk of concussions in their players (Table 3). Firstly, coaches must be aware of their own knowledge limitations in this complex neurological condition; conversely, coaches must also be aware that their duty of care is enormous, given the potential of time lost for players to train and compete following a concussion injury.

It should also be noted that males and females can differ greatly in their symptomatic presentation, but as noted by Brown et al. (2015) differences can be explained by normal hormonal changes associated with the menstrual cycle. Conversely, it has been suggested that concussion symptoms can be downplayed by males (Sanderson et al., 2016). However, coaches should be aware of other coaches' attitudes towards concussion as many continue to underplay the potential seriousness of this injury (Caron et al., 2015).

Education	Training	Competition
First aid accreditation updated	Clear courts of hazards (eg hose removed from back of court; balls cleared away and not left on court)	Responsibilities could include ensuring and overseeing: <ul style="list-style-type: none"> • Match conditions are safe for players • Venue and its facilities are safe for all on site This necessitates that Occupational and Health Safety policies for the match venue are up-to-date and implemented. Tournament personnel may need to be trained and briefed.
Concussion awareness education (part of professional development)	Ensuring change rooms and general facilities/areas are free of hazards (e.g., slippery and/or uneven surfaces)	Coaches should have open discussions with their players about the risk of concussion and how to best respond to any such incident, erring on the side of caution and reporting it immediately. Physical well-being should never be compromised ahead of 'winning'.
	Phone access for medical emergencies	
	Knowing and implementing return-to-training protocols through graduated increase in physical activity	

Table 3. Implications for coaches in mitigating concussion injuries.

CONCLUSION

Although concussion in tennis is rare, injuries have been documented in players with disturbing results. When medical professionals are not available, coaches should be concussion aware, given the current culture of players to 'underplay' the potential seriousness of their injury. Sideline concussion assessments are available and can assist in the evaluation of a player's injury and determination to return to play. However, further case studies detailing concussions during tournament play will assist with awareness of the issue.



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Working with sport psychologists

Alistair Higham (GBR) and Julie Blackwood (GBR)

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ABSTRACT

In this joint article, Alistair Higham examines the benefits and challenges for coaches of working with sport psychologists and introduces how he worked with Sport Psychologist Julie Blackwood in the lead up to the World University Games in South Korea last year, where GB won a Gold and a Silver medal. Julie then recounts her work in more detail to offer further insight into some of the ways in which coaches can work effectively with sport psychologists.

Key words: Sport Psychologist, team culture, remote support

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INTRODUCTION

It's all in the mind. Decision-making, creativity, expectation, pressure, concentration, emotional control ... I could go on. In fact, I will: winning ugly, raising your game, determination, perseverance, seeing an opportunity, varying your tactics, relaxing, remaining positive ... it's all in the mind. Well, where else would it be?

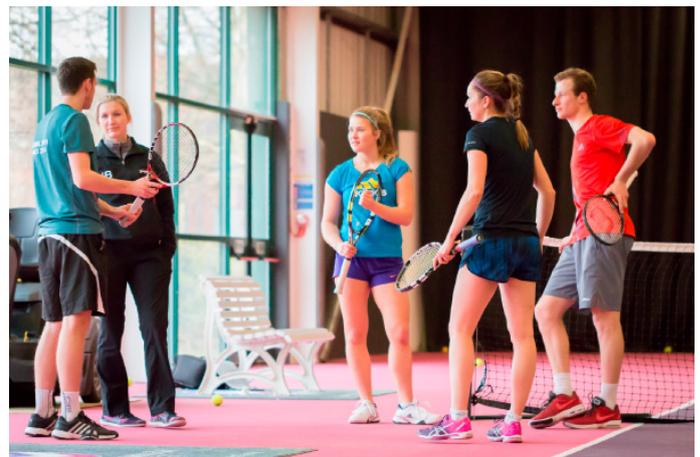
I think most coaches recognise the vital role the mind plays in winning tennis matches. Many things we say as coaches to players during matches have a psychological aspect 'Stay with it', 'Dig in', 'Find a way', 'Keep trying', 'Concentrate' 'Right here, right now'. However, for some reason, sport psychologists are not seen as physical trainers, they are seen as physiotherapists. The perception is that they fix things that are broken. We accept that physical trainers will develop stronger muscles, we should accept that sport psychologists will develop stronger minds.

And therefore, I have always looked for ways to work with sport psychologists. And early in my career, I was lucky enough to begin a close working relationship with Dr Chris Harwood, which exists to this day. Amongst early discussions on Momentum and Match Flow, it became obvious that working with a sport psychologist who knew tennis, was much more about building a mindset than the commonly held misconception that you only need a sport psychologist if something requires fixing.

BENEFITS AND CHALLENGES

I continue to work closely with sport psychologists, currently with Ana Soares on how players understand The Journey of the Match (see next edition for her latest report on Turning Points in Tennis) and Julie Blackwood in her role as Sport Psychologist for the GB student team. In my experience, there are a variety of benefits to working with sport psychologists. These benefits are not only for the players in a programme, but also for the coach. A sport psychologist can:

- Be an excellent sounding board for the coach's own ideas/ coaching behaviour
- Clarify questions a coach may have on the best way to prepare players
- Make suggestions for improving the effectiveness of drills and skills by incorporating a psychological element
- Challenge the coach in a supportive way
- Help create a team ethos which is valued by the players
- Provide an independent and safe place for the players where their thoughts and feelings can be voiced without consequences



Equally there can be some challenges to working with sport psychologists:

- Expense. Time with players and realistically what impact can be made unless it is a longer-term relationship
- Coaches think they take care of the psychology
- Sport psychologists can operate in mental areas in isolation
- Sport psychologists are professionally bound to retain confidentiality if agreed with the player

Therefore, to maximise the benefits and minimise the challenges, I would suggest that coaches:

- Work with a psychologist who knows tennis or is willing to work collaboratively to learn
- Work with a university to identify a potential candidate who has recently qualified
- Choose initiatives/ activities that involve all the players, are easy to implement
- Have both team and individual aspects to the support
- Make psychology practical by having definite time periods and resources produced

CASE STUDY

The GB student tennis team, supported by the Tennis Foundation*, excelled at the 2015 World University Games, bringing home Gold and Silver medals in the Men's and Mixed Doubles respectively, from the second largest multisport event in the world, behind only the Olympic games. As Great Britain Team Manager for the event, I employed the services of Julie Blackwood, a Sport Psychologist who had qualified and played at Loughborough University, and who the

Team Coach Barry Scollo and I worked closely with in the run-up to the event.

The remainder of this article is Julie's account of her role as Sport Psychologist in supporting the team's preparation for the event, which adheres to the conclusions highlighted above. While presented within a team context, the ideas can be easily adapted by a coach for their coaching programme.

INITIAL CONTACT

I became involved with the GB student tennis setup 8 months prior to the World University Games event, attending a preparation camp for the annual World University Masters event. The camp presented an excellent opportunity to meet the coaching staff and players and observe the environment and interactions. Based on gaining knowledge about the players, event and schedule of processes leading up to the games (camps, fixtures, selection dates) from the Team Manager, I developed a sport psychology brief that detailed key areas for psychology support.

At this point it is relevant to note that I remained independent of the formal selection process, in order to maintain open relationships with the candidate players. However, I did actively engage in several discussions with the Team Manager and Team Coach around the influence of different selections on doubles pairings and team dynamics, which served to stimulate reflection and raise awareness to biases and assumptions.

DEVELOPING A TEAM CULTURE

At the second two-day GB student camp in May, I ran an interactive workshop with coaches and players with the purpose of developing a GB Student Team Culture, which would not only be relevant for the upcoming World University Games, but also for future GB students' events (given the wider audience at the camp). The session focused on discussing experiences of team environments that were perceived to have a positive or negative influence on performance. The players' contributions made the session a great success and the players and coaches subsequently each inputted a list of constructs for incorporation within the team culture.

Following the session, I refined the lists into three main themes, which were underpinned by core foundations. The culture was then shared in the form of a medal-shaped graphic (aligned with the goal for the team at the World University Games) and talked through with each team member. I incorporated this into a team video and the Team Manager was equipped to review the culture in team meetings as required.

INDIVIDUAL PREFERENCE CONVERSATIONS

I conducted telephone conversations with each of the team members in the month prior to the event. Questions included, 'How do you like to be supported?' and 'What is going to be your signature contribution to the team?' From these conversations, I put together a list of bullet points on each team member that was shared with the coaching staff. The Team Coach and Manager remarked that comments on what players wanted from them, such as a preference for positively framed coach feedback, were particularly useful. I also feel that having further individual contact with each player made my in-event support more accessible.

REMOTE SUPPORT

During the World University Games event, I supported the team remotely from the UK. I remained in contact with the Team Manager and the wider team throughout via inclusion on a group message thread, as well as following the team's progress online. While seemingly insignificant, the thread gave me an insight into daily arrangements and developments (e.g., who was seeing the physio) and who was winning the ongoing Boys versus Girls quiz. I was available 'on-call' via Skype, contact through which was encouraged but not obligatory, owed to the busy nature of such events. Once the team had returned home, the Team Manager and I debriefed the event and the preceding journey, documenting the process through reflective practice.

CONCLUSION

We hope this article has provided an insight into some of the ways in which coaches can work effectively with sport psychologists from both sides of the equation. For me, being involved with the GB student tennis team has been thoroughly rewarding experience that continues to this day and I would like to thank Alistair for having the forethought to engage with a sport psychologist in his role as Universities Manager.

It's all in the mind... where else would it be?

**The Tennis Foundation is Britain's leading tennis charity. For more information see www.tennisfoundation.org.uk @TennisFoundation*

RECOMMENDED ITF TENNIS ICOACH CONTENT (CLICK BELOW)

Tennis*i*Coach



Professional knowledge of tennis coaches

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Miguel Crespo (ESP), and Carlos Balbinotti (BRA)

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ABSTRACT

The role played by the coach, an emerging profession in terms of importance, is key to the growth of sport regardless of the sport in question. This study presents the most valued professional insights for tennis coaches, in order to contribute to current research, which can assist the institutions responsible for training coaches in promoting meaningful activities, which are close to the interests of the learner.

Key words: Interpersonal knowledge, professional knowledge, intrapersonal knowledge

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INTRODUCTION

To be a coach and work with excellence in different environments, one needs to master different skills and a range of expertise in different areas. According to the International Council for Coaching Excellence (ICCE, 2012) the ability to work effectively in a complex and dynamic environment such as the sports coaching industry, requires a solid knowledge base (professional, interpersonal and intrapersonal) that supports various skills such as vision, organization, leadership, communication, personal relationships, evaluation, reflection, in addition to a series of values that guide professional practice.

