

Pg.	Title / Author
2	Editorial
3	Measurement and control of tennis training load: a case study Cyril Genevois (FRA) , Isabelle Rogowski (FRA) & Tom Le Sollicec (FRA)
6	The power of attention Lucía Jiménez Almendros (ESP)
9	Attitudes of tennis coaches towards continuous education: a Caribbean perspective Kyle Hannays (TTO)
12	Research on the specific movement of the head in tennis strokes Manuel Fernández López (ESP)
15	Integrating mental skills into your coaching: a practical approach Merlin van de Braam (GBR)
18	The development of perception in tennis Santiago Micó Salvador , Rafael Martínez-Gallego & José Vicente Rams (ESP)
21	Accepting the pressures of coaching: insights into what coaches learn with over 10 years of experience working with elite junior tennis players Callum Gowling (GBR)
24	Circuit training for 12 and under tennis players: an on-court exercise proposal Carlos Valle (ESP)
27	Tennis teaching as a business: coaches as creators of added value Andrés Crespo Dualde (ESP)
29	The impact of biological age vs. chronological age on the development of the young tennis athlete André Vilela Brito (POR)
32	Recommended e-books Editors
33	Recommended web links Editors
34	General guidelines for submitting articles to ITF Coaching & Sport Science Review Editors



International Tennis Federation

COACHING & SPORT SCIENCE REVIEW

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EDITORIAL

Welcome to issue 80 of the ITF Coaching and Sport Science Review. During these troubling times, our foremost thoughts are with everyone who has been directly affected by the COVID-19 pandemic, and we send our condolences to those who have lost loved ones and those who are currently suffering. The lockdown being observed in many countries in the world has meant the suspension or postponement of many tennis events including tournaments, training and casual play. Whilst this is an obvious necessity at this time, and the priority must be on protecting lives, we know that for those with lives more embedded in tennis such as players and coaches, this has meant a stop to all work and activity for the time being. Therefore, to assist everyone in tennis affected globally during this time of uncertainty, the ITF has made more coaching resources available for free for the duration of this period of imposed shutdown.

More than 340 content pages, including videos, articles and scientific research papers, have now been made available for free on the ITF Academy, the ITF's educational platform, under the iCoach video and article library. New interactive online courses have recently been added to the 'Education' platform in the ITF Academy, with 23 free courses currently available in English and a further 8 in Spanish and 8 in French. The courses cover a variety of subjects, from an 'Introduction to Strategy & Tactics' to 'Ethics in Coaching'. New courses will be added each week, with 'Goal setting', 'Tennis Parents' and 'Teaching Methodology' among the upcoming topics to be covered. Whether for an established coach, a newcomer, or just someone interested in better understanding the fundamental of the sport, the ITF Academy is an essential tool for continued professional development. Please [click here](#) to register for free now.

In addition to the courses and resources available on ITF Academy, the ITF are also making their bestselling eBook 'Advanced Coaches Manual' available for free to all during this period (previously £14.99). Accessible via the ITF eBooks App which is available only on smartphones and tablets, the manual has been published in 13 languages and contains comprehensive scientific and practical information on all elements of the game for coaches working with players of all ages and abilities. The ITF eBooks app is an invaluable source of information in its own right, with more than 150 publications currently live – many of which are free to access.



We encourage our readers to use the ITF Coaching and Sport Science Review as much as possible as it is a fantastic resource for players, fans and coaches looking to improve their game, knowledge or coaching. The ITF Coaching and Sports Review enters its 28th year in 2020, with this issue this being its 80th issue. Around 800 articles have been published in the ITF Coaching and Sport Science Review since 1993, and these have covered a wide range of topics such as biomechanics, tactics, psychology, physiology, strength and conditioning, business, and more. Each of these articles, at the time of publication, contains the most up-to-date scientific knowledge, written by experts and those in the field, contributing to current coaching knowledge base. We would also like to encourage new submissions to the ITF Coaching and Sport Science Review, and full guidelines for acceptance and publication of articles can be found in the [most recent issue](#) page on the ITF Academy.

Finally, back to the current issue of the ITF Coaching and Sport Science Review. This article covers a wide range of topics including the movement of the head, a Caribbean perspective on coach education, circuit training, biological vs. chronological age, mental skills, attention, measuring training load, perception and the attitudes of elite coaches. One final article covers some considerations for running a tennis business. Finally, we would like to thank all the authors for their contributions, as well as all of those who sent in proposals. We hope that you enjoy reading the 80th edition of the ITF Coaching and Sport Science Review.

Luca Santilli
Executive Director
Tennis Development

Miguel Crespo
Head Participation & Coaching
Tennis Development/Coaching

Michael Davis Higuera
Research Officer
Tennis Development/Coaching

Measurement and control of tennis training load: a case study

Cyril Genevois (FRA), Isabelle Rogowski (FRA) & Tom Le Sollicec (FRA)

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ABSTRACT

The objective of this study was to quantify the training load involved in tennis training using relatively simple tools to provide practical information to coaches on the calculation and optimization of the training load, paying particular attention to the session-RPE method, the calculation of the monotony index and the acute to chronic workload ratio calculation. This article presents a case study of a 16-year-old player combining his education with his training in a tennis academy as well as with competition. The daily and weekly training load as well as the other indicators were calculated over 31 weeks and then explained, interpreted and discussed in this article.

Key words: RPE, training load, monitoring, monotony, ACWR

Corresponding author: cyril.genevois@aol.fr

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INTRODUCTION

The appropriate application of the training load (TL) is one of the fundamental factors in inducing beneficial physiological adaptations and improved performance. Insufficient loads do not bring about physiological adaptations, and excessive loads lead to harmful adaptations, such as a state of non-functional fatigue and/or a state of overtraining.

Considering the wide variety of exercises used both in technical-tactical training and in the physical conditioning of the tennis player, the measurement of TL is a challenge. The session-RPE (Rating of Perceived Exertion) method proposed by Foster et al. (2001), which is based on the post-session perception of the session's intensity and its duration, makes it possible to quantify the TL of different types of training by expressing it in arbitrary units (AU). It has been validated in several sports with men and women of different age categories and with various levels of expertise (Haddad et al, 2017), and in tennis with Elite players (Gomes et al, 2015). From a practical point of view, 30 minutes after the session, the player answers the question: "How did you feel the session on a scale of 1 to 10?" – the scale proposed by Borg et al. (1982). The TL of the session is then calculated as the product of the duration of the session (expressed in minutes) and the RPE. As a result, the higher the result obtained in the RPE, the higher the perceived TL.

Training load control is important from one session to the next but also from week to week and month to month to find a balance between fatigue and recovery. Since tennis injuries are mainly over-stress injuries, the goal is to find a threshold that allows both the optimization the player's training capacity while protecting him or her from the risk of injury. The Monotony Index provides an overview of the variability in training throughout the week. It is calculated by dividing the average daily TL for the week by its standard deviation. A weak index with large variations from one day to the next is to be sought, and it is advisable not to exceed a value of 2 (Foster, 1998). The acute load / chronic workload ratio (ACWR) is an indicator that compares the training load of the current week (acute) with the average of the previous 4 weeks

(chronic). A ratio between 0.8 and 1.3 would be considered a target area in which the TL is high enough to cause beneficial adaptations but not enough to generate harmful adaptations like increasing the risk of injury (Blanch & Gabett, 2016).

The objective of this study was to quantify the size and the variation of the TL using the RPE session method, the monotony index and the acute load / chronic load ratio over 31 weeks in a 16-year-old high school player.

METHOD

The case studied a tennis player training in an academy (16 years old, weighing 51 kg, measuring 168 cm, with 9 years of practice, 10 hours of weekly training and an ITN3 ranking) following a traditional high school schedule (30 hours of lessons including 2 hours of P.E. per week). During the 31 weeks of the study, the player accumulated 78 technical-tactical training sessions, 75 physical training sessions and 50 competitive matches. Physical endurance (30/15 IFT) and strength (Squat and Deadlift) tests were performed in weeks 1, 16 and 29 to assess the effectiveness of the training. The EC for each session was calculated by multiplying the RPE score by the duration of the session in minutes. These data were then used to calculate the weekly monotony index and the acute to chronic workload ratio (ACWR).

RESULTS

Presented below in table 1 an example of a summary table used to calculate and analyse the training loads per session, daily and weekly.

Day	Session	Session RPE	Session duration (min)	Session workload (min)	Daily workload
Monday 8/10	Tennis	4	90	360	720
	Strength	6	60	360	
Tuesday 9/10	Tennis	3	90	270	630
	Endurance	6	60	360	
Wednesday 10/10	Rest day	0	0	0	0
Thursday 11/10	Tennis	4	90	360	720
	Endurance	6	60	360	
Friday 12/10	Tennis	2	90	180	420
	Strength	4	60	240	
Saturday 13/10	Competition	5	90	450	450
	Sunday 14/10	0	0	0	
Weekly workload					2940

Table 1: Example of a weekly training workload summary

Figure 1 shows the distribution of weekly training loads as well as the change in the monotony index and the acute to chronic workload ratio (ACWR) throughout the 31 weeks.

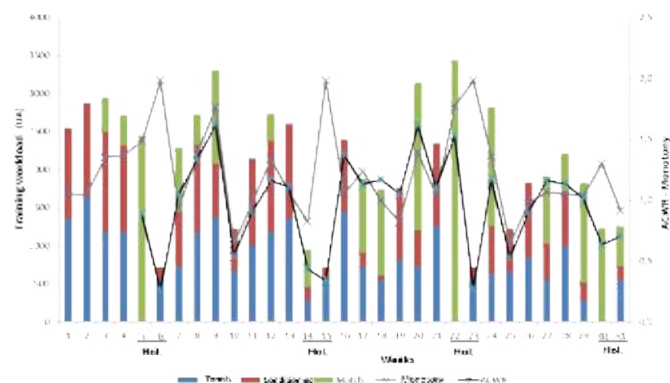


Figure 1: Total weekly workload (bars), monotony index (grey curve) and ACWR ratio (black curve) for 31 weeks. The underlined weeks (VS) are holiday weeks outside the academy.

The average weekly training load during the 31 weeks was 2105 ± 787 UA, varying from 720 UA to 3440 UA. The average monotony index was 1.2 ± 0.4 (minimum: 0.64; maximum: 1.98). The ACWR ratio was 0.97 ± 0.39 . Values outside the theoretical target area (0.8-1.3) were observed for 11 weeks out of the 31 studied: three higher values (between 1.49 and 1.63) for weeks 9, 20 and 22 and eight lower values (between 0.34 and 0.60) for weeks 6, 10, 14, 15, 23, 25, 30 and 31.

Figure 2 shows the distribution of average RPE values, duration and training load for the different types of session.

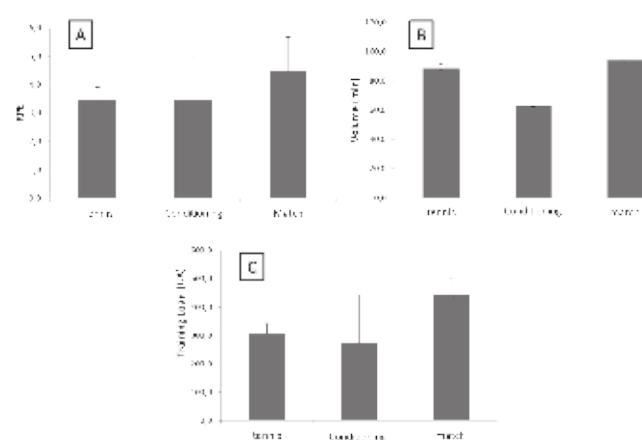


Figure 2: Average values (with standard deviations in error bars) in RPE (A), volume (B) and load (C) for technical-tactical sessions, conditioning sessions and competitive matches over the 31 weeks.

Higher average values of RPE, duration and training load were observed for the matches when compared with technical-tactical sessions and the physical conditioning sessions. A greater average value of session duration was observed for the technical-tactical sessions in comparison with the physical preparation sessions.

Table 2 presents the results of the player's physical tests and highlights an increase in endurance and strength.

Tests	Week 1	Week 16	Week 29
Squat (% BW)	57.7	115.4	134.6
Deadlift (% BW)	57.7	79.6	105.8
30/15 ITF (km/h)	17	18.5	19

Table 2: Summary table of physical strength as a percentage of bodyweight (BW) and endurance (in km/h) test results at three moments during the season.

DISCUSSION

The aim of this case study was to quantify the training load with the session-RPE method and analyse its evolution over 31 weeks using the acute to chronic workload ratio in a 16-year-old player at high school. The results revealed an average weekly training load of 2105 AU, and an average ACWR of 0.97 with 35% of the total training weeks outside the target zone. They also revealed that the values of RPE and average load of the technical-tactical and physical sessions were significantly lower than those of the matches.

Our results are relatively comparable to those of other studies in tennis (Gomes et al, 2015; Murphy et al, 2016; Coutts et al, 2010; Gomes et al, 2011) or on physical preparation (Lockie et al, 2012; Kilpatrick et al, 2015; Singh et al, 2007). They can therefore be used as a reference for planning training loads. On the other hand, it is important to understand that the weekly TLs depend on the number of hours of training and that they can therefore vary greatly depending on the level of involvement of players in practice (Fett et al, 2017). However, the average values of RPE and training loads for technical-tactical sessions and matches are lower than those observed for a very similar average duration for players of the same age at national level (Perri et al, 2018; Murphy et al, 2015). In addition, as previously presented, the RPE and average load values of the technical-tactical sessions were significantly lower than those of the matches, suggesting a lack of adaptation of the training to the levels of competition. However, the value of the post-session RPE can be impacted by physical exercises in technical-tactical sessions (Murphy et al, 2014). It would therefore be interesting to consider the relative RPE and the duration of the exercises in order to prescribe situations which allow approximation of training to the levels of competition.

The weekly monotony index reflects the daily change in TL. The highest values were obtained during holiday weeks when training was significantly reduced and therefore posed no significant risk. It is interesting to note that the RPE values of the physical preparation sessions are more dispersed than those of the technical-technical sessions and could therefore be the main factor of variability. In view of these results, coaches could be advised to bring more variety in the intensity of the technical-tactical sessions.

The acute to chronic workload ratio (AWCR) remains mainly in the targeted area (0.8-1.3). The values below this threshold correspond to weeks of school holidays (weeks 6, 15 and 23) where the player was not present at the academy and had to perform sessions independently. The values above the threshold correspond to weeks with several competitive matches. As the variability in the duration and intensity of competitive matches is difficult to predict, an analysis a posteriori should allow coaches to adapt training sessions for the following week to stay within optimal ratio values.

During the 31 weeks, the player was never absent (no injuries), progressed on physical tests, and had a win / loss ratio of 1.9 including 13 wins against players ranked higher than him. We can therefore conclude that, in addition to the player's development being linked to his growth, the organisation of its training load has enabled him to adapt effectively by improving his performance and avoiding injury.

CONCLUSION

The purpose of this case study was to introduce coaches to a simple method of quantifying tennis training load and its indicators in order to analyse variations over time. More research involving different levels of play and age categories is needed to establish benchmarks and to improve and develop workload planning methods in our sport.

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RECOMMENDED ITF TENNIS COACH CONTENT (CLICK BELOW)



The power of attention

Lucía Jiménez Almendros(ESP)

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ABSTRACT

This article attempts to define the concept of attention and characterise its main characteristics in order to better its impact during the learning process as well as on the tennis player's own performance. This is accompanied by examples of exercises as well as guidelines for the improvement of this crucial psychological ability, on and off court.

Key words: focus, concentration, full attention, learning, emotion

Corresponding author: lucia@feelinflow.com

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INTRODUCTION

'Attention' as an umbrella term incorporates several terms which although related, are different to each other and have different connotations that should be considered. What is certain is that this mental aspect belongs to a large family of concepts named 'attention skills', and that classification of a player with reference to these different skills provides us with information about the tennis player's ability to function and progress in his/her learning process, from recreational levels to competitive ones. The concepts that emerge from the study of attention, as well as the one that we mainly deal with in this article bring to mind a whole host of situations that are transmitted and take place on-court. We will look at how to use and train attention in a way that helps improve the performance of our players.

"I was playing pretty well in the first set until 5-2. Maybe I thought too early on that the match was over. I lost my concentration for just one game, and the match turned completely" (Justin Henin)

Of the multiple definitions of attention, Reategui (1999) explains it as follows: "attention is a discriminatory and complex process that accompanies all cognitive processing, it is also responsible for filtering information and allocating resources to allow internal adaptation of the organism in relation to external demands".

In other words, attention, being discriminatory, is partially voluntary or intentional, as it allows the mind to attend to one thing or another based on interest/motivation, objectives, relevance, etc. On the other hand, it is complex and accompanies the entire cognitive process which includes the processes of decision-making, memory, and (very relevantly for the context of this paper) emotional regulation. Finally, it is responsible for filtering the information which in turn allows for the allocation of resources that make it possible to adapt to the incoming ball or situation. That said, and transferring this definition to tennis, the attention we develop while playing allows us to attend to one or the other stimuli depending on our interest, i.e. do I focus on how the ball just hit is coming to me, or do I stay focused on the previous failure and focus my attention on the circumstances that led to it? In addition, this attention will condition a player to either play aggressively, looking for the next point, or more conservatively. It will also remind a player - consciously and unconsciously - of the situations in which that same situation has happened to them in previous games, and finally, depending on how constructive the interpretation they make of it (on how I say it to myself), it makes the player feel better or worse, guiding their resolve in one direction or another.

In short, attention is the precursor, the seed or crucial point of how games develop in many cases or of a learner progressing faster or slower in their learning process. It is not by chance that the prestigious psychologist and journalist of the well-known Emotional Intelligence concept, Daniel Goleman, dedicated his next book 'Focus' (2003) to this great protagonist of our tennis life - "attention".



TYPES OF ATTENTION AND THEIR RESPECTIVE APPLICATIONS IN LEARNING IN TENNIS

From the different classifications available, the following are the most relevant for the current context:

a) Based on the mechanisms involved:

Selective or focused attention: Defined as the player's ability to select the relevant stimuli and discard those that are not. Example: The player who is attentive to his score regardless of how the courts next to him/her are doing. This involves being able to continue paying attention to the dynamics of the game despite the distractions that the other player performs, i.e. his/her possible complaints, celebrations, and signs of pain due to possible injury.

Divided attention: Ability to pay attention to several stimuli at the same time. It is known that we can effectively attend to two stimuli when one of them is automated; it is therefore a matter of distributing attention resources effectively. Examples: a player focuses on the place where he wants to serve without having to think about how he is going to hit the ball; or, a player has a game plan for the next point and is able to observe where the other player is located as he is about to hit the ball, thus being able to change the initial plan.

Sustained Attention: Ability to keep attention on relevant stimuli for a desired amount of time. A lot of time, this is referred to as concentration. The obvious example is being able to stay focused throughout the entire game, without large absences in attention, that are normally natural.

b) Based on the object to which it is directed:

External Attention: We attend to external stimuli such as: the ball, the court, contact point, and the non-dominant hand... any object external to oneself.

Internal Attention: Stimuli from our bodily sensations and that are closely related to everything we perceive through the body. For example: feeling on the grip, focusing on the breath, the position of my shoulders when taking off or walking, the support of the feet, the sound of the ball when I hit...