Recent literature by Côté and Gilbert (2009) and Gilbert and Côté (2013) presented a conceptual definition of the different knowledge that forms the basis of the practice of sports coaching. Although this definition subdivides the types of knowledge, the authors reiterated that knowledge is interrelated, and by thinking of this in an isolated way can minimize the importance of reflective and complex interactional nature of sports coaching.

In this perspective, it is understood as professional knowledge, scientific and technical fields that form the basis of the performance of athletic coaches (Côté, Gilbert, 2009). Interpersonal knowledge is related to aspects of the relationship of the coach with their athlete and the coach's ability to communicate and relate effectively in this environment (Gilbert, Côté, 2013). Intrapersonal knowledge refers to the ability to self understand, ethical insights and reflections made by the coach (Côté, Gilbert, 2009). For an understanding of this conceptual idea applied to tennis coaches, Figure 1 presents specific aspects that involve the area:

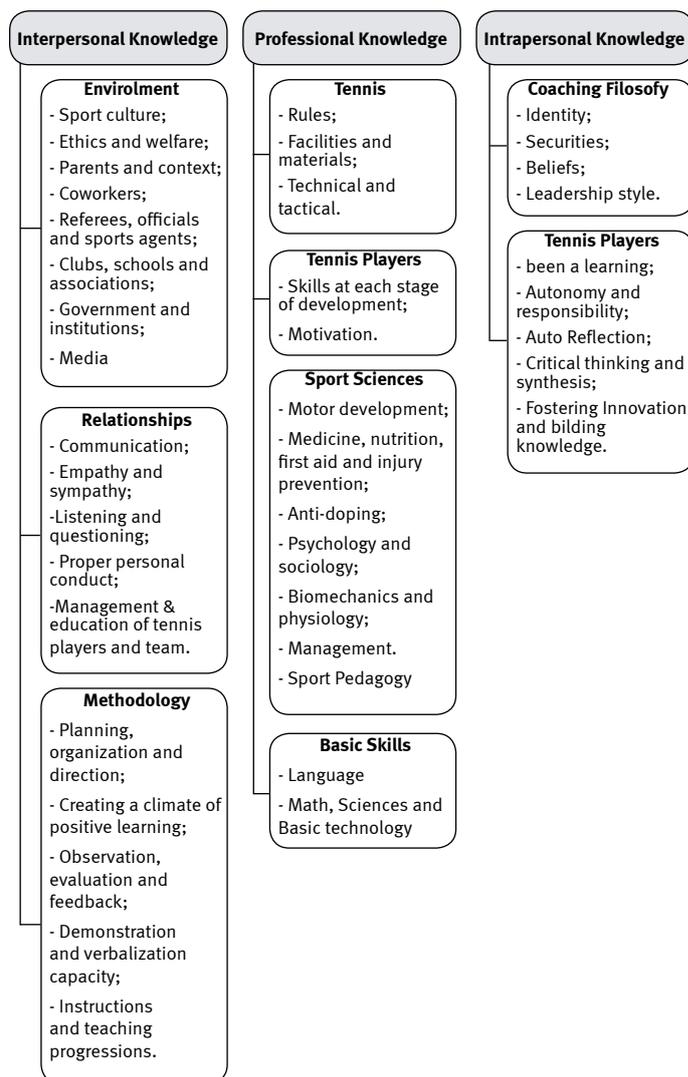


Figure 1 - Knowledge needed for tennis coaches (Adapted from Côté and Gilbert, 2009, Gilbert and Côté, 2013).

Traditionally, the coaches' training programs is based on their Professional Knowledge structures (Côté, Gilbert, 2009). To be considered as the experts of sports coaching, the coaches themselves seem to value these contents, because they related to specific fields and are applied from the sports in which they work (Cortela et al., Fuentes, Villar, Resende, Mosque, Romero, 2007). Based on this understanding, the purpose of the study was to describe the perception of tennis coaches on the Professional Knowledge, and the importance attached to the contents belonging to each category of this knowledge.



METHODS

Samples

73 tennis coaches (32.9 ± 9.6 years) participated in this study having signed an informed consent form, from the state of Paraná, southern Brazil. The sample was composed mostly of male professional players (93.2%), 57.5% of them with more than five years of professional experience, and 56% with academic qualifications at a higher level (22% in Physical Education and 34% in other areas). Coaches reported to have participated frequently (79.2%) on the training courses offered by the Brazilian Tennis Confederation. Approximately 66% of the coaches who participated in these courses were present on four or more courses in the last five years. Regarding the experience as a player, 57% were classified as first or second class in the Paranaense Tennis Federation, on a scale of eight, where the first is the highest level and the eighth lowest.

Instruments

The instruments used for data collection were: a sociodemographic questionnaire, and the Scale of Auto Competence Perception (EAPC) of sports coaches, validated to the Brazilian reality by Egerland (2009). The Professional Knowledge dimension of scale consists of 46 items, belonging to four categories: Management and Sports Law; Biodynamic; Psycho-socio-cultural aspects of sport; and Theory and Methodology of Training. Through a Likert five-point type scale, coaches inform the degree of dominance (1 = not dominate and 5 = mastered), and the importance given (1 = not important and 5 = great importance), to the knowledge.

Procedures for collecting and analyzing data

Data collection occurred in person at the Tennis Manager Paranaense Meeting, held in August 2015 in three distinct regions of the state. Statistical analysis was performed using Microsoft Excel 2010 software. Frequency calculations and descriptive statistics were analysed.

RESULTS AND DISCUSSION

From the data in Table 1, it can be seen that the participants generally reported to dominate reasonably or well in the Professional Knowledge-related content. The knowledge related to the Theory and Methodology of training, at the psycho-socio-cultural aspects, and the Biodynamic of Sports, respectively in that order, presented the highest results by the coaches.



Professional Knowledge	Competence perceived		Importance attached	
	Mean	SD	Mean	SD
Management and Sports Law Knowledge				
Management and organization	3,23	0,80	3,92	0,95
Basic legislation	2,88	1,01	3,58	0,99
Legislation and doping	2,45	1,02	3,69	0,99
Official functions	3,04	1,11	3,79	0,93
TOTAL	2,09	0,98	3,75	0,97
Sport Biodynamics Knowledge				
Physical qualities of athletes	3,38	0,78	4,26	0,80
Motor development	3,56	0,81	4,36	0,76
Biomechanics	3,31	0,96	4,27	0,85
Physical exercise effects	3,58	0,79	4,29	0,77
Exercise physiology	3,07	1,03	4,10	0,99
Recovery after physical exertion	3,50	1,01	4,20	0,80
Sports nutrition	2,97	0,99	3,93	0,84
TOTAL	3,34	0,91	4,20	0,83
Sport Psycho-socio-cultural Knowledge				
Understanding and interpreting public behavior	3,59	0,83	3,80	1,01
Understanding and interpreting the sportsmanship	3,48	0,84	3,77	0,88
Understanding the role of sport in society today	3,71	0,84	3,77	0,88
Strategies for the development of values	3,65	0,91	4,34	0,73
Sport psychology	3,31	0,85	3,91	0,96
TOTAL	3,55	0,86	3,95	0,90
Sport Coaching Methodology				
Technical and tactical aspects of the sport	3,78	0,84	4,31	0,90
Theory and methodology of sports coaching	3,46	0,84	4,20	0,83
Sport initialization	3,74	1,08	4,23	0,81
Evaluation techniques in sports	3,51	0,86	4,10	0,83
Programming, planning and structuring coaching	3,28	0,80	4,29	0,89
Pedagogical principles in delivering coaching sessions	3,61	0,90	4,35	0,76
Technical and tactical content of the mode in which it operates	3,97	0,86	4,55	0,76
TOTAL	3,62	0,88	4,29	0,83

Table 1 - Descriptive statistics: self-perceived Professional Knowledge of Brazilian tennis coaches

Regarding the importance attached to Professional Knowledge, it was found that the related to the Theory and Methodology of training, and the Biodynamic were the most valued areas. These categories showed the highest levels of importance to all content, especially: those related to specific technical- tactical aspects; to knowledge about human development; those required to perform duties in training; and those about the effects of the activities and/or exercise. The Sports Management and Legislation category received the lowest level of importance, noting that the contents related to basic legislation were considered less important by the coaches.

Similarly to the results found in this study, the work by Egerland, Nascimento and Both (2009a, 2009b), and Egerland et al. (2013), with coaches operating in the sporting context of performance and different sports modalities (individual and collective), show that the knowledge related to Methodology of Sports Training and Biodynamic, are considered the most important. In these categories, the content related to technical- tactical aspects, specific of the sport, and athletic motor skills were those that received higher figures of importance. As was observed in this study, the Sports Management and Legislation category, received the lowest value (Egerland et al., 2013). The authors reported that academic training has shown to influence the importance attributed to Professional

Knowledge, verifying that the postgraduate coaches gave more important to this knowledge when compared to graduate coaches (Egerland, Nascimento, Both, 2009b).

Specifically with tennis coaches, Fuentes and Villar (2004) describe the main Professional Knowledge needed for professional practice by referring to the basic teaching methodologies and the knowledge derived from sports sciences (physiology, biomechanics, psychology, motor learning, sports medicine and nutrition).

CONCLUSION

Regarding the perception of the domain Professional Knowledge, it is observed that the coaches presented lower values than those allocated to the importance, in all analyzed categories. The largest domain of knowledge referred to the related to Theory and Training Methodology, the Psycho-socio-cultural aspects, and Biodynamics of Sport, meeting less significant values for Management and Sports Law knowledge.

As observed in other studies, it was found that the more specific knowledge of the sport, related to Theory and Methodology of Training, and Biodynamic were the most valued by tennis coaches.

Even participating frequently in the context of non-formal learning and mediated situations, it was observed that Brazilian coaches reported lower dominance on the field of Professional Knowledge, when compared to the importance attached by them. Thus, it reinforces the need for training programs offering opportunities through different situations and learning contexts, so that this knowledge can be better developed.

The studies that deal with other skills, such as Interpersonal and Intrapersonal, appear as an important topic in the research agenda for the professional development of coaches. Understanding the knowledge necessary for professional practice in a contextualized way, and how they have been covered in the training programs, can contribute to the rapprochement between the activities offered in these programs and the interests and needs of coaches, making the learning process more significant.

Note: The authors thank the coaches who participated in the study and the support offered by Paraná Tennis Federation.

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RECOMMENDED ITF TENNIS ICOACH CONTENT (CLICK BELOW)

Tennis  **iCoach**

Mindfulness and tennis performance: A review of literature and practice

Shameema Yousuf (GBR)

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ABSTRACT

Mindfulness practice has grown exponentially in more recent times out of two schools of thought: Eastern Bhuddist meditative practice which has been popularised by Kabat-Zinn and colleagues (Kabat-Zinn, 2003), and a Western approach developed by Langer and colleagues (Langer, 1989). Adaptations of both Eastern and Western practices have been utilised by sport psychology practitioners as an alternative to psychological skills training. There have been some practices that combine mindfulness with psychological skills training when assisting athletes in optimising performance (Baltzell, McCarthy & Greenbaum, 2014). Indeed, mindfulness is associated with positive psychology and wellbeing. The paper reviews some of the literature in the Eastern practice, the practice of mindfulness in sport environments, and will highlight some of the interventions undertaken in tennis.

Key words: Mindfulness Meditation, Tennis, Performance, Awareness, Self-Regulation

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INTRODUCTION

Many athletes will improve their performance through a host of techniques. Coaches, parents and athletes will focus on technique, improved nutrition, equipment changes, and strength and conditioning. This holistic approach also includes psychological skills training (PST) otherwise known as mental skills training, used by athletes to gain a mental edge and achieve marginal gains in performance. For tennis players, being able to concentrate and focus on a task at hand without becoming overwhelmed or distracted, is just one example of when mental skills can make the difference.

Sport psychology practitioners work with athletes to help them optimise performance by implementing interventions that change behaviours and thought processes. Over the years, PST has focussed on cognitive modification, preparing the mind and body for performance. Yet despite this, Thompson Arnkoff, and Glass (2011) discovered that such methods that replace negative thoughts or suppress anxiety, may lead to increased frequency of negative thoughts and anxiety experiences, while mindful acceptance is associated with greater psychological adjustment. As such mindfulness training has become widely used in sport performance. Rather than suppress thoughts and bodily experiences, players are encouraged to raise awareness of them without accompanying judgement. Some practitioners however, may weave in psychological skills training with mindfulness. Baltzell, McCarthy & Greenbaum (2014), suggest that a performer who is mindful can acknowledge what is unfolding in a non-judgmental way and subsequently select a mental skill that would be most helpful to them.

Guided audiotapes and simple breathing techniques are a form a mindfulness that help an athlete pay attention to the task in the present moment, while changing the relationship to unwelcome debilitating thoughts, emotions, and physical sensations (Gardner &

Moore, 2007). The process involves focusing on breathing to anchor in the present, noticing distracting thoughts and remain accepting of them without judgment, and then returning to focus on breathing and the present once again. Being more accepting and aware of the present moment, enables players to change their relationship with the experience and move ahead without being caught up in intensifying negative thoughts, or overwhelming emotions that affect performance. This, mindfulness training is strongly linked to peak performance.

CONCEPTUALISING MINDFULNESS

Much of the literature in mindfulness draws from eastern Buddhist approach popularised by Jon Kabat-Zinn. He defines mindfulness as 'paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally' (Kabat, Zinn, 1994). It entails:

- 1) Self-regulation of one's attention
- 2) Directing one's awareness to internal and external experiences,
- 3) Metacognitive consciousness and
- 4) Adopting an accepting attitude." (Ivtzan & Hart, 2016)

MINDFULNESS TRAINING PROGRAMMES IN ELITE SPORT

Kabat-Zinn's was the first to operationalize mindfulness in sport with their world-renowned Mindfulness Based Stress Reduction (MBSR) approach (Kabat-Zinn, Bealle, & Rippe, 1985). The intervention named the mental training intervention was used with elite rowers who reported benefit from the training. There is further support for mindfulness training in elite sport environments which includes the Mindfulness Acceptance and Commitment (MAC) Approach in which athletes experienced less anxiety and enhanced performance (Gardner & Moore, 2004), and the Mindful Sport Performance Enhancement (MPSE) Program in which athletes reported experiencing more flow (Kaufman, Glass, & Arnkoff, 2009). More recently, mindfulness training has been delivered in the Mindfulness Meditation Training in Sport (MMTS) in which soccer players reported a changed (more productive) relationship to negative on-field emotions (Baltzell, Chipman, Caraballo, & Hayden, 2014), and better emotion regulation and focus on task-relevant cues (Baltzell & Akhtar, 2014). There is also the mPEAK program in which BMX athletes experienced greater body awareness, attentional control, less difficulty in difficulty in identifying feelings, greater levels of self-regulation and trust, and being more adept at describing and labelling their experience (Hasse, et al, 2015).



MINDFULNESS TRAINING IN TENNIS

Stankovic & Baltzell (2015) undertook a meditation study of masters level tennis players who received MM, and a control group who listened to a tape of moderate coaching tips. MM had a positive affect on performance - MM participants won more than double the number of games, and lost less than half the number of games than the control group. MM participants were also more accepting of performance related anxiety than before, and they experienced fewer negative thoughts than the control group.

Stankovic and Milinkovic (2016) undertook mindfulness training with a 24 year old WTA player who has been playing professional and college tennis for six years. The program involved breath awareness meditation using a guided audiotape. The player meditated 30 minutes once per week, for a period of eight weeks. Stankovic and Milinkovic (2016) reported that prior to the intervention, the player had heightened levels of stress during tournaments due to the pressures of family expectations of winning. Rather than focus on her strategy in match play, they reported that the player would self criticise and focus on what was going wrong, resulting in inability to deal well with failure. Having tried self-talk and imagery techniques, she found that PST had not helped her. Her intentions for engaging in mindfulness training was thus to improve performance during stressful situations of playing tournaments, by raising awareness and acceptance.

Based on the players tournament results and by utilising mindfulness measurement scales, results after the eight weeks evidenced a significant increase in attention and awareness. According to Stankovic and Milinkovic (2016) the player reported being able to compartmentalise emotions, feelings and thoughts. She no longer felt as anxious nor did she feel the weight of others expectations. They also reported the WTA player had won more than double the number of tournaments after the MM than before, and describe that she felt 'so confident'.

Mindfulness practice is not only being introduced to elite or senior players. Practices were introduced by the author to a junior performance tennis player who reported feeling less anxious and more equipped to complete a task, and a club league tennis player was encouraged to engage in a mindful breathing intervention on his commute to a tennis match (Yousuf, 2016). However, more research on the effects of gender, age and playing standard is needed.



CONCLUSION

Mindfulness training increases self-awareness, changes the relationship to an experience, and provides better emotional control. It has enabled athletes in a number of sport contexts to optimise performance. Practitioners integrating both PST and mindfulness training may find that they have more tools at hand to help tennis players find wellbeing, and enjoyment in competition. Mindfulness is being integrated at all levels to enhance wellbeing and performance, and the practice in the game of tennis is growing, with the very best Novak Djokovic, engaging in the Eastern practice.

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RECOMMENDED ITF TENNIS ICOACH CONTENT (CLICK BELOW)

Tennis*i*Coach

A sponsorship game plan for tennis players

Youvale van Dijk (NED)

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ABSTRACT

Various factors are of importance to the ultimate success of a tennis player's career. Apart from technical, tactical, mental and physical abilities, athletes require access to certain resources to fulfil their potential. Entering sponsorship agreements is often essential in realising access to these resources. This article reviews some basic concepts that tennis coaches, supporting team members and players could use to realise successful sponsorship deals.

Key words: sponsorship, financing, new media, crowdfunding

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INTRODUCTION

Sponsorship is a cash and/or in-kind fee paid to a property (e.g. tennis player) in return for access to the exploitable commercial potential associated with that property (IEG, 2015).

Sponsorship is thus a two-sided relationship and must be mutually beneficial. Both parties enter the agreement with the objective to gain something. Companies want a return on investment, which sports properties need to provide. This is in contrast to a donation, whereby sports properties are given money or other goods/services without necessarily providing a return on investment.

To set up sponsorship agreements several concepts need to be taken into account. Having a well-defined strategy increases the chance of a successful sponsorship proposal, agreement and subsequently successfully carrying out of that agreement.

MUTUALLY BENEFICIAL PARTNERSHIP

The athlete's perspective

The ultimate success of a tennis player's career, whether that is professional or not, is dependent on various factors. Technical, tactical, mental and physical abilities all contribute to the potential and ultimate success of an athlete. To fully develop these abilities athletes need access to certain resources. Entering sponsorship agreements is often required to gain adequate access to these resources.

Financial resources are an important reason for athletes to enter sponsorship agreements. The cost of developing as a tennis player and/or playing on the professional tour is high. Covering expenses from prize money alone is for many players on the professional tour unattainable.

The ITF (2014) concluded that in 2013 the average cost for playing professional tennis – including flights, accommodation, food,

restringing, laundry, clothing, equipment and airport transfers, but excluding support team cost – was \$38,800 for men and \$40,180 for women (varies depending on ranking band and region). To break even (cost = prize money earnings) women needed to be ranked inside 253, while men needed to be ranked inside 336.

A high number of players on the professional tour and at amateur level thus have to invest money to develop as a player while not having adequate financial resources. Financial contributions by sponsors are therefore needed for these players to at least break even.

Another reason for athletes to enter sponsorship agreements is to gain access to non-financial resources, e.g. equipment, clothing, training facilities, accommodation or marketing services. These non-financial resources indirectly lower the financial burden. Therefore, athletes could agree on non-financial sponsorship agreements when financial sponsorship agreements are difficult to realise.

The sponsor's perspective

Companies enter sponsorship agreements as a strategic activity “for the purpose of achieving commercial objectives” (IEG, 2015). The returns on investment companies expect from sponsorship agreements vary and are numerous.

Common reasons for companies to pay “a cash and/or in-kind fee” to a property (e.g. athlete, team, event, National Association) are: increase brand loyalty, raise involvement with the local community, increase general public awareness of the company, reinforce company image, alter public perception, enhance employee relations and motivation, block competition, increase sales and/or market share and reach a target market (IEG, 2015; Colijn & Kok, 2009, p117-118; Irwin and Sutton, 1994).

Compatible partners

Establishing why both parties enter a sponsorship agreement is essential to the ultimate success of the partnership. Although it is not always within reach, one should aim for sponsorship partners that are compatible with the athlete's own brand. It is therefore required to have a well-defined personal brand (more about personal branding can be found in Van Dijk, 2015), an image to share with the external environment, about who one is as an athlete and as a person.