EXERCISES TO IMPROVE DIFFERENT TYPES OF ATTENTION:

Selective Attention:

1. **Pay Attention!:** The coach feeds balls to the player with the hand or with a racket. The player has to follow certain tactical guidelines for the directions to aim for depending on the type of incoming ball (attack, defensive, construction). Meanwhile, another player speaks to the one playing, from behind, trying to distract him.
2. **Deaf Ears:** Players play a set with music playing on speakers. The guideline to the players will be to focus on the tasks proposed for the set, without paying attention to the music. At the end of the set the player will reflect on how many songs they remember. The more they remember, the less selective capacity they will have shown.
3. **Listen...:** Sitting near the training court, the player or players close their eyes and is invited to pay attention to the sounds of the environment, e.g. birds, wind, cars, people, the sound of the other hitting the ball, a coach making a comment, etc.. After a few minutes you are asked to focus only on one of them and try, at the end of the exercise, to describe it in depth, with as much nuance as possible.

Divided Attention:

4. **Getting Dizzy:** A cooperative rally is carried out with a partner: They rally cross-court, and when player A sees an opportunity, hits down-the-line and the sequence continues. At the same time, partner "C", placed behind "B", will do different individual balance or agility exercises. At the end, player "A" will name the exercises performed by player "C" of which he has been aware. NOTE: The objective will only have been achieved if the rally between players A and B has been of a high quality.
5. **Surprise:** Two players rally together cooperatively down the line or cross-court; When the coach sees fit, he will put another ball into play so that the players forget about the rally ball and continue to play the point with the "new" ball.
6. **Hawk-eye:** The players sit down next to the training sessions of three different courts, they are given the following guideline: "You have 3 minutes to observe the three courts". Afterwards, the players reflect on who trains on each court and what exercise they are doing?

Sustained Attention:

7. **Am I here or not?:** A tie-break is played and at the end of it the player will write down the thoughts that have crossed his mind, and whether these are directed to the past, present or future.
8. **Super Focus:** Perform "your" ritual after each point for the next 20 minutes. How many points have you not done it for?
9. **Am I or not I?:** Close your eyes and keep your mind blank for a minute. How many times have you "drifted" from this? In this exercise we are not intending for the player to spend the whole minute with a blank mind, this would show a very high level of concentration that requires years of practice; the point of the exercise is to teach the player to "return" to their mental screen whenever they drift, teaching awareness that they can return whenever they choose. Over time, the length that one can stay 'blank' may be increased.

ATTENTION AND ADOLESCENCE: LEARNING OPPORTUNITIES

Today, teenagers as well as children have an increased ability to pay attention to multiple stimuli at once. Digitalisation has caused the general pace of life to increase enormously whilst causing waiting times and patience to decrease, with this last virtue even losing value for younger generations. In this sense, tennis is currently immersed in one of its great battles, the one that marks "the society of immediacy vs. learning processes". This trend has even influenced tennis regulations: matches with 4 games, super tie-breaks in the third set, no-let net rule, golden ball; however, not all of these situations are actually that inconvenient or difficult, and as with any other situations that occurs when we play, we can use these circumstances to improve. On the one hand, the young tennis player's high capacity to switch attention to various stimuli allows him to receive more information that when well selected and organized, stimulates a greater capacity for assimilation. This is all accompanied of course by training with sustained attention, concentration, as well as attention to the present moment (mindfulness), as proposed by Van de Braam and Aherne (2016) or Yousuf (2016). For this, tennis is an ideal setting, given that a tennis point in itself grounds you in the present moment naturally, since the ball always returns and never in the same way, necessitating conscious and unconscious adjustments constantly.

On the other hand, the speed at which the matches are played, with the rules that have been implemented (especially in lower categories), put the player to the test in handling emotionally charged situations much more frequently and quickly; thus, they become potentially expert regulators of stress, when and if, of course they are accompanied and guided in the process.

Guidelines for improving attention skills:

We know that there are certain stimuli that attract our attention more than others, therefore, we use this information and apply it to the exercises that we propose. Taking into account the variables that Roselló (1998) proposes, at the level of external stimuli, we find:

Novelty: Present different exercises or variants on exercises which you already use

Complexity: When we don't master something, our attention is focused on capturing it, trying it, failing, restructuring and trying again.

Intensity: The same exercise with a different intensity, either slower or faster, makes us pay a different type attention to before.

Repetition: Whilst repetition creates monotony and can decrease motivation, it is, especially in advanced players, a great tool to develop attention since tennis players often face repetition in their careers (e.g. first rounds, matches with a lot of rallies, heavy balls and therefore difficulty in closing points ...).

Color, movement, position: This will consist of introducing variables in the exercises that we usually do, taking these aspects into account.

Figure 1: Guidelines for developing attention

ENEMIES OF ATTENTION

Although improving attention requires willingness and intention, there are certain variables that affect it and that, if unknown, can confuse us about what may actually be failing in the process. We may think that our player has certain technical deficiencies or difficulties in learning, but what may be happening is something different related to the following (Czajkowski, 1996):

1. **Tiredness:** When we are tired, we lower our defenses at all levels, the most evident being at the physical level. We should also be aware that this also affects our emotions (we get irritated more easily, we have less patience) as well as with our cognitive capacity, in this case the difficulty to keep our attention on the stimulus that interests us.

2. Boredom: This is a double-edged sword because, although it diminishes the attentional capacity (the mind jumps from one thought to another randomly, without apparent control), we should not always run away from it since it constitutes a great space to develop creativity, as well as to improve attentional capacity, as long as the players know how to transcend the subjective feeling of "boredom".
3. Low activation: A low activation puts the brain at a rate of work at odds with our most effective attentional peak; therefore, 'activation' is a great mechanism to return attention to what interests us

CONCLUSION

Attention has been a concept widely recognized in sports psychology for many years. While in recent times the rise of Emotional Intelligence has shifted this crucially important cognitive ability from the main focus, the popularity of Mindfulness has once again highlighted its importance. Given the importance of attention, seen in the multiple tennis situations-mentioned during this article in which it plays a large role, it seems logical to train it with the same intensity or importance given to other psychological technical-tactical and physical skills. Furthermore, remembering that every situation is an opportunity to improve attention, it is not the same to do physical training whilst thinking of things that have little to do with training, than to do the same exercise focusing on range of motion and/or muscles involved; just as hitting balls is not the same as paying attention to them with a specific intention.



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Attitudes of tennis coaches towards continuous education: a Caribbean perspective

Kyle Hannays (TTO)

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ABSTRACT

This study sought to unearth the attitudes of Caribbean Tennis coaches towards continuous education. Utilizing purposeful sampling, forty (40) respondents of assorted coaching levels from various islands were recruited to participate in the study. The results illustrated that, contrary to belief, coaches did not view continuous education negatively but rather illuminated that courses may not be adequately catering to the needs of coaching practitioners in a meaningful way. Additionally, results also highlighted issues such as inadequate exposure and disgruntlement of coaches who feel undervalued. As such, strategies must be focused on addressing these issues.

Key words: coaching, education, attitudes, experience

Corresponding author: kahannays@hotmail.com

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INTRODUCTION

The concept of coaching education has been gaining traction within the athletic sphere. Coaching education is a developmental strategy which sees the coach assume the role of learner within an environment geared towards achieving a specific personal or professional goals; this is facilitated through the provision of training and/or guidance (Vargas-Tonsing, 2007). This process of coach education has been identified by several researchers as key to “raising the standard of coaching practice” (Avner et al., 2017, p. 101). Yet despite the reported consensus above, coaching education as a developmental initiative for coaching practitioners seems frequently overlooked and undersubscribed within the Caribbean. Most often, experience surfaces as the favoured qualifier in the field. Researchers have noted that while certification is mainly obtained following successful completion of formal coaching education programs, many studies have pointed to the fact that “formalized learning venues are not valued by coaches as much as their day-to-day learning experiences in the field” (Werthner & Trudel, 2006, pp. 198–199).

Despite this preference noted above, several researchers agree that, “Successful coaches make active attempts to obtain additional knowledge and skills right through their careers as coaches.” (Van Der Merwe et al., 2015, p. 2). While this in no way negates the importance of experience to coaching practice, the role of coaching education to this development cannot be ignored. A primary fact that must be highlighted within this discussion refers to the nature of coaching education. Gilbert, Côté and Mallet (2010) aptly point out that coaching competency occurs via both formal and informal educational environments; such as observation (Cushion et al., 2003, p. 217), and mentorship (Bloom, Durand-Bush, Schinke, & Salmela, 1998). Furthermore, Nelson, Groom and Potrac (2014) aptly highlight that knowledge can be either propositional/theoretical (knowing-that) or practical/performative (knowing-how). They also highlight that the nature of the practical knowledge (weak or strong) is a significant issue since in the weak sense, one can perform a task but cannot articulate how it is done while in the strong sense, one can both execute and articulate the process (Nelson et al., 2014, p. 10). This distinction within practical knowledge inadvertently highlights that experience alone may not be sufficient and lends validity to the argument in favour of more structured coaching education.

While coaching education in its many forms seem to be growing in significance and engagement, an observation evidenced by the existence of substantial literature on the subject, tennis coaching within the Trinidad and Tobago remains a practice that mandates no qualification. Though no shortage of talent exists within

both coaches and athletes alike, development seems almost stunted and performance outcomes remain less than favourable. This reality is not only true for Trinidad and Tobago tennis but also within the wider Central American & Caribbean Tennis Confederation (COTECC). Even more alarming is the fact that when developmental courses are offered, they are very poorly attended by the region's coaches. It would seem therefore, that despite its increasing relevance, many tennis coaches within the Caribbean seem content with base level coaching qualification or none at all. This study therefore sought to explore the attitudes of Caribbean tennis coaches towards continuous coaching education, in an attempt to learn how it may influence tennis success in the Caribbean.