Image compatibility is a criterion sponsors take into account (IEG, 2015). Sponsors choose properties based on natural compatibility with the company, which also makes the partnership more credible to the public (Colijn & Kok, 2009, p21). The athlete's brand/image should be aligned with the imagery the sponsor wants to establish. Compatible factors such as values, character, interests and fan/customer base, increases the chance of a mutually beneficial partnership.



An athlete's personal brand is tied to what they can offer to potential partners. This is not limited to just the traits and preferences as a sports person. An athlete's interests outside sports can also be of interest to potential partners. It is "a lifestyle" with which the sponsor wants to be associated (IEG, 2015).

The market of potential sponsors should not be restricted to major (inter) national companies. Local and regional sponsors could potentially benefit far more from local coverage about the athlete and from the athlete's (local) fan base.

The role of new media

New media (social media and other digital channels) play an important role in offering sponsorship partners a return on investment. Sponsors "expect social media to be integrated into sponsorship packages" (Cornwell & Kwak, 2015).

Digital channels are popular sponsorship vehicles as they can offer immense value to sponsors. IEG (2015) found that 90% of their study respondents deem the use of social media (extremely) valuable in leveraging sponsorships.

Building an online presence – where one interacts with an audience and that simultaneously reflects one's brand – could thus be beneficial in negotiating sponsorship deals. The tools to create a social presence are easily accessible and require limited financial and time investments.

It is favourable to start young or as early as possible – even when the potential audience size is limited – as it takes time to build a digital fan base. By creating personal social media accounts (e.g. Twitter, Facebook, Snapchat, YouTube) and a website (including a weblog), athletes can keep fans informed about the latest career developments, show their personal brand/personality and interact with fans.

There are dangers to using social media (Lagae, 2013). Athletes should therefore be aware of the professional attitude that needs to be portrayed on digital channels. An athlete's online image will reflect on a (potential) sponsorship partner. Stupid, impulsive reactions and other blunders could lead to negative publicity, which could negatively impact a sponsor's image (Lagae, 2013).

A well-established digital presence offers the opportunity to showcase and introduce sponsorship partners.

It indirectly provides sponsorship partners with a target audience with specific demographics (e.g. age, geographic, gender). Audience composition is often provided by social media platforms. Having this knowledge could be an asset in establishing sponsorship agreements, as audience composition is a typical sponsorship criterion for companies (IEG, 2015).

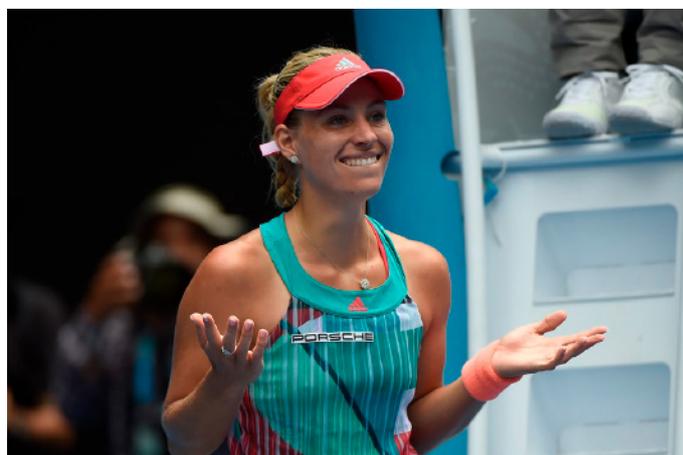
Return on investment an athlete could offer:

- Publicity in media
- Access to a digital fan base
- Legal right to use athlete's image
- Cross-promotion with other sponsors
- Presentation or presence at a corporate event
- Showcasing products by usage
- Give clinics

FROM PREPARATION TO SPONSORSHIP AGREEMENT

Defining the athlete's objectives, what can be offered and selecting potential partners are all part of preparing the sponsorship plan. Having a sponsorship plan makes it easier "to approach and contract potential sponsors as efficient and effective as possible" (Colijn & Kok, 2009).

As the acquisition phase begins, the sponsorship plan needs to be transformed into a sponsorship proposal. A proposal needs to include among others a value proposition, ways in which the



athlete will activate the sponsorship and what it is the athlete wants from the sponsor. By addressing the proposal to the right people within companies – direct connections and people in charge – one increases (time) efficiency.

Sufficient time and other resources need to be invested to have any chance at a successful proposal. If financial resources permit, athletes could hire an intermediary (individual or agency) to set up sponsorship agreements.

Once a sponsorship agreement is in place – with measurable and reachable targets – both parties should invest in activating the deal. Periodic evaluation and feedback is needed to know whether the agreement or activation should be adjusted.

ALTERNATIVES

Financial sponsorship is often the goal for athletes. However, getting sponsorships that provide enough funds is difficult. Alternatives to traditional sponsorships are appearing.

Recently crowdfunding has become a popular alternative to financial sponsorship. Crowdfunding is a method of collecting many small contributions, by means of an online funding platform, to finance or capitalize a popular enterprise (Freedman & Nutting, 2015). It is more aligned with donating than it is with sponsorship, yet it can be an effective way to raise funds.

Similarly to preparing sponsorship agreements, it is necessary for the athlete to set clearly defined goals that cover what (e.g. money) it is one wants from the other party (i.e. the public) and why.

Alternatives

- An alternative to a sponsorship proposal by an individual athlete is offering 'a team' (several tennis players together) as property to invest in.
- National Associations may need to get involved to realise larger sponsorship packages for groups of players.
- There are online market places where companies and athletes are brought together with the aim to broker sponsorship deals.
- Raising funds by offering tennis career related services, e.g. presentations about one's career or giving tennis lessons.

CONCLUSION

The concepts reviewed should give coaches, supporting team members and athletes a better understanding of the important factors in realising successful sponsorship agreements. Establishing what it is both parties want from the partnership and what both can bring to the table is essential in creating a mutually beneficial agreement. Athletes and sponsors should be compatible based on factors such as values and target group to realise maximum benefits.

Although this article focused on sponsorships for individual tennis players, the concepts are also applicable to teams and tennis academies/clubs.

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RECOMMENDED ITF TENNIS ICOACH CONTENT (CLICK BELOW)

Tennis  **iCoach**

Early specialization in sports: A factor to be considered in Brazilian tennis players?

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Silvio Souza (BRA) and Carlos Balbinotti (BRA)

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ABSTRACT

This article discusses, under the sports early specialization's point of view, some of the probable reasons why Brazil has outstanding tennis players at junior level, but does not have the same performance in professional ranks when compared to countries with similar results in ITFJC.

Key words: Tennis; Long-term's athlete development; Early specialization

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INTRODUCTION

The ranking conquered by tennis players in the International Tennis Federation's Junior Circuit (ITFJC) has been considered an important tool to forecast results in the professional circuit. For years, Brazil stands out as one of the countries with the highest number of successful tennis players in this circuit, equating to some of the world's greatest powers in tennis, such as Argentina, USA and France (Reid et al., 2007). Through a brief analysis of the ITFJC boys ranking it is possible to observe that Brazil had, from 2005 to 2015, 10 tennis players among the ITFJC Top 10; two of them led this ranking and six of them were among the Top 5.

However, differently than what has been observed in other countries, Brazilian success in the ITFJC has not been converted into a high number of successful tennis players in the professional circuit. While Argentina, France and USA emerge as powers in the Men's Professional Tennis (ATP) singles rank with 8, 12 and 8 tennis players, respectively, among the ATP Top 100, Brazil has only two athletes in this condition (ranking consulted on 3rd of July 2016).

Professional tennis' success is known to have a multifactorial origin. After a literature review on this topic, Crespo et al. (2003) reported that elite tennis players development is influenced by several factors, among which some are highlighted: country's tradition in the sport; competitive opportunities; training conditions; infrastructure quality; weather; coaches level and application; access to clubs and courts; and the presence of elite tennis players to serve as a role model.

With no claim to drain the topic and admitting the scenario of low productivity of studies regarding tennis in Brazil (Cortela et al., 2016), the present study aims to debate how Brazilian contextual specificities, regarding the training and competitive system, might be impacting on the development of Brazilian tennis players during athletic development stages.

TRAINING AND COMPETITIVE SYSTEM, CONSIDERATIONS REGARDING BRAZILIAN TENNIS PLAYERS

Many studies have shown problems regarding the training system (Balbinotti et al. (2004; 2005; Brandão et al., 2015; Cortela et al., 2012; Pacharoni; Massa, 2012), and in participation of Brazilian tennis players in competitions (Arena; Böhme, 2001; Cafruni et al., 2006; Cortela et al., 2011), presenting evidences of early specialization. According to Balyi (2005), early specialization in sports takes place when the training and competitive system do not respect maturation and development stages and motor, coordinative and conditioning capacities' optimal window of trainability. Thus, excessive loads of training are applied in order to specialize a limited range of moves, which could give players expressive competitive results in a short term.

Due to its specificities, to Barbanti and Tricoli (2004), the unilateral preparation and early specialization have a greater tendency to

be present in individual sports. However, tennis is characterized as a late specialization sport (Balyi, 2005; Tennis Canada, 2011), i.e. young athletes' development emphasis must be in general development of fundamental motor skills and technical/tactical skills. According to Balyi (2005), early specialization in sports with this characteristic could contribute to sports dropout, occurrence of injuries, among other factors, which limit the development of sports career.

In this scenario, Balbinotti et al. (2004; 2005) emphasize that the athletic development stage of tennis players must be marked by the construction of resources needed for future high performance, and it must occur in a diversified and balanced way. The age range from nine to 12 years-old is seen as a moment of great importance, being considered a period of optimal trainability for learning all basic and advanced techniques. These techniques should be refined during the next stage of the long-term athlete development process, contributing with the development of the all-court playing style. Only after the consolidation of these capabilities is that the specialization process, in order to stablish individual's style and patterns of play, must occur (Balyi, 2005; Tennis Canada, 2011).

However, among Brazilian tennis players the pursuit of results in competitions seems to be influencing negatively this process. In their study with ATP Top 500 Brazilian tennis players, Cafruni et al. (2006) identified that 69% of the sample had early outstanding results (Top 10 in the national rank). According to Arena and Böhme (2001), in order to achieve good results in national competitions, the athletes need at least one or two years of specific training, given the competitive level. This means that the athletes would be initiating their specialization in this sport with an age average around seven and nine years-old, which according to Bompa (2002) and Balyi (2005) affects the essential training load to build the resources needed for future high level performance.