METHOD

Given the nature of the research, a mixed methods approach was adopted; a modified Coaching Education questionnaire (Vargas-Tonsing, 2007) and semi-structured interviews were utilized. The questionnaire sample was purposefully recruited via the ITF development officer who served as gatekeeper for the study; selection was based on the educational level of coaches. Following the questionnaires, interviews were conducted with four coaches whose selection was influenced by their coaching level, experience and geographic location. The criteria for selection was as follows: A Play Tennis coach with less than two years of experience, a Level 1 coach with more than five years of experience, a Level 2 coach with ten or more years of experience and the single level three coach within the region who has over fifteen (15) years of experience. Each coach represented a different island within the Caribbean.



Data Treatment/Analysis

Responses to the coaching education questionnaire were analyzed to elucidate any dominance or lack thereof among the investigated topics, motivators and attitudes. The results were measured comparatively using the mean of the responses given within the 5-point Likert scale with the general consensus of the participant coaches with regards to the subjects noted. Following this exploration, interview questions were constructed and general talking points noted for reference during the semi-structured interviews. Interviews were recorded and a partial transcription was done during which subsequent commonalities were identified and extracted for further exploration. Findings of the questionnaires were also compared to the thematic commonalities identified during the analysis of the interviews.

RESULTS

Fifteen coaching education topics were outlined, and participants were asked to rate each topic in terms of how helpful they felt the subject would be to their practice of coaching. Among the highlighted subjects, Sport Nutrition (M=4.51), Goal setting (M=4.45) and Communication (M=4.42 on a 5-point Likert Scale, were topics that generated the greatest interest for coaching education courses. Drugs in sports and addictive behaviours had surprisingly low means given the frequency of drug use among athletes, weighing 2.74 and 3.13 respectively (See figure 1).

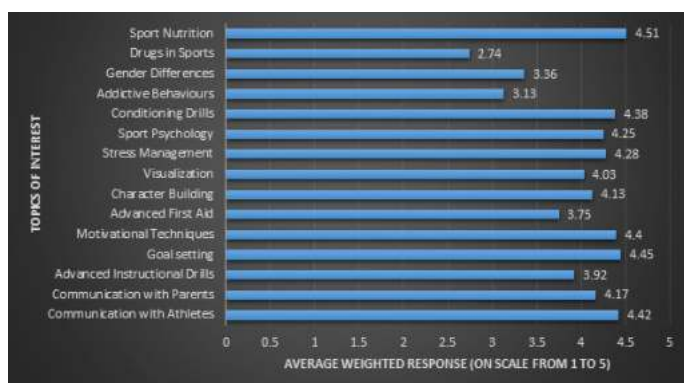


Figure 1. Topics of interest in coach education: weighted average responses from Caribbean coaches.

Additionally, nine motivational factors to coaching education were outlined and participants were asked to rate how significant a role each played in their decision to pursue coaching education. Results showed that relevance of topic (M=4.0) was the most significant factor impacting the participants' decision to engage in continuous coaching education. Also significant to motivation were online availability and desire to coach higher levels having an average of 3.88 and 3.85 respectively. Ranging lowest in consensus was league requirement with a mere average of 2.63; this mean value was reflective of the responses which ranged largely between not important at all (1) and important (3) on the 5-point scale. All related results are included in Figure 2.

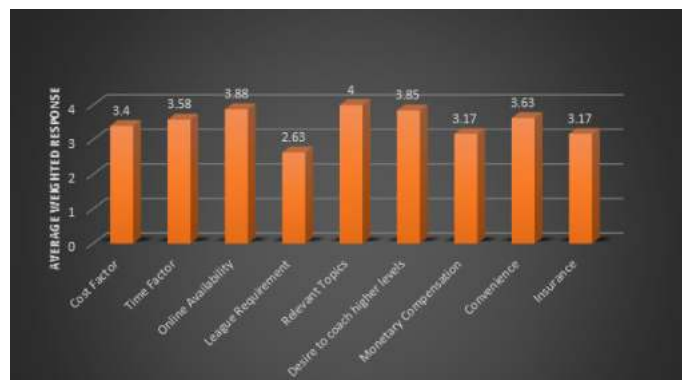


Figure 2. Motivations for engagement in coach education: average weighted responses from Caribbean coaches.

Participants were also asked seven questions aimed at ascertaining their perceptions of coaching education. In general, coaches seemed to recognize the value of continuous coaching education; 100% of the respondents acknowledged the importance of coaching education to youth sport coaching, 92.5% felt it should be mandatory while 75% agreed it should be required. Only 80% of the respondents planned on pursuing this path with 72.5% expressing a higher likelihood of participation if this education were available online.

Following the questionnaires, the interviews attempted to gain clarity on not only the participants philosophy of coaching but also their views on coaching education and their perspectives on what accounts for the underperformance of the athletes within the region. To this end, highlighted themes among the coaching levels included Compliance of coaching Education and individual philosophy, Online availability and continuity for coaching education, Funding and Coaching education and Experience and coaching education.

DISCUSSION

A descriptive exploratory analysis was performed on the data presented above in a bid to address the major concerns of this research. Given the results noted above, it seems only fitting to point out that in general, the attitudes of Caribbean tennis coaches towards continuous coaching education are significantly positive. Results of the mixed-methods approach supported an acknowledgement of its value to development; 100% of the participants agreed that coaching education was important for youth sport coaches, 80% of which expressed plans to pursue coaching education in the future. However, despite the overwhelming acceptance of its role, several other factors impact the frequency of pursuit. These included compliance of coaching education and individual philosophy, online availability and continuity for coaching education as well as issues related to funding by governing sporting bodies and the perceived value of experience.

The compliance of coaching education to the coach's philosophy emerged as a determinant for the pursuit of coaching education. When participants explained their coaching philosophy, it became evident that for some, their philosophy was both a motivator and a product of their recent educational pursuits. Additionally, online availability and continuity emerged as significant. Many agreed that their respective associations should develop and implement online support for coaches that can be engaged on a regular basis for the purpose of continuous engagement in training and follow up. Coaches seemed to agree that the courses are not in and of themselves inadequate but rather lacked the continuity necessary to ensure that coaches maintain the highest calibre of practice following their certification.

Perhaps the most significant of the finding was illuminated at the cross-section of the funding and experience perspectives. The apparent reluctance of sporting bodies to fund coaching education ventures emerged as a factor that greatly affects coaches' willingness to participate in coaching education. Several coaches expressed that more should be done from an institutional standpoint to ensure facilitators of the national programs are given the opportunity to enhance their skill and knowledge base. In the absence of this provision, responses seemed to suggest that coaches feel undervalued and simply have no interest in pursuing financial commitments which are neither mandatory nor will it improve their value to the organization. Coupled with the above is the held belief that experience, which requires no additional funding, significantly impacts coaching efficacy; 97.3% of participants admitted to having experience as a player within the sport of tennis with 52.63% stating that this experience was the factor that influenced their coaching style. Therefore, since the lessons of experience are not only invaluable but also free, it remains a major qualifier for practitioners.

CONCLUSION

Having completed the investigative process, what the results illustrated was not negative attitudes but rather the fact that courses may not be adequately catering to the needs of coaching practitioners in a meaningful way. Therefore, in order to address the issue of underperformance and encourage coach development via educational programs, more effort needs to be directed at meeting the educational needs of coaches. Additionally, issues such as disgruntlement of coaches who feel undervalued and inadequate exposure must be addressed in real and tangible ways. While exploration of this topic is by no means complete, there is now a better understanding that can guide future developmental efforts.

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RECOMMENDED ITF TENNIS COACH CONTENT (CLICK BELOW)



Research on the specific movement of the head in tennis strokes

Manuel Fernández López (ESP)

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ABSTRACT

Technique is one of the aspects that has the most relevant influence on tennis player performance. Searching for more efficient and effective technique, by means of the application of biomechanical laws, is a constant among coaches and researchers. This article deals with a very concrete subject in tennis technique: the position of the head during the impact phase of tennis strokes. Biomechanical aspects of the strokes will also be considered, as well as other relevant aspects such as fixing the gaze during the stroke and the stretching-shortening cycle.

Key words: vision, balance, fixing, impact

Corresponding author: tennisplay.manu@gmail.com

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INTRODUCTION

Certain studies carried out with professional players, both male and female, suggest that fixing the head during all or part of the impact phase in a tennis stroke is an important factor for the correct execution of tennis strokes, determining performance through stability during this execution (Lafont, 2008).

Heightened balance/stability of vision or the head occurs at three points in the game: first, during the gaze when receiving information when reading the sent by the opponent (for example, the flight of the ball); second, focusing when the ball moves into the player's impact zone; and third, fixating on the impact point, keeping the eye-head stability during and even after impact (Elliott, Reid, & Crespo, 2009).

The support base will help to keep the right alignment of the spine and, in turn, it will help to keep the head up. The lack of balance, an incorrect execution of the movement, or a wrong position will make achieving head stability difficult at impact, and therefore, will reduce the possibility of an efficient stroke.

ITS RELEVANCE FOR TENNIS

The biomechanics of tennis strokes is a field of great importance for coaches and researchers. Several studies have specifically dealt with the function of the head: for example its position during play (Elliott et al., 2003; 2009); and, its relationship with the gaze. Lebeau et al. (2016) studied the "quiet eye" concept, taken from Vickers (2016), who observed the relationship between the position of the head, the direction of the gaze and the attention of the athletes or persons being studied. In tennis, research done by authors such as Reina, Moreno, & Sanz (2007); Sáenz-Moncaleano, Basevitch, & Tenenbaum (2018) and Giblin, Whiteside, & Reid (2017), among others, is worth mentioning.

On the other hand, head movements can be related to the stretching-shortening cycle of the upper limbs; moving the head slightly forward, away from the shoulder, facilitates the creation of the pre-stretching movement that will provide power to the arm and the racket. Because of this, most probably, beginner level children and less experienced players may move their heads when hitting.

For this reason, it is suggested that it is necessary to train the eye-head fixation at impact, so as to avoid potentially harmful movements (Elliot, et. al., 2009). In this same vein, Lafont (2007; 2008) states that it is probable that inexperienced players try to see if the ball goes to the desired target, and because of this, they do not fix their head on the impact zone, as elite players do.

When comparing the technical movements in Nadal's and Federer's strokes, which are now considered the best ever, we find a number of differences between them; however, there is an aspect in which they both coincide: they fix the gaze and the head on the impact point, and maintain it after the stroke, during the follow through. Unlike other lower level players, these two do not try to see if the ball goes towards the target they were aiming at (Lafont, 2008).

MOST RELEVANT RESEARCH

Research can be classified according to the most relevant content types researched:

Research with subjective or qualitative observation of the head at impact

Keller et al., (2006) subjectively evaluated the body position of participants (children), classifying their styles using different tests. One of the tests involved hitting a forehand with a mini-tennis racket with the body position being observed and evaluated (it being explained in the study that particular attention would be placed on evaluation of the horizontal position of the player's feet, the low centre of gravity and the straight position of the back and the head). Also, the test scored the accuracy of strokes, relating the outcome and biomechanical variables. The results suggest that the most efficient kids are classified as reflective in their style, performing more mature movements and skills.

Among other subjective observations are the ones made by Lafont (2007; 2008) which used photographs of the head positions of professional tennis players at the point of impact. This author has classified players into: "fixers, partial fixers and non-fixers", depending on whether they fixed their heads more or less at impact. Results concluded that most professional players were at least partial fixers, even though the exact zone near the impact zone where they fixed, varied considerably from player to player. The duration of the maintenance of fixation after impact helped to differentiate elite players from professional players.



Research of biomechanics or quantitative analysis of the head position at impact

A study by Shafizadeh et al. (2019) has implications for perfecting the movement of the tennis serve. The author gathered all movements in a full biomechanical model with various degrees of freedom, quite an innovative procedure given that it would allow subsequent analysis to be performed from either a general perspective or a more specific point of view for each joint or axis. So far, much biomechanics research has focused on and has made a great deal of progress in stroke mechanics, measuring the speed of the joints, the racket, the ball, even in the global movements in the rotation of the trunk, the leg drive, or both, in many cases using markers and 3D records (see Bačić & Hume, 2018) for all. However, in many studies, the position and orientation of the head were not considered, and neither was accuracy of the strokes, i.e. measured with targets in different contexts during play.

Quantitative research related to ocular movement

The gaze in the strokes is a very important aspect. Giblin et al. (2016) observed that when testing players who were serving with closed eyes, there were significant stroke differences in the ball toss and racquet kinetics from the backswing to the final phase, with misses in 16 out of the 24 services intended. Furthermore, and contrary to the hypothesis, the speed of the movement of the racket decreased when compared to those serves with open eyes. This study intended to prove if the service is a closed skill, as had been normally commented; but it is quite the opposite according to the results, since if it were closed, it could be performed very well by top level competition players as the participants of the study.

Luis del Campo et al. (2015) whilst studying the visual search, observed and classified the vision of the ball into four phases both in lab conditions and court conditions: A) the ball leaving the ball machine to entering the player's field of vision; B) the moment the ball enters the players field of vision to the bounce; C) from the bounce to shot contact; and D) from the contact to the moment the ball leaves the player's field of vision. The fact that the ball becomes the most important spacial location in all phases (except phase D) highlights the role of the gaze in these phases, in which fixation is based around intercepting the ball, according to some studies of different sports (Lebeau et al., 2016).

Reina et al. (2006) in a previous study with wheelchair tennis players and players standing on two feet, found in the observed D phase in their study (from impact in service until the ball bounces on court) that there were a greater number of fixations in zones ahead of the ball for wheelchair tennis players, compared with standing players who had a greater number of fixations in zones behind the flight of the ball.

Reina et al. (2007) when comparing the gaze of expert to beginner wheelchair players relative to visual search behaviour during an opponent's serve, noted a greater number of fixations on the ball in general from beginners, obtaining a significant difference at the time of opponent impact where experts, when compared to beginners, made a greater number of fixations on the server's racket rather than the ball. In turn, beginners fixated more on the ball. The authors suggest that the difference could be due to the fact that experts anticipate more on the area of the bounce of the ball from the stroke, since they predict the resultant direction, speed, effect or height of the ball more accurately, whereas this prediction is still lacking in beginners.



In different lab studies concerning the vision of and movement response to opponent strokes (Singer, Cauraugh, Chen, Steinberg, Frehlich, 1996; Ward, Williams, Bennett, 2002), the differences between expert and beginner tennis players were analysed. Singer et al. (1996) showed that beginners fixated more on the head of their opponents but that the experts' movement were faster and more accurate. Ward et al. (2002) showed in their study that the decision time from the expert group decreased less than the beginner group's did when moving from a normal image to an obscured image, signalling better anticipation for the expert group given that experts may require more minimal information for successful performance.

Williams, Ward, Knowles, Smeeton (2002) followed the same research line to support their previous research, to develop an on-court test based on results obtained from the lab. The outcome of the lab in lab conditions, involving tennis video clips watched by the participants, conclude that 2D observation makes it difficult to predict the flight of a ball, due to the lack of depth, even when dealing with experienced players (Taya, Windridge, Osman, 2013).

Quevedo et al. (2015) studied competitive tennis players and observed how saccadic service movements in a non-specific task improved with programmed training by means of a 3D training system of different visual skills.

On the other hand, Ducrocq et al. (2016; 2017) suggested that the eye/head fixation impacts on the attention to play towards a target when under pressure, after training for it. These investigations are based on studies like Lafont's (2007; 2008), which have already been mentioned, which state there is a direct relationship between the position of the head being oriented towards the impact zone and maintaining stability during and after impact, with the level of elite professional players.

Along the same lines, Sáenz-Moncaleano et al. (2018) examined the "gaze behaviour", that is, differences in fixations on the flight of the ball and QE (Quiet Eye) between intermediate and higher-level tennis players. According to the authors, this has been the first approach to study the gaze behaviour in the return of the service in situ. Higher level players proved to make better returns than lower level players. Furthermore, the scores of these players when hitting the targets was characterized by longer fixations in the bounce zone just before the ball arrived. Higher level players managed to have longer QE duration and scored higher in the strokes in this same group.

CONCLUSIONS

The first conclusion refers to the scarce amount of research that exists on the function of the head and the "QE", "gaze" or "saccades" at the time of impact, and mainly in real game conditions.

Another important conclusion has to do with the use of technological advances that make it possible to measure specific movements. These measurements centre on the impact phase and are combined with measurements of stroke accuracy, so as to link the target, the movement performed, the gaze and the fixation on the same phase.

Finally, it is necessary to discuss the importance of research on the gaze and the head at impact in tennis strokes, and how the fixation and stabilization of these two factors seems to be key in the outcome and accuracy of the execution.

The research mentioned above concluded that higher level players can better manage all the movements of the kinetic chain, and consequently, they fix the eyes and the head ("gaze behaviour") on the impact zone to keep the accuracy levels extremely high.

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RECOMMENDED ITF TENNIS COACH CONTENT (CLICK BELOW)



Integrating mental skills into your coaching: a practical approach

Merlin van de Braam (GBR)

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ABSTRACT

Competitive tennis places a number of unique psychological demands on players. This article discusses some basic theoretical frameworks that coaches can use to underpin a practical approach to training mental skills as part of everyday squad training. The exercises outlined are specifically aimed to improve concentration, confidence, control of emotions and commitment.

Key words: mental skills; psychology; on-court training

Corresponding author: Merlin.van-de-braam@lta.org.uk

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INTRODUCTION

Competitive and professional tennis places many demands on athletes from a psychological perspective. There are no substitutions permitted, coaching is not allowed during a match and unlike most team sports, the duration of competition can vary significantly. At the regional and national level, players are required to both compete and also officiate their matches. At the higher end of the game, most players ranked inside the world's top 150 in both male and female tennis lose more matches than they win in an average season (ATP, 2020; WTA, 2020). Analysis by O'Shannessy (2018) has also shown that tennis players must learn to cope with high amounts of loss, with the world's top 10 players winning on average just 53% of the points they play in a year.

MENTAL SKILLS

There are a number of frameworks and publications that have been developed in an attempt to facilitate the training of mental skills within athletes across a range of sports, including football (Harwood, 2008) and tennis (Crespo, Reid & Quinn, 2005).

The "5C's framework" (Harwood, 2008) positions mental skills as trainable, and suggests that coaches can play a key role their development. The specific skills cited within this framework and by the ITF Tennis Psychology manual are Commitment (motivation), Concentration, Control (of emotion), Confidence and Communication.

MENTAL TOOLS

Applied sport psychologists and coaches utilize a number of strategies, techniques or 'tools' to enhance performance and the mental skills in their athletes. There are a number of well documented and empirically tested tools that can be specifically used to develop and support the aforementioned mental skills. These tools include, but are not limited to;

1. Goal setting
2. Visualisation
3. Self-talk
4. Breathing

To understand the relationship between mental skills and mental tools, it is helpful to use the analogy of physical development. In explanation, running could be employed as the physical 'tool' that develops the physical 'skill' of endurance. Similarly, stretching can be used as a tool that develops the skill of flexibility.



In the context of mental skills, if a coach would like to develop confidence, the use of goal-setting could be employed to foster this. Confidence can be derived from the experience of completing a specific, measurable but challenging target e.g. an increase in ranking (outcome goal).

In a practical on-court setting, one mental tool can be used to develop more than one mental skill. For example, goal setting can also be used to develop concentration by providing focus and direction for an athlete within a point, match or training block/season.

PRACTICAL EXERCISE FOR DEVELOPING CONCENTRATION

Reading the ball

Players rallying from the baseline must concentrate on the flight path of the oncoming ball, and shout verbally if they think the ball will land short or deep before it bounces. Coaches can progress this to be more difficult by splitting the court into three segments, or by challenging the player to predict the bounce of the ball before it crosses the net. Coaches can adapt this drill in a number of ways, including asking players to 'read' the oncoming spin of the ball.