This situation is alarming, because it impacts directly the style and patterns of play adopted by the athlete. During early athlete development stages, players specialized in hitting high balls behind the baseline are capable of winning important tournaments. The lower game speed found in this period allows that a purely defensive athlete achieves good results in competitions (Fernández, 2007).





Thus, due to the technical immaturity and the incapability of generating power and/or accuracy with consistency shots, many tennis players abdicate to hit offensive shots, trying to induce their opponent to make unforced errors, without risking. These athletes end up winning many matches by having a consistent baseline game style and making few errors. It is known, however, that results in high performance tennis are determined by the efficiency in the execution of Definition Strokes (DS), characterized by power and precision in the execution. Due to their high level of difficulty, these shots should be trained since the initial stages of the athlete's development process in order to reach maturity and capacity to execute them consistently (Balbinotti et al., 2005).

In this way, it is verified that Brazilian tennis players' training sessions, during the development stage, have been drawn up in order to attend these competitive context specificities. Therefore, it is observed a higher training frequency of Preparation Strokes (PS), characterized by control and regularity, instead of training DS (Balbinotti et al., 2004; 2005, Brandão et al., 2015), which are essential for future success in tennis. According to Balbinotti et al. (2004; 2005), at a stage which training should be planned in a diversified and balanced way, a disproportional frequency of training for a specific group of shots is clearly a sign of technical/tactical early specialization, which should be avoided.

Although it is not the main focus of this article, a similar behavior was observed among female athletes; and also an even bigger discrepancy between PS and DS training frequencies. According to Balbinotti et al. (2004), this could be one of the possible causes for the higher failure index of female Brazilian tennis players in the professional circuit when compared to male athletes, considering that the insufficient training of the DS causes incapacity of generating power and accuracy, having difficulties when competing at the speed imposed by their opponents. It is noteworthy that Brazil has not had any female athlete among WTA Top 100 for more than 20 years.

The wrong conduction and training planning alerts to other problems found in Brazilian tennis players sports development, related to the inexistence of a national model of reference and application of long



term athlete development models during the development stage. In their study with Brazilian professional tennis players, Pacharoni and Massa (2012) identified that training routines were only planned when the athletes had already shown some potential to become a pro. It was verified that important stages of the athlete's development such as learning and consolidation of the basic and advanced shots, and all-court playing style development were organized based on coaches' empiricism. This corroborates, partially, with the results presented by Balbinotti et al. (2004) who affirm that there are no differences in training volumes of Brazilian tennis players over the years, verifying that younger players (13 year-old boys) had higher training loads than older players (16 year-old boys).

CONCLUSIONS

As presented, it is observed the importance of having a reference pattern to be followed. A pattern that breaks existing paradigms in Brazilian context; that really prepares young tennis players to become competitive at a high level and not only in the ITFJC. Therefore, it is necessary that training and competitions practices seek for more offensive patterns of play as soon as the players have their basic techniques and patterns of play under control. Thus, the athletes will be familiar with the current predominant model in professional tennis sooner; having more training hours of more aggressive styles and patterns of play, understanding the importance of leading most part of the match actions and imposing their own will during a match.

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RECOMMENDED ITF TENNIS ICOACH CONTENT (CLICK BELOW)

Tennis  **iCoach**

Exploring how psychosocial factors influence the skill refinement process in tennis

John Toner (GBR) and Adam R. Nicholls (GBR)

ITF Coaching and Sport Science Review 2016; 70 (24): 21 - 23

ABSTRACT

Coaches overseeing technical changes, which are driven by the desire to enhance performance, are a very common part of the coaching process among tennis players. A number of psychosocial concomitants (e.g. confidence) appear important in influencing an athlete/coach's ability to successfully implement such refinements. The current study explored this issue by conducting a series of semi-structured interviews with highly-skilled tennis players who have attempted to extensively refine an aspect of their technique. Remaining confident and committed to the changes prescribed by their coach were more likely to make refinement successful. Our data suggests the need for better communication between the coach and athlete at the initiation of the refinement and throughout the process.

Key words: Commitment, confidence, expertise, Five-A Model, sports coaching

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INTRODUCTION

Highly-skilled performers may seek to refine their technique when their movements have become 'attenuated' or when changes in equipment design requires them to find optimal solutions to new problems (Carson & Collins, 2011; Toner & Moran, 2015). Despite its apparent ubiquity there has been no systematic study of the psychosocial factors (i.e., mental states, psychological traits, and aspects of the social environment) that might underpin successful or unsuccessful cases of this process. This is surprising given the importance attributed to these factors in helping athletes to address the challenges (i.e., improving their game, recovering from injury, transitioning between sports) that inevitably arise in longitudinal sporting involvement (MacNamara, Button, & Collins, 2010). In seeking to address this issue, Carson and Collins (2011) proposed four psychosocial factors that influence the process of making technical refinements: involvement in the process, commitment, trust, and confidence in the specific technical refinement prescribed by a coach. We explored Carson and Collins' (2011) proposal by conducting a series of semi-structured interviews with skilled tennis players who have attempted to extensively refine an aspect of their technique.

METHOD

Six males and two females aged between 19–30 years ($M_{age} = 23.5$, $SD = 4.3$) with experience of refining their technique within the last 5 years were purposively recruited for this study (see Table 1 for details).

Pseudonym	Age and rating when refinement was made	Technical refinement
Scott	16 (3.1)	Shorten forehand takeback
John	17 (2.1)	Adopting 'eastern' grip on forehand
Mike	15 (3.1)	Shorten backhand takeback
Matty	18 (3.1)	Shorten forehand takeback
Paul	18 (1.2)	Adopting 'continental' grip on forehand
Luke	28 (1.1)	Alter forehand path
Michelle	21 (2.2)	Shorten backhand takeback
Andrea	20 (3.1)	Square racket face on forehand

Note: For junior and adult players there are 20 rating bands, starting with 10.2, which is the lowest, progressing to 10.1, 9.2, 9.1 etc. until you reach 1.1, which is the highest rating.

Each participant took part in an in-depth, face-to-face semi-structured interview. Although interview topics and supplementary probes were informed by the work of scholars in the field of technical refinement (e.g. Carson & Collins, 2011), the semi-structured nature of encouraging elaboration and seeking clarification within the



interviews ensured flexibility and sensitivity toward emergent issues. Interviews lasted between 55–95 minutes.

The main focus of the interviews was on identifying the moderators of change (i.e. the psychosocial factors that influenced the refinement process).

ANALYSIS

Data was analysed abductively (i.e. involving a succession of inductive and deductive processes). Inductive content analysis was used to identify meaning units which were subsequently grouped together to form emergent categories (lower-order themes) based on their similarity to each other and distinction from other categories. This process was then repeated in order to generate higher-order themes until theoretical saturation was reached, whereby all new meaning units fitted into the existing code structure.

RESULTS

In this section we outline two key psychosocial moderators (i.e. commitment and confidence) that influenced the extent to which the technical refinement process was successful or unsuccessful.

Commitment

Players discussed their level of commitment to executing the desired technique, particularly during the early stages of making the change. They revealed that they felt uncomfortable with the movement when they first tried it in a competitive situation and this resulted in a lack of commitment to selecting the effected shot. Although all of the participants were fully committed to the new movement in practice, this changed when some of them played in a competitive event.

Here their competitive urge to win appeared to override their desire to remain committed to trying the new movement. For example, Scott explained that he:

was sticking to the shape, but it's almost the competitive side of you....I wanted to win too much to be able to just to stay with it and accept a few errors...I stuck with the new movement when I hit a top-spin forehand, but I wouldn't say that I hit that many of them as I was trying to avoid hitting it.

Athletes' commitment was also influenced by the extent to which they were prepared to accept that they would make errors during competition. John suggested that he may have struggled to adopt the technique because he put himself under so much pressure to execute it flawlessly – even during the initial stages of the change:

I wasn't prepared to make even one forehand error . . . I created that mindset for myself where I wasn't allowed to make mistakes and to fail with it . . . I created a fear of making mistakes and a fear of losing.

Although the preceding evidence would suggest that a number of players struggled to commit to the new movement, four players revealed that, despite initial setbacks in competition, they steadfastly committed to the new technique because they realized that there was no reason to go back to the old inefficient movement pattern. To illustrate, Mike was prepared to accept that he would “hit a lot of errors. . . . In my head I knew that I was better going for it and making the error than just running around it or hitting a slice and winning”. These players also spoke about the important role their coaches played in removing pressure by emphasizing that practice and competitive results were not important in the early stages of the change process (i.e., focusing on the processes of performance). Matty revealed that he was worried that he was going to lose matches during the initial stages of the change, but:

In that month I had two tournaments that I went out of first round . . . coach was like 'don't worry about winning just go out and try to get the technique' . . . he was like 'when you're changing something new expect to lose but you'll start winning again once you get it correct'.

The extent to which these players regulated their expectations is in notable contrast to the experiences of both John and Paul (who struggled with their change) who reported putting themselves under considerable pressure from the start. For example, Paul revealed that his attitude was “can we get this done as quickly as possible . . . so maybe progressing it a bit too quick so I hadn't built the foundation – so the hand feed I hadn't really perfected that and we're trying to rush it because I was still competing in competitions”.

Confidence

Confidence also had an important bearing on players' ability to successfully enact change. Six players reported high confidence in their coaches' ability to help them improve their game. Scott recalled when the idea was introduced to him that he felt:

pretty confident, I was just so happy with my tennis at the time and again because of the two people working with me I was like for sure this is going to work . . . it's not going to [negatively] affect me.

Early setbacks in competitive events had a significant impact on four players' confidence in their ability to execute the new technique under pressurized conditions. For example, John explained that:

there had been an overall dent in my morale because of the way the tournament went and looking back that would have resulted in my training attitude being low. . . . it was quite demoralising really . . . I was thinking it couldn't have gone any better in practice the day before the tournament and I still couldn't do it so my confidence in it and my enjoyment of doing it would have been less in subsequent weeks.

Significantly, the players who retained confidence in their own ability to execute the new movement under pressurized conditions were working with coaches who appeared to have used a variety of



psychological skills to develop their confidence. For example, these coaches attempted to get five players to focus on the processes of the performance rather than on the outcome of a competition. In three cases, coaches appeared to use reframing/restructuring by showing the athlete evidence of successful performances on a tablet device or video recorder. Andrea felt that seeing ‘good’ performances on video made it “clear in her mind what I was doing and what I was aiming for” and that this enhanced her confidence that her action was improving in the desired direction.

DISCUSSION

The results demonstrate that the technical refinement process involves a degree of risk and that cases of unsuccessful change are likely to affect not only an athlete's skill development, but also their long-term involvement in competitive sport. However, it is encouraging to note that four players felt that the process had been extremely successful and that it had contributed to the improvement of their game. Significantly, the results provide empirical support for the FIVE-A model's (Carson & Collins, 2011) proposal that a number of psychosocial concomitants will have an important bearing on whether or not coaches and players can successfully enact technical change. Retaining the athlete's commitment to, and confidence in the process, seems absolutely crucial in this regard.

Commitment to the new movement may be enhanced if coaches can encourage their players to appropriately regulate their expectations. Players may need to accept that the new movement is likely to feel uncomfortable and that they will experience a drop in performance proficiency for a period of time. In the long-term, the use of imagery scripts and self-set goals may allow coaches to ‘sell’ progress to the athlete and maintain their commitment to the change. There are also a number of approaches that coaches may employ in seeking to enhance the athlete's confidence in the new movement. Coaches should encourage their athletes to avoid competition until they are confident that they can consistently perform the new movement under pressurized practice conditions (that it is “pressure-proofed”; See Carson & Collins, 2016). Moreover, it may be wise to initiate the change during the player's ‘off-season’ rather than in the midst of the competitive season. Confidence profiling techniques may also be used to assess the athlete's confidence levels and to generate confidence enhancing strategies targeted toward their perceived confidence needs (Hays, Thomas, Maynard, & Butt, 2010). Finally, video may be used to enhance the athlete's confidence that they are progressing towards the desired technique. Additionally, coaches could adopt an autonomy supportive coaching style during the refinement process, which is characterised by the coach listening to his or her player's views, allow them to make an input into the process, and focus on improvement rather than the outcome of matches.

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RECOMMENDED ITF TENNIS ICOACH CONTENT (CLICK BELOW)

Tennis  **iCoach**

Motivating through the brain reward system

Claudio Sosa (ARG)

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ABSTRACT

To motivate learners, from beginners to top performance levels, is one of the toughest tasks for teachers and coaches who find it very hard, particularly when working with the young generations. This is due to the distracting elements like electronic games, social media and internet. With the help of recent research, neurosciences have discovered how to activate the brain reward centre that moves people to action.

Key words: motivation, reward system, electronic games, dopamine

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BRAIN AWARD SYSTEM

I will start telling you how the brain reward system works, so that we can later apply it to our lessons or coaching sessions.

The brain reward system is the one that promises you will feel happy, and drives you to act. This area called motor-limbic strengthening circuit includes very primitive regions in our brain and has evolved to drive us towards action and consumption. Our world is full of stimuli that make it work: ads, clothes and racket brands, electronic devices, etc. They drive us to action in search of a promised happiness. Our brain is obsessed with: "I want it", "I want the racket Federer uses", and once it is triggered, it is harder and harder to say "I don't want it". So, when the brain acknowledges the opportunity for a reward, it liberates the neurotransmitter dopamine. Dopamine tells the rest of the brain what to pay attention to, and in which direction to go. However, a squirt of dopamine does not bring about happiness, but a feeling of excitement and pleasure. We feel alert, awake, euphoric, spellbound, captivated. When we recognize the possibilities of feeling well, we do whatever is necessary to achieve that sensation. Over the last years, neuroscience has given different names to the dopamine liberation in the brain: search, want, desire, yearn. It was in 2001, after an experiment of Doctor Brian Knutson, from Stanford University, that the anticipatory effects of dopamine were definitely demonstrated, and not the experience of feeling rewarded.

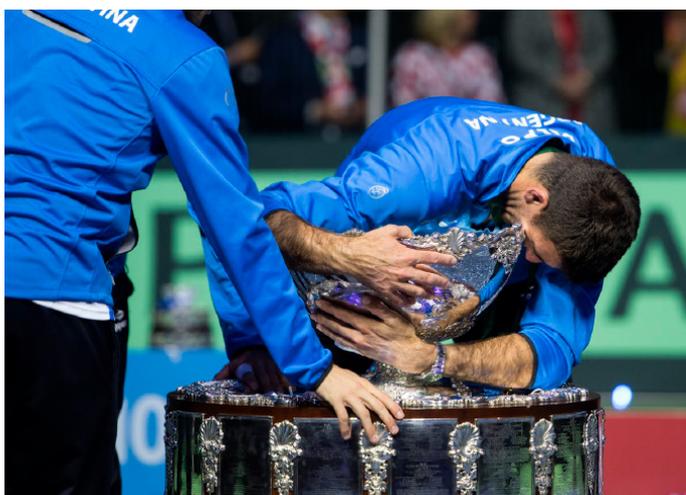
Dr. Knutson placed different people under brain scanners and conditioned them to wait for the opportunity of getting money, if they saw a particular symbol on a screen. In order to get that money, they had to press a button when the symbol cropped up. But the reward system activated and illuminated as soon as the symbol appeared, before getting the reward. When the participants got the money, this area deactivated. The pleasure of getting the money was reflected in the activation of other areas. This way, it was proved that dopamine relates to action and not happiness (Bachrach, 2014). The promise of the reward is a warranty for not missing the opportunity.

Whatever you think that will make you happy, will activate this area, the smell of coffee, a discount at the supermarket, getting a cap if you win the next point, if you enter the first service you are the first in the class, etc. Dopamine, then, captures all your attention, your mind is obsessed with getting that, or repeating the behaviour that was once triggered by the same stimulus. The dopamine wave shows that new object of desire as something vital for survival. This is a perfect mechanism of nature that assures that you will eat again, even if you do not feel like going to buy some food. That is why we are not extinguished. "Evolution is not interested in happiness, but uses the promise of happiness for you to continue fighting for survival", says Dr. Estanislao Bachrach. It is the promise of happiness, not happiness itself, the strategy of the brain for you to go on working, conquering and accumulating. When a racket brand makes advertising campaigns for you to feel the desire to get it, you are becoming a slave of the dopamine squirt, that will make you look for all the "opportunities" to get what you think will make you happy: "the new Roger's racket". Nowadays, modern technologies provide a sensation of instant gratification. You know that the newly received email or Youtube video may make you laugh, so, you keep on impulsively checking the device you have in front of you all the time. It is as if your smart-phone and laptop had a wire directly connected to your brain, as if it were constantly feeding it with dopamine flows. That is why technology is so addictive, and you want more and more. The basic internet function perfectly describes the basic function of the reward system: to look for, to go for more. Although internet, the social media and cellular phones have accidentally burst your reward system, computers and games are designed to keep you trapped, playing and playing: the promise to reach the next level. That is why you find it difficult to quit the Playstation, the Wii or the like (McGonigal, 2012).

ADDICTION TO ELECTRONIC GAMES

A study has shown that playing a video game increases the quantity of dopamine just as much as the use of amphetamines. The unpredictability of the score, or advancing to the next level will keep you glued to the joystick or to the screen of your phone. This can be either tremendously entertaining or dangerously addictive.

Studies show that when the promise of a reward is released, we become more susceptible to all kinds of temptations, many of which trigger our bad habits, for example soft drinks consumption. High levels of dopamine widen the attraction of immediate gratification and you are less concerned about long term consequences. This system also responds to the novelty and variety, that is to say, your dopaminergic neurons - the ones that segregate dopamine - respond to familiar stimuli less and less, the same thing happens with things you are very fond of doing, like eating a particular dish, or a certain drill on court. That is why it is very important to programme different exercises and with the possibility of advancing levels. For this reason, racket brands change the cosmetic appearance, models, colours, etc. all the time.





HOW TO PLAN EXERCISES TO ACTIVATE THE BRAIN REWARD SYSTEM

Knowing how the brain reward system works, helps us to motivate children and players to train and compete. It is necessary to prepare exercises, with different levels, that players must overcome, just like advancing levels in video games. For example, in the tennis schools, level one is hitting the ball, level two, making it overcome the net, level three, directing the ball towards a certain target, level four, hitting the target. Remember that the promise to advance to the next level activates the brain reward system, and drives the child towards action.

Examples of exercises for the different competency levels: First cross-court forehand, for level 1, each player places 5 balls in a given area, without failing, level 2, seven balls without failing, level 3, nine balls without failing, and so on and so forth. If we use our creativity, the number of possible exercises and levels is unlimited. Remember that the young generations come to coaching and class with their brains shaped by electronic games.

CONCLUSION

The reward system is activated with the promise of getting something you wish, or meeting an objective. I have proved that trying to set a programme with different levels, just as in electronic games, increases the learners' will, their level of commitment and the permanence of the players of all levels all year long.

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RECOMMENDED ITF TENNIS COACH CONTENT (CLICK BELOW)

Tennis  **iCoach**

Stress test specific to tennis (Test): Case study of an elite player

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ABSTRACT

Although assessment of the technical, physical and physiological qualities required for performance optimisation is complex in tennis, it is nonetheless essential to training planning. While physical goals are often dissociated from technical ones, we argue that a recently validated stress test specific to tennis, known as “TEST” (Brechbuhl, Girard, Millet, & Schmitt, 2016), allows to combine both effectively. Differences in forehand and backhand efficiency may occur as a result of fatigue under standardised conditions, thus minimising emotional and tactical effects. The aim of the present case study is to offer a practical reading of TEST in an elite player.

Key words: Incremental test, ball hitting, ball speed, training

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INTRODUCTION

Technological and scientific advances have made it possible to gradually progress towards field testing that is more specific and closer to performance specificities. Two aspects seem to favour specific tests (on the court, using real or simulated ball-hitting action) over semi-specific tests (close to the activity pattern in terms of work and recovery times) (“Yo-Yo IR2” [Bangsbo, Iaia, & Krstrup, 2008]; “30-15 Intermittent Fitness Test” [Buchheit, 2008]; “Shuttle Run Test” [Leger & Lambert, 1982]): (1) the use of the tennis court dimensions, and (2) the combination of specific footwork and upper body movements (i.e. simulating or executing strokes).

In regards to specific tests, some authors have used tennis-specific movements, but with no actual hitting of the ball (Ferrauti, Kinner, & Fernandez-Fernandez, 2011; Girard, Chevalier, Leveque, Micallef, & Millet, 2006), while others have integrated real ball-hitting action with assessment of hitting accuracy (Baiget, Fernandez-Fernandez, Iglesias, Vallejo, & Rodriguez, 2014; Davey, Thorpe, & Williams, 2002; Smekal et al., 2000) or without any technical assessment (Fargeas-Gluck & Leger, 2012). There is a growing desire to relate parameters of technical performance (stroke accuracy and/or velocity) to physiological changes (blood lactate concentration [la], heart rate (HR), oxygen uptake (VO₂)) under standardised conditions (Davey et al., 2002; Smekal et al., 2000; Vergauwen, Spaepen, Lefevre, & Hespel, 1998).