How does this exercise help to develop concentration?

Concentration can be seen as a mental spotlight (Kremer & Moran, 2008). This exercise directs a player's attention to relevant cues, which in this case is the flight path and speed of the oncoming ball. Directing concentration to relevant cues can lead to improved anticipation and movement in preparation for the next ball.

PRACTICAL EXERCISE FOR DEVELOPING CONTROL OF EMOTIONS

Serve nerve

Players can compete against each other working in pairs on the same baseline. For this drill, players hit serves only. A total of four 1st serves need to be hit in a row to win a game. The player should serve from alternating sides after each successful serve. If a player misses a serve, then they are required to step away to give the opponent a chance to 'hold their nerve' and hit four first serves in a row. Players can be instructed to complete a full set.

How does this help to develop control of emotions?

This exercise is proposed to provide an environment for the player to test their emotional control under pressure. Specifically, the consequences of a missed serve increase incrementally after each successful serve. A player who has hit three successive first serves for example, will feel pressure building up to make the final serve to close out a game. Alongside this exercise, coaches can introduce positive self-talk to the player's normal service routine. The hypothesis here is that by using positive self-talk, players are less likely to experience negative thoughts or feelings that have been shown to result in lower serve consistency (Van de Braam & Moran, 2011).

PRACTICAL EXERCISE FOR DEVELOPING COMMITMENT

Dice tennis

This exercise requires players to play six competitive points to simulate the duration of one average game in tennis. Upon the conclusion of all six points, players are required to come to the net and roll an oversized foam dice. The player that wins the game is the player that won the point that corresponds to the number rolled by the dice. For example, if a player won the 1st and 5th point only and the dice roll was 1 or 5, this player will win the game, despite the fact that they won less points, and lost the last point played.



How does this exercise help to develop commitment?

This exercise aims to teach players that they should commit and fight for every point within a match. The use of a Dice introduces random allocation of victory and therefore the game can be won by either player, not the player that won the last point in the game, which is the norm in tennis. This results in players learning to fight for each point because they are of equal importance due to the introduction of the Dice. Whilst this exercise does not develop long-term motivation or underlying constructs linked to lasting commitment, it is a fun approach to competition that teaches players a valuable lesson to compete for each point.

PRACTICAL EXERCISE FOR DEVELOPING CONFIDENCE

Marathon tennis

Players or coaches need to select a process (e.g. recover off-centre during a forehand cross-court exercise). During the exercise, the player calls out loud if they achieve this task (by crossing a marker on the ground). Players accumulate a point for every successful execution of this specific process. The player that goes on to win the point receives a number of points that corresponds to how many times they executed the process. The player that loses is awarded half the points based on how many task completions. The objective of the exercise is to reach 26 points first – the equivalent of a marathon in tennis.

How does this exercise help to develop confidence?

Research shows that players whose perceptions of success are based on personal best (task orientation), alongside winning (ego/outcome orientation) are more motivated, show more persistence in the face of adversity, and demonstrate less competitive anxiety. This exercise teaches players that whilst the outcome of the point is important (did you win?), it also emphasizes the importance of the process (how did you win?). In the current exercise, quality is the process that would result in scoring more points. Winning the point without completing the process can only yield one point at a time.

GENERAL CONSIDERATIONS FOR INTEGRATING MENTAL SKILLS INTO YOUR COACHING

1. Structure the training environment in a way that enables mental skills to be tested and developed every day – in a fun and positive manner.
2. Always look to create player ownership, autonomy and independence – ask effective questions to involve your player in the learning journey and listen more than you speak.
3. Create an environment and communicate in a way that values a player's personal best, alongside beating others.
4. Do not use 'mental toughness' training as an excuse for bullying, intimidation or any other inappropriate behaviour that may harm athlete well-being and their enjoyment of tennis.
5. Know your limits as a tennis coach: ensure that you refer or recommend players to engage chartered sport psychologists or clinical psychologists where you detect a significant issue, such as a potential eating disorder or extreme levels of competitive anxiety.

CONCLUSION

Concentration, commitment, confidence and control of emotion are all skills that an athlete needs to navigate the unique psychological demands of tennis. Developing these skills through the use of mental tools, embedded into on-court exercises, can provide a fun and innovative way to enhance the efficacy of your coaching sessions. It is hoped that using these well-established mental skills and mental tools frameworks within tennis will lead to an increase in the amount of time spent training what is traditionally the most neglected of performance factors in tennis.

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RECOMMENDED ITF TENNIS COACH CONTENT (CLICK BELOW)



The development of perception in tennis

Santiago Micó Salvador, Rafael Martínez-Gallego & José Vicente Rams (ESP)

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ABSTRACT

This article provides coaches with a background to the concept of perception, defining it and linking it to the different components involved in certain specific motor tasks. The article then discusses theories that provide a framework to develop this aspect. Finally, it provides a practical set of specific exercises for tennis players who want to improve their perceptive capacities, one of the keys to improving player performance.

Key words: perception, training, tennis, exercises

Corresponding author: ramargal@hotmail.com

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INTRODUCTION

Perception is defined as the capacity allowing the identification and acquisition of information so as to incorporate it into one's existing knowledge (Marteniuk, 1976). Perceptive processing will depend on the sensory systems (in the case of the vision, mainly the eye), on the brain, and on the conscious processing of the perceived stimuli (Palmi, 2007). Thus, the perceptive mechanism is more complex than the mere fact of receiving a stimulus (seeing, hearing, feeling...), it implies being conscious of what is being seen (perceiving).

All the actions a tennis player performs on court (motor tasks), are based on three mechanisms or phases: perception, decision, and execution (Marteniuk, 1971) (Figure 1). Therefore, depending on the difficulty of each mechanism, so will the actions tennis players perform during play be more or less complex.

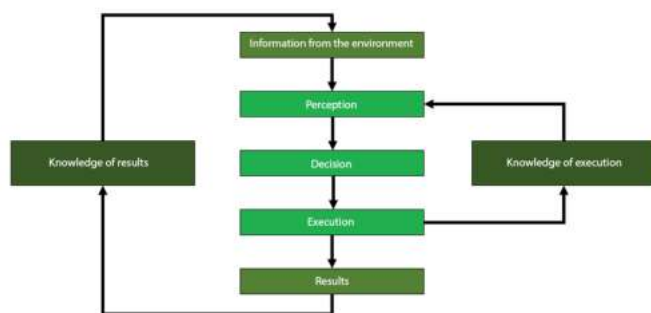


Figure 1. Mechanisms of motor tasks. Adapted from Marteniuk (1971).

Thus, perception is the first step in the process of any tennis action, and its relevance for optimum performance in the phases following the process, i.e. decision and execution, is obvious.

Having got to this point, it is important to reflect on the time devoted to these processes during training. Even though there is no previous research on the subject, as coaches and trainers, we seem to work this process from the opposite direction, that is, devoting a great deal of time to the execution mechanism (technique) and decision mechanism (tactics), and more often than not, neglecting the perceptive mechanism, in spite of its importance.

DEVELOPMENT OF PERCEPTION

Motor tasks may be classified according to the perceptive difficulty in: self-regulation tasks, external regulation tasks and mixed regulation tasks. (Singer, 1986). Tennis could be placed among the external regulation tasks, where it is necessary to continuously gather and adapt to the information received from the environment. That is, because it is a mainly perceptive and open activity, the player cannot have a preset and determined specific programme of action and must constantly anticipate the ball and their opponent. Finally, the game takes place in a stable and invariable environment - the tennis court.

From a more practical view, Billing (1980) states that the perceptive difficulty of a motor skill depends on five points:

- **Number of stimuli to pay attention to:** The greater the number of stimuli, the greater the difficulty.
- **Number of stimuli present:** The more the stimuli, the greater the difficulty.
- **Speed/ duration of the movement:** The greater the speed, the greater the difficulty.
- **Size and discriminatory aspect of the stimulus (intensity):** The smaller the size, the greater the difficulty.
- **Time/ Extension in which the stimulus may be confusing:** The shorter the time to react to a confusing stimulus, the greater the difficulty.

Applied to tennis, we have at least two stimuli: the opponent and the ball. The flight time and speed of the ball will greatly determine the perceptive difficulty of the game. Furthermore, the presence of the spectators or difficult weather conditions will also impact on the perceptive difficulty. In doubles, the perceptive difficulty will normally be greater due to players having to consider a greater number of stimuli, i.e. greater number of players, and on the other hand, players have less time to perceive the stimuli due to the increasing number of actions at the net.

In tennis, several studies have focused on this issue, analysing the visual and motor behaviour, visual pre-indexing, anticipation, reaction response and time, and occlusion and fixation training with players (Farrell, 1996; Crespo, 1997; Avilés et al., 2002; Del Campo et al., 2008; Del Campo et al., 2012; Del Campo et al., 2015). Williams et al. (2013) observed that training centred on perceptive skills only, as well as perceptive-executive training, improved the perceptive ability and the anticipation of beginner and intermediate players.

EXERCISES PROPOSED

The following proposed training programme is designed to improve perception, and it divides the exercises according to the variables defined by Billing (1980), classifying them into: general (G), without tennis equipment; special (E), with tennis equipment; and specific (S), taking place in game situations.

Number of stimuli to pay attention to:

Exercise 1 (general)

Cones are placed in lines (2-3 cones per row and 6+ columns) leaving a space between them. Players are asked to go over the rows (facing them or sideways, skipping, with arms forward...) whilst being directed to a particular line/column (middle, left or right), and they must say the colour of the cone in the line in order to move to the next one.

Variant: One of the cones is turned over and they should say either stay quiet or say the colour of the cone next to it, depending on the instructions.