By comparing physiological responses between a field-based procedure and a discontinuous treadmill test, Girard et al. (2006) highlighted that laboratory tests underestimate maximal oxygen uptake (VO₂max) values, while the main cardiorespiratory variables (HR, VO₂) measured at submaximal intensities did not differ (Girard et al., 2006). We prefer tests that integrate real ball-hitting action because upper body contribution, which has a significant influence on energy expenditure as reported in the literature (Fernandez-Fernandez, Kinner, & Ferrauti, 2010), must be taken into account. To date, no comparison of physiological influences between simulated and actual strokes (without distinguishing forehand and backhand strokes) has been published in the literature.

From a study case, we will see how TEST (Brechbuhl, Girard, Millet, & Schmitt, 2016) allows to have a physiological approach while ensuring that technical execution meets the requirements of high performance.

EQUIPMENT AND METHOD

Player

The subject is an elite male player, aged 19 at the time of the test. After having been one of the most promising junior players, he continued to perform well on the tour, reaching second weeks of Grand Slams and winning ATP titles.

Test Protocol

TEST procedure consists of hitting balls thrown at a mean velocity of 86 km.h⁻¹ by a Hightof[®] ball machine, alternating crosscourt forehand and backhand strokes (Brechbuhl, Millet, & Schmitt, 2016) (Figure 1). After a 2-minute “habituation” phase (ball frequency of 16 shots.min⁻¹), the first stage consists of a ball frequency of 10 shots.min⁻¹, which is then increased by 2 shots.min⁻¹ every minute until the stage corresponding to 22 shots.min⁻¹ is reached. From there, increment in ball frequency is set at +1 shot.min⁻¹ until exhaustion. Between each stage, a 30-second (passive) recovery break is implemented. TEST allows a simultaneous evaluation of physiological and technical variables. Ball velocity (using a radar) and accuracy values are recorded for each stage completed. Player is encouraged to find the right balance between ball speed and accuracy. Combined, velocity and accuracy parameters give an insight on technical performance (PerfTennis) (Figure 3B).

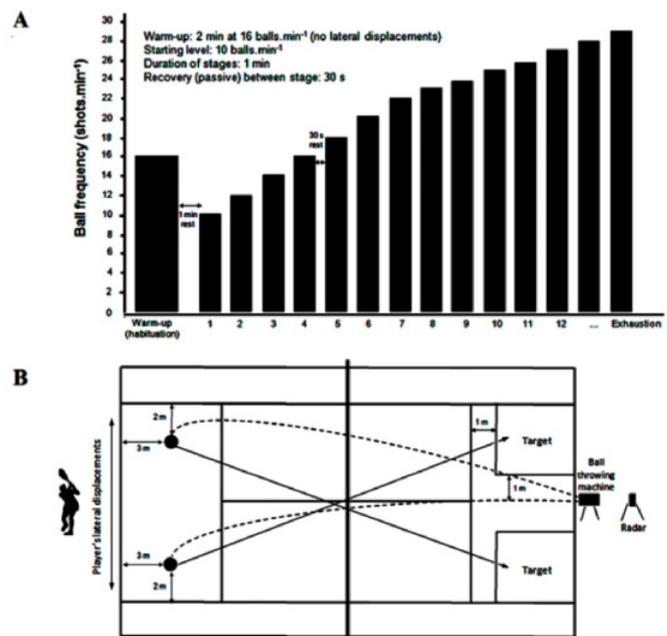


Figure 1 – TEST design (A) and schematic setting (B) (Brechbuhl, Girard, et al., 2016). GAS ANALYSIS SYSTEM

We chose the Cortex MetaMax 3B® analyser because of its ease of use, light weight and compact size. It weighs 570 grams and allows to measure HR, VO₂, carbon dioxide production (VCO₂) and ventilation (VE). Ventilatory threshold (VT₁ and VT₂) detection was done by analysing the points of change in slope (breaks in linearity) of ventilatory parameters (Wasserman, 2005).

Furthermore, for the player's optimal comfort, we used a neoprene mask which does not obstruct vision. In order to hold the MetaMax 3B® system in place during the player's movements, we used a breathable, comfortable Surgifix elastic net bandage (Picture 1).



Picture 1 – Player's equipment (gas analysis system) during TEST.

LACTATE CONCENTRATION MEASUREMENT

Capillary blood samples were taken from fingertip and analysed for lactate concentrations as per current guidelines (Dassonville et al., 1998). Samples were taken on the non-dominant hand to preserve the quality of the player's racket grip. Accordingly, during TEST, measurement was done every two stages using the Lactate Pro II analyser by Arkray®.

BALL VELOCITY AND ACCURACY MEASUREMENT

Groundstroke efficiency was determined from ball velocity (km.h⁻¹) measured using the Solstice 2 radar (Hightof®), and accuracy measured by a coach who recorded data on a touch screen. Groundstroke accuracy value was derived from the percentage (%) of balls landing in the target zone defined in Figure 1.

RESULTS

Data on physiology and technical performance relative to increasing effort are shown in tables and figures below.

Zone d'intensité	Palier	n balles.min ⁻¹	FC (bpm)	Lactates (mmol.l ⁻¹)	VO ₂ (ml.min ⁻¹ .kg ⁻¹)	VCO ₂ (ml.min ⁻¹ .kg ⁻¹)	VE (l.min ⁻¹)
Zone 1	1	10	131		40.2	36.6	68
	2	12	140	1	41.5	39.0	74
	3	14	154		43.9	42.7	79
	4	16	159	1.2	45.1	45.7	84
	5	18	165		47.6	48.8	87
	6	20	171	1.4	50.4	51.2	95
Zone 2	7	22	175		53.2	53.3	98
	8	23	180	2.1	55.6	57.1	104
	9	24	183		57.4	61.2	115
Zone 3	10	25	184	4.2	59.6	65.2	125
	11	26	188		60.5	68.1	133
	12	27	189		61.5	70.2	145
	13	28	191	11.8	62.2	74.2	160

Table 1 – Physiological responses during the completion of TEST in an elite player. HR: heart rate; VO₂: oxygen uptake; VCO₂: carbon dioxide production; VE: ventilation. Height: 185 cm; Weight: 82 kg.

Zone 1: Pure aerobic zone, below LT₁ (first lactate threshold) and VT₁ (first ventilatory threshold).

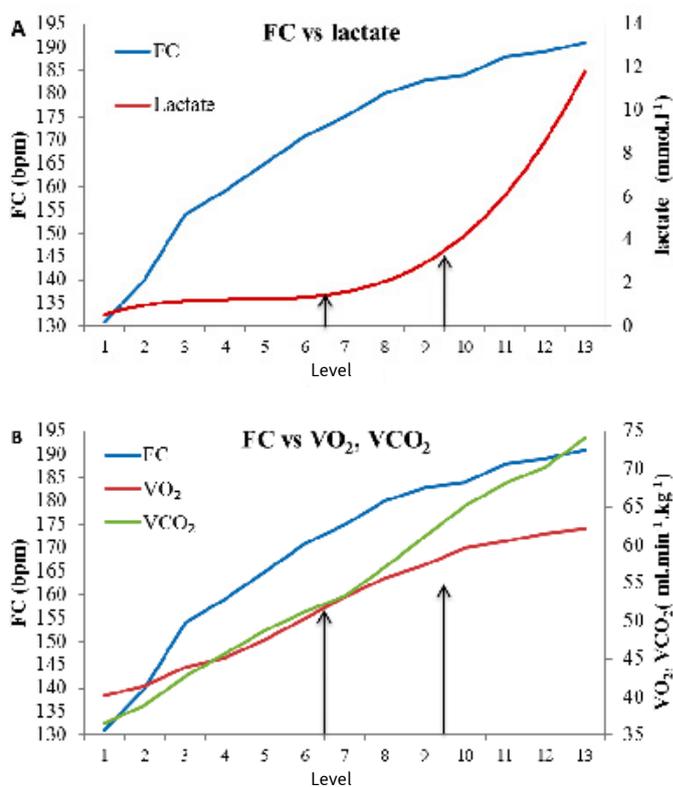
Aerobic endurance training: increased vascularisation of muscles, increase in the number and size of mitochondria, increase in the amount of aerobic enzymes (Krebs cycle) and beta-oxidation enzymes.

Zone 2: Zone between the first and second lactate thresholds (or below VT₂); zone of aerobic development through increased use of shuttle systems of transport of hydrogen ions (NADH₂); mixed zone of lipid and carbohydrate use.

Zone 3: Above the second lactate threshold and VT₂; zone of elevated blood lactate levels; decrease in tennis performance level as a result of muscle acidosis and hyperventilation. Maximal aerobic power training. Increased cardiopulmonary capacity, increased transport of oxygen, increased glycolytic enzymes (PFK and LDH during conversion of lactate into pyruvate), improved muscle buffering capacity, increased muscle glycogen stores.

palier	VO ₂ ml.min ⁻¹ .kg ⁻¹	Lactate mmol.l ⁻¹	Vitesse Coup Droit km.h ⁻¹	Vitesse Revers km.h ⁻¹	Précision Coup Droit % in zone	Précision Revers % in zone	Perfennis Coup Droit (% x V(CD))	Perfennis Revers (% x V Rev)
1	40.2	1	122	113.4	50	40	51	45.4
2	41.5	1	132	113.6	66	42	87	47.7
3	43.9	1.1	126	120.0	78	64	98	76.8
4	45.1	1.2	133	123.5	75	69	99	85.2
5	47.6	1.3	128	119.2	66	60	84	71.5
6	50.4	1.4	135	123.8	80	60	108	74.3
7	53.2	1.6	131	117.7	82	55	108	64.7
8	55.6	2.1	125	123.2	65	57	81	70.2
9	57.4	3	122	117.0	66	54	80	63.2
10	59.6	4.2	125	110.4	60	60	75	66.2
11	60.5	5.7	123	117.9	59	61	73	71.9
12	61.5	7.9	126	112.6	65	55	82	61.9
13	62.2	11.8	115	104.3	60	50	69	52.2

Table 2 – Parameters of technical performance as measured during TEST in an elite player.



Figures 1A and 1B – Changes in heart rate (HR) in relation to lactate concentration (A) and oxygen uptake (VO₂) and carbon dioxide production (VCO₂) (B) during completion of TEST. Vertical arrows indicate VT₁ and VT₂.