Figure 1. Exercise 1 set-up

Exercise 2 (special)

The coach throws the yellow, orange and red balls to the player at the same time and says one or several colours. The player must catch the balls of the colours indicated (with or without a bounce).

Variant: Catch the ball of the colour indicated, without it bouncing, the other two with a bounce.

Exercise 3 (specific)

Two players rally in the centre of the court and the coach who is next to one of the players feeds balls to that player for him/her to volley back to him.

Variant: The coach feeds the balls from the other side of the court, for the player to hit back from the baseline.

Number of stimuli present:

Exercise 4 (general)

A square is formed by cones of different colours, with the player is in the centre. The coach will indicate a colour and the player must run as fast as possible to touch it.

Variant: The player will move to touch the cone while bouncing a ball.

Exercise 5 (special)

Different types of balls will be mixed in a basket (red, orange, green, yellow). The coach feeds the balls and the player does the following progressions of exercises:

1. catch balls of a certain colour.
2. catch all the balls except those of a certain colour.
3. catch the green balls with the right hand, the red ones with the left hand.

Exercise 6 (specific)

Two players rally from the baseline while two players next to the net posts play volleys simultaneously.

Variant: Several teams of two players rally volley to volley in the doubles alleys, while the players on the baseline keep rallying.

Speed/ duration of the movement

Exercise 7 (general)

The player stands approximately 1m from a wall, with a football at their feet. They must kick the ball against the wall for 30 seconds, as many times as possible.

Variant: Throwing the ball with their hands.

Exercise 8 (special)

The player, shows his back to the coach, and stands approximately 2m away. The coach says turn and throws the ball at the same time, and the player will turn to catch the ball that the coach has thrown.

Variant: The coach feeds two balls with a bounce.

Exercise 9 (specific)

Players rally with a squash ball (much faster) or with a red ball (slower).

Variant: They rally volley to volley.

Size and discriminatory aspect of the stimulus (intensity):

Exercise 10 (general)

The word of colours are marked on the floor but the two do not correspond (e.g. the word 'red' painted in yellow) and they have to go where they are told: "X COLOUR/WORD!"

Variant: They are shown an object or shape with the colour they have to go to.



Figure 2. Exercise 10 set-up

Exercise 11 (special)

The player will have to control several balls of different sizes in different situations, e.g. a basketball with one hand, and a red ball on the racket with the other.

Variant: Vary the size/type of the balls.

Exercise 12 (specific)

Players rally with balls of different sizes, like a red ball or a squash ball.

Variant: Do the exercises with limited visibility, for example, facing the sun.

Time/ Extension in which the stimulus may be confusing

Exercise 13 (general)

A "Z" ball is thrown to the player who has to catch it after its irregular bounce.

Variant: In pairs, one on each side of the net, using half of the service box, play a 7 point match. They score when the player fails to catch the ball after the first bounce, or the first bounce is outside the limited area.

Exercise 14 (special)

A player, facing a wall, will be fed balls that they will have to touch after each ball hits the wall.

Variant: Playing volleys.

Exercise 15 (specific)

A player serves to the returner who will start with their back turned. They will turn to return at the coach's signal.

Variant: Starting with their eyes closed.

CONCLUSIONS

The development of perception plays a very important role in the acquisition and performance of any motor action, but it is especially relevant in the acquisition process of the basic motor skills. It represents the first phase of motor skill performance, and thus, it has a great influence on the decision and execution processes. Therefore, perceptive work becomes particularly relevant at early ages, playing an important role in achieving an effective long-term development of players. This article intends, on the one hand, to contextualise the importance of perception in tennis, and on the other, to provide physical trainers and coaches with some basic information that they can use as a basis to train this capacity with their players.

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RECOMMENDED ITF TENNIS COACH CONTENT (CLICK BELOW)



Accepting the pressures of coaching: insights into what coaches learn with over 10 years of experience working with elite junior tennis players

Callum Gowling (GBR)

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ABSTRACT

Despite a growing body of research into sports coaching there is little understanding of what it is like to coach elite junior tennis players. The purpose of this study was to examine the experiences of 8 UK, experienced tennis coaches and describe what it is like to coach elite junior tennis players. An Interpretative Phenomenological Analysis (IPA) of 8 experienced tennis coaches (over 10 years-experience) shows their insights into elite junior tennis coaching and provides avenues of comparison with the experiences of younger tennis coaches (Gowling, 2019). This study found that (a) experienced tennis coaches described a panoramic view of coaching, (b) experienced coaches were confident in their coaching effectiveness, and (c) acceptance of challenges in coaching helped experienced coaches develop effective coping mechanisms to sustain their emotional well-being and motivation to coach for long careers. The findings of this research contribute to an evolving, problematic epistemology of sports coaching and confirms that the experiences of existing coaches could contribute to more effective training of coaches. The findings present governing bodies opportunities to inform coach education literature and help tennis coaches to sustain themselves in an emotionally challenging role.

Key words: Interpretative Phenomenological Analysis, coaching, elite players, attitudes

Corresponding author: callumgowling@btinternet.com

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INTRODUCTION

Coaches serve an apprenticeship of observation during their coaching careers (Lortie, 1975). Prolonged periods of observation act as a primary source of learning for coaches and much of what they learn is through interaction with knowledgeable peers and "ongoing interaction in the practical coaching context" (Cushion et al., 2006, p. 217).

Research into young tennis coaches shows that building relationships, striving to prove oneself to others, interpersonal conflict, and competition between coaches are defining characteristics of elite junior coaching (Gowling, 2019). Furthermore, the challenging nature of elite junior tennis coaching has the potential to reduce coaches' motivation to coach (Bandura, 1997; Lundkvist et al., 2012; Bleach 2019; Gowling, 2019). A logical next step for tennis coaching research was to speak to practitioners with over 10 years-experience of the elite junior tennis coaching environment. The purpose of this study was to examine experienced tennis coaches' understanding of elite junior tennis coaching culture and illustrate how they were able to sustain their well-being and motivation to coach in the face of challenges in coaching.

This article looks at the experiences of eight LTA level 5, UK tennis coaches, with over 10 years coaching experience and shows how they adapt to cope with the challenges of coaching. For example, research shows young coaches describe self-employment making coaching competitive, and interpersonal conflict with parents or coaches reduced motivation to coach. This report shows that experienced tennis coaches were more accepting of the challenges they faced and understood that the challenges would remain constant throughout their careers. The evidence suggests that accepting challenges was associated with experienced coaches developing confidence and effective coping strategies to sustain their well-being and motivation for long careers.

METHOD

This study was an interpretative phenomenological analysis (IPA) of 8 experienced tennis coaches who worked with elite junior tennis players in the UK. The participants included 6 males and 2 females aged between 29 and 56 years old. The participants worked in the following areas; Northern England (3), Midlands (1), Southern England (3), and Wales (1). Experienced coaches had over 10 years coaching experience with elite juniors (Flett et al., 2012). Participants worked with elite junior tennis players and held level 5, LTA coaching qualifications. Junior tennis players were aged between 11 – 18 years old, corresponding with the LTA yellow ball competition system. Junior elite is competing at national level competition and above (Rees et al., 2016). Interviews in this study were semi-structured and the aim was to understand what it was like for participants to coach elite junior tennis players. Interviews lasted between 1.5 and 3.5 hours and were audio recorded. Interviews were transcribed verbatim, printed out, and analysed by following the procedure for IPA



RESULTS

The results show (a) experienced tennis coaches described a panoramic view of coaching, (b) experienced coaches were confident in their coaching effectiveness, and (c) acceptance of challenges in coaching helped experienced coaches develop effective coping mechanisms to sustain their emotional well-being and motivation to coach for long careers.

Experienced coaches described a panoramic view of coaching

Experienced coaches understood that coaching was more than a transfer of information process and the role of coach included many different aspects away from the tennis court. Harry opened his discussion by saying: "There are so many different elements to coaching. The technical side plays such a small part in what I do these days. You're constantly educating and then re-educating yourself". Even with over 20 years coaching experience, Harry alluded to learning on the job. Coaches regularly referred to the human interaction inherent within coaching making their role far more than delivery of technical information. Gabby described managing expectations as part of her role and this made coaching more complicated:

You're constantly managing expectations. Constantly managing other issues, whether it be school issues, family issues, problems away from the court. Life. Managing all that and making sure players tennis experience is fulfilling is tough to stay on top of.

Experienced coaches considered many factors that could affect player performance for example, work ethic, school, social, family issues, expectations, maturity. Experienced coaches embraced the multifaceted nature of coaching and incorporated off court issues into their role. David described a holistic view of his coaching: "Tennis coaching is so much about psychology. You're developing people not just players. Once these kids are 15 / 16 it is so much more than forehands and backhands".

Experienced coaches had evolved into more than knowledge experts and method appliers. The participants generally agreed that due to the amount of time they spent with players due to training requirements, they felt responsible for a holistic approach to coaching (e.g. helping players mature, improve personal discipline, self-sufficiency, and other life skills).

Experienced coaches were confident in their coaching effectiveness.

Experienced coaches understood that public scrutiny was part of coaching. When describing periods of unsatisfactory results with players, the participants maintained belief in their methods despite negative judgements about their coaching from players, their parents, or other coaches. Thomas explained: "I trust what I am doing is the best I can do, and I'm good at what I do. There is always someone dying to say they can do a better job. Younger coaches probably question themselves more and think "what am I doing wrong?"

Participants consistently expressed confidence in their methods. Questioning of the self can erode self-belief if it produces negative self-evaluations. Years of experience had taught the participants that coaching wasn't straight forward. Sarah discussed her confidence: "I have a clear picture in my mind of what I'm trying to achieve. That has taken time, but I'm very clear and confident in that. If things are going wrong, don't dart around looking for solutions, stick with your picture and believe in it".