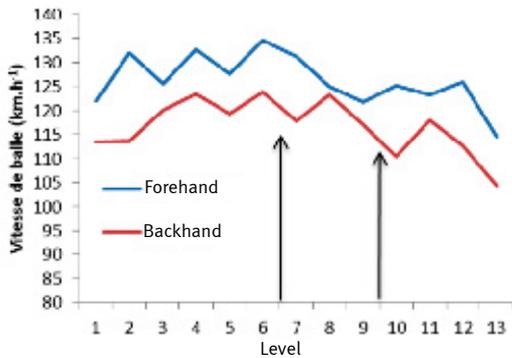


Figure 2 – Forehand and backhand ball velocity during completion of TEST. Vertical arrows indicate VT1 and VT2.

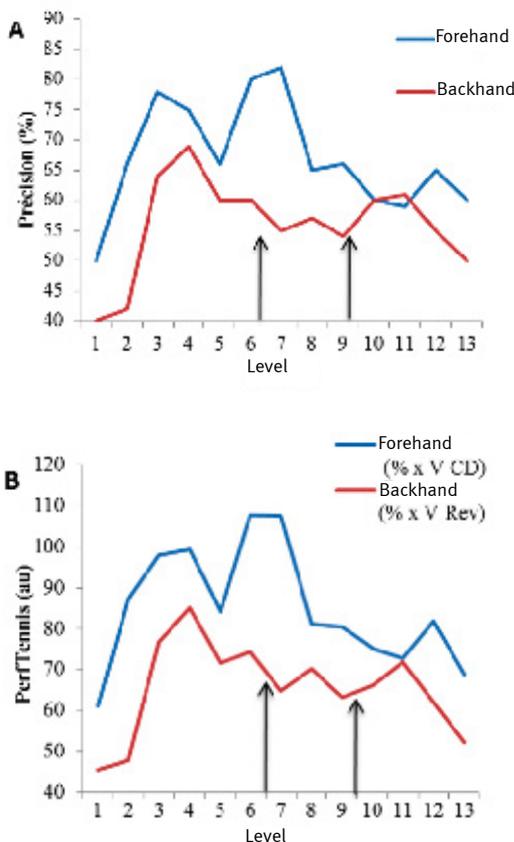


Figure 3A and 3B – Accuracy levels and technical performance (PerfTennis) during TEST.

DISCUSSION

The growth of training methodologies in tennis forces us to think about ways to optimise time and resources used. How can we make strength training techniques coexist with those designed for the development of speed, endurance and technical skills? Our aim is to suggest an approach which combines physiological capacity development and technical skill training based on data provided by TEST.

A “polarised” approach to training, whereby approximately 75% of total training volume is performed at low aerobic intensities (Zone 1), and 10-15% is performed at high or very high intensities (Zone 3), has been suggested as an optimal training intensity distribution for elite athletes who perform intense exercise events (Laursen, 2010). Clearly, such a distribution can hardly be applied to tennis considering the routines and exercises that we typically find in our sport, but this proposal serves as a basis for our discussion. In a

recent study on tennis players’ energy responses during competition (Baiget, Fernandez-Fernandez, Iglesias, & Rodriguez, 2015), Baiget et al. (2015) found that players spend 77% ($\pm 25\%$) of playing time in the low intensity zone (Zone 1), 20% ($\pm 21\%$) in the moderate intensity zone (Zone 2), and 3% ($\pm 5\%$) in Zone 3. TEST data allow for this organisation of the workload.

Training effects on general physiological state must contribute to balancing the influences on athletes’ neurovegetative activity (Schmitt et al., 2015). It has become evident that most training situations that incorporate repetitions of ball-hitting drills with a high level of commitment bring players close to VT2 (Reid, Duffield, Dawson, Baker, & Crespo, 2008). Therefore, we encourage coaches to reconsider predominantly technical training sessions with a focus on a limited number of strokes that does not exceed 7 s, and 20-s recovery periods between repetitions. This way, glycogen stores – particularly used at such intensity levels – would be preserved and it would allow for repetitions of ball-hitting drills at VT1 (i.e. Stage 6 in the studied case, which corresponds to an intensity level of 20 shots.min⁻¹). Similarly, analysis of activity under competitive conditions (Baiget et al., 2015) supports the assumption that forms of points played with serve should aim to maintain players close to Zone 1 with less deleterious effects on fatigue.

From TEST, goals focused primarily on technique (Zones 1 and 2) or energy (Zone 3) can be pursued, with a focus on quality of stroke production and feedback on velocity and accuracy (Table 2). For Zone 1, for example, the goal would be to keep the session going as long as possible at Stage 6, which corresponds to VT1 (i.e. 81% VO₂max or 89% HRmax for the player in our study), with 2 or 3 series of 5 to 10 minutes of continuous activity and 3-minute passive recovery periods between series. Alternatively, if the goal is Zone 3, shorter hitting intervals (15 s to 1 min), interspersed with passive recovery periods (15-30 s), should be preferred. In all cases, it is advisable to avoid falling below a 50% rate of balls in the defined target zone for expert players; and a 40% rate for less experienced players (Lyons, Al-Nakeeb, Hankey, & Nevill, 2013) during TEST. In the present study case, we observed a somewhat stable ball velocity during the test. In contrast, changes in accuracy were quite significant for forehand strokes: first between Stages 4 and 5 (-12%), and then more noticeably between Stages 7 and 8 (-20%). In both cases, the player had not yet reached VT2. Therefore, it is important to put the emphasis on forehand accuracy when working at Zones 1-2. It should also be noted that values attained by our player compare favourably with those published elsewhere. Indeed, at the lowest point of the start of the decline, we still observed a 65% accuracy rate in forehand (Stage 8), still 15% above the average values found by Lyons (Lyons et al., 2013) for expert players, even though our target zones were smaller. Nevertheless, in the interest of progress, a work plan can clearly be identified.

CONCLUSION

Considering the complexity of performance and trainable performance factors, training themes in tennis appear to be too frequently treated analytically. Through TEST and its applications, our aim is to suggest a global approach designed to avoid redundant physiological demands. Without underestimating the diversity of practices, this approach may contribute to a more efficient planning of training contents and a better management of fatigue.

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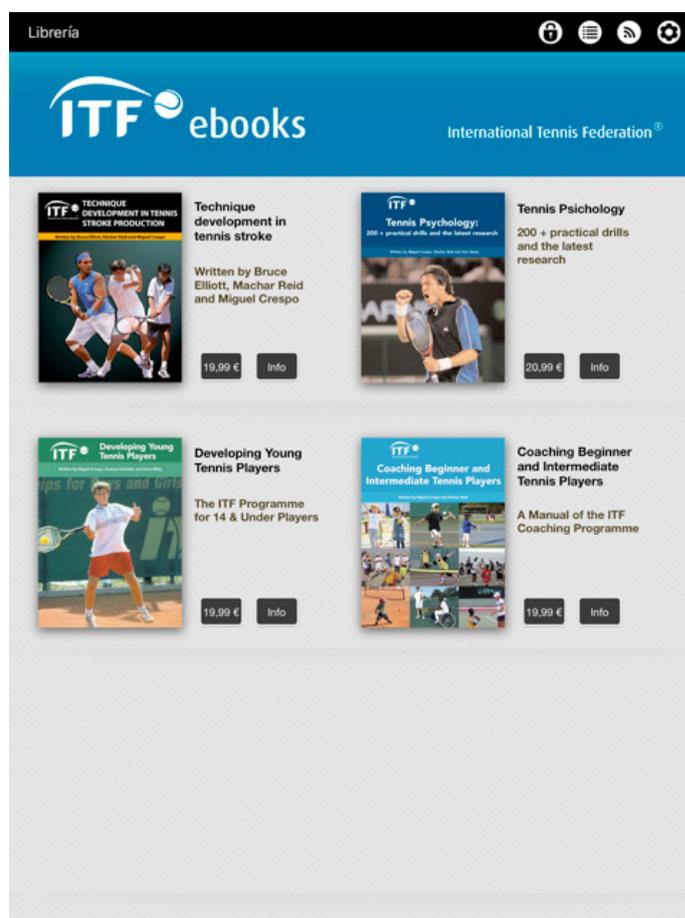
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ITF-OC Coaching (Beginner & Intermediate Tennis Players) Course took place at the Republican State Tennis School of Olympic Reserve in Tashkent, Uzbekistan.

UPCOMING COACHING COURSE WORKSHOPS

- 24 April: ITF-OC Coaching Beginner & Intermediate Tennis Players Course.
- On-court skills from Coachita Martinez on Tennis Coach On-court coaching drills used by Spain's Fed Cup and Davis Cup.
- Beijing hosts an ITF Play Tennis Course. The ITF delivered its latest Play Tennis course for the Chinese.

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FACEBOOK - SERVE RALLY SCORE

Tennis Play and Stay

ITF TENNIS.com | International Tennis Federation

NEWS | ABOUT DEVELOPMENT | DEVELOPMENT OFFICERS | PLAYER DEVELOPMENT | NATIONAL ASSOCIATIONS

UPCOMING DEVELOPMENT EVENTS

- 11 - 19 August: East Pacific Regional Event (12&U, 14&U, 16&U and 18&U) American Samoa
- 18 - 27 August: Pacific Oceania Junior Championships (12, 15 and 18 & Under) Fiji
- 31 August - 13 September: ITF/ATP Development Training Camp for JTI players

Click here to view the full 2014 events calendar

TOURING TEAMS

Grand Slam tournaments increase funding to GSDF
The Grand Slam tournaments have agreed to increase their contribution to the Grand Slam Development Fund (GSDF) by 25 per cent to over \$2 million annually.

LATEST NEWS

Lebanon headlines ITF West Asian

TennisCoach | Technical | Tactical | Physical | Mental | Medical | Player | Coach | Parent | Tutor

Physical training - short, middle, long distance footwork training

Latest Content

- Development of the game of doubles on the orange court
- Research and practice
- Physical Coach and the Stage present on the tennis teaching...
- ABC of core training
- In this presentation, C. Fotheringham details the A1 of...

Recommended Content

- On-court conditioning circuits: Speed
- The game of tennis places unique physical demands on the...
- Wheelchair tennis: On court speed and stroke drills
- This video provides examples of an event...

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Clarity of expression should be an objective of all authors. The whole emphasis of the paper should be on communication with a wide international coaching readership. Papers can be submitted in English, French and Spanish.

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When submitting articles authors should indicate their name(s), nationality, academic qualification(s) and representation of an institution or organisation that they wish to appear in the paper.

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