The participants generally agreed that experience helped them gain confidence in their coaching. Simon stated: "There is no substitute for experience. You've been there and done it. I do look back at what I taught 10 years ago and now I just know more. I've read books, and I've done the years. It's taken me a while to really become confident". Previous studies have described an "experience threshold" for coaches to become confident (Cote & Gilbert, 2009). The respondents in this study agreed that experience helped with confidence.

Acceptance of challenges in coaching helped experienced coaches develop effective coping mechanisms to sustain their emotional well-being and motivation to coach.

Experienced coaches adapted cognitively and emotionally to accept the challenges in elite junior tennis coaching. Bauman (2012) says that problems associated with human interaction "cannot be regulated out of existence" (p. 98). Tennis coaches work is dependant upon human interaction between player, their parents, and coaches (Gowling, 2019). Therefore, interpersonal conflict is inevitable. Gabby said:

There are always those questions. "Why is my son or daughter not being picked for this or that?" There is no outright blame but it's a leading question. You know what's coming next... "What are you going to do about it? There is so much pressure for kids and parents to feel like they are keeping up with whoever they have set their sights on. As coach you're always going to be up against that and there will be conflict along the way."

Alex said: "There are really tough parts to the job, like getting lambasted by parents. But what job doesn't have issues? Conflicts are common, it's fine".

Finally, David said: "Oh yeah, I fall out with national coaches all the time. It's the nature of the job".

Accepting conflicts would continue to occur enabled coaches to develop ways to cope with professional / interpersonal conflicts. For example, coaches use social support as a coping strategy when conflict occurs (Thelwell et al., 2010). David coped with conflict by talking to other coaches: "It's good to unload sometimes. You need to unload with someone who gets it (another coach)". There was agreement amongst the participants that social support helped them to cope with the stress of conflicts. Sarah said: "You need coaches you can trust and chat to about all the things you commit. It's a tough job and you need support when you're feeling got at".



In addition to social support, coaches also described a hardening effect that years of coaching had on them. Harry discussed becoming more resilient: "Criticism always hurts, but when you've been through it so often, you become tougher and it affects you less". Coaches agreed that a thick skin was necessary to coach, and emotional stamina was a fundamental coping mechanism. Alex said: "I'm so weatherworn to it now. You can't please everyone. You can't stop people being critical when players lose matches. Once you accept that, you develop a thicker skin". Experienced coaches accepted they could not manage conflict out of coaching, and they developed support networks and emotional stamina to cope.

DISCUSSION

The data in this study highlights several ways that coaches adapt to their environment with over 10 years-experience:

First, the findings of this study support arguments that coaches serve apprenticeships of observation (Lortie, 1975). New experiences continually influence their beliefs, attitudes, and behaviours (Stodter & Cushion, 2017). Years of practice and observation help coaches to consider their role from a holistic perspective and position their coaching philosophy, so it is conducive to elite junior tennis culture.

Second, the findings confirm our understanding that coaches develop confidence as they become more experienced. Furthermore, confidence can be associated with developing a coaching philosophy (Camiere, Trudel, & Forners, 2014). Confidence reduced self-doubt during difficult periods with players, helped experienced coaches to maintain belief in their methods, and sustain motivation.

Third, the findings contribute to an existing understanding that coaching is emotionally challenging work irrespective of the experience coaches have (Thelwell et al., 2010; Purdy et al., 2013; Kelly et al., 2018). Experienced coaches develop cognitively (broader understanding of coaching) and emotionally (coping mechanisms) over 10 years. The participants in this study were accepting that coaching would remain stressful throughout their career, and they constructed ways of coping with elite junior coaching culture.

CONCLUSION

The evidence contributes to an existing understanding that coaching is emotionally challenging work irrespective of the level of experience coaches may have (Thelwell et al., 2010; Purdy et al., 2013; Kelly et al., 2018). The findings support assertions that coach education could use insights of experienced coaches more effectively to support active coaches in their roles (Cushion, Jones, & Armour, 2003; Gowling, 2019).

Educating coaches about the coping mechanisms used by experienced practitioners would help to (a) raise awareness that coaches will experience emotional challenges in their careers, (b) enable new coaches to select coping strategies that have worked for other coaches, and (c) reassure existing coaches that the struggles they may face are not unique to them.

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RECOMMENDED ITF TENNIS ICOACH CONTENT (CLICK BELOW)



Circuit training for 12 and under tennis players: an on-court exercise proposal

Carlos Valle (ESP)

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ABSTRACT

The transition from global exercises to more specific ones, using specific equipment and stimuli, is key for the physical conditioning of young tennis players. This article describes a proposal for an on-court agility, coordination, speed, injury prevention, power and balance circuit for 12-year-old tennis players.

Key words: circuit training, young players, physical conditioning

Corresponding author: chals.vall@gmail.com

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INTRODUCTION

Physical conditioning adapted to the needs of young tennis players is key, not only because of the importance of physical conditioning in modern tennis, but because of the need for multidisciplinary training in the physical qualities that tennis demands. Circuit training is a very efficient methodology for the physical conditioning of 12-year-old tennis players, since it is perfectly adaptable to the daily conditions that trainers and coaches manage at tennis clubs and academies. For examples of this kind of training with tennis players of different ages, see the work done by Dent (1996), Chu (1998), González (2003), Marques (2005), Mohanta, Kalra, & Pawaria (2019) and Genevois (2019).

BENEFITS AND CONSIDERATIONS

Circuit training comprising of simultaneous workstations allows for specific control of the work and recovery times. Thus, the coach can manage the density of the load by means of these variables. When there are more players than stations, the work time of the first group doubles up as recovery time for the second group and vice versa. This kind of training helps create a high intensity working environment where the participation of players is active and constant, letting the coach control the equipment and structure the exercises in a clear and orderly fashion. At the beginning of the session, the coach must clearly explain and demonstrate the technique for the execution of the movements, the working and rest times, the sequence of the stations, and the maximum number of possible repetitions in an exercise (González, 2003).

Among other things, during this stage, the player must learn how to develop versatility, gain experience, improve the level of motor and mental skills, and improve the main specific capabilities for tennis. It is important to highlight that it is at the age of 12 when the two most important motor capabilities for tennis, agility and speed, can best be developed (Unierzyski, 2003).

PRACTICAL APPLICATION

Strength and physical conditioning for young tennis players implies progressive implementation of appropriate exercises for general physical development as well as more important and specific areas for tennis players. These exercises include jumping, throwing, receiving, strength, power, speed, coordination, balance, endurance, and flexibility (Kovacs, 2016).

This article presents an example of on-court circuit training for 12-year-old players, with 6 stations and 2 players working simultaneously per station. Physical qualities, like explosive

strength (plyometric work), specific coordination to hit from an open stance, core strengthening (preventive work), balance, hand-eye coordination, agility, and running technique together with speed are worked. Working time: 15 seconds, the same as resting time, with 2 consecutive series (i.e. two lots of work and rest – 1 min.) in each station, reaching a 1:1 work to rest ratio. The work and rest time will vary depending on the physical qualities of the players, their targets and their technical adaptation to the exercises.

Station 1: plyometric work of lower limbs

It has been demonstrated that the application of plyometric work to habitual tennis training seems to be a more appropriate stimulus for the improvement of physical qualities in young players when compared to training without plyometric practice. Thus, specific power training is suitable for increasing tennis explosive actions (Fernández-Fernández et al., 2016).

Equipment: 2x high fences (30-40 cm) and 2x low fences (10-20 cm). The height of the fences may be modified depending on the physical characteristics of the players.

Protocol: The player jumps over the higher fences coordinating the impulse with the movement of the arms (ABK jump), followed by two jumps over the lower fences, with stretched knees and quick flex-extensions of the ankle joint at the maximum possible speed. The process is repeated until the end of the set. The coach must explain execution and landing techniques.

Direct connection to tennis: Power and changes of direction.



Figure 1. Station 1: plyometric work of lower limbs

Station 2: receiving and throwing the Swiss ball in an open stance

Receiving and throwing skills are key for the learning and development of the new movement patterns. The combination of these skills with adequate positioning for stroke execution can be properly trained with Swiss balls (Genevois, Reid & Crespo, 2016).

Equipment: Swiss ball, 2 cones per player.

Protocol: In a 2m per side square, two players (A & B) stand in opposite corners, player A will throw a Swiss ball in an arc-shaped flight path to the opposite cone at the signal: "NOW!" Player, B makes a cross first step, coordinating the lateral movement to catch the ball in an open stance, taking the ball at waist height, rotating the shoulders over the cone, simulating a back swing position. Player B always throws the Swiss ball towards the diagonal cone for the player to repeat the same reception and preparation process. After two shots each, player A and player B interchange the direction of their shots in order to catch on the other side.

Direct connection to tennis: Space-time coordination in stroke preparation.



Figure 2. Station 2: receiving and throwing the Swiss ball in an open stance

Station 3: reactive hand-eye coordination

Hand-eye coordination is a key quality for tennis. Here, the reaction must be trained by means of varied exercises (Dent, 1996).

Equipment: 1 tennis ball and 2 cones per player.

Protocol: The players (one holding a tennis ball) stand in a line with 1 cone at 1.5 m. from them on each side perpendicular to the line. When the partner points at one of the two cones, the player must throw the tennis ball underarm to the partner but so that it bounces, touch the specific colour cone with their hands, and return to the centre before the ball has bounced for the second time.

Direct connection to tennis: Hand-eye reaction with the bounce of the tennis ball.



Figure 3. Station 3: Reactive hand-eye coordination

Station 4: Forward movement & sprint technique

Learning an appropriate movement technique is key for the efficient execution of strokes. Coordination between running and sprinting must be trained in development stages, but mainly, before the players are 12 years old, so that they acquire the correct foundations (Chu, 1998).

Equipment: 1 elastic rubber band and 3 cones.

Protocol: The player doing the exercise, with a band round their waist and facing away from their partner, tries to run away from their partner whilst the partner holds the ends of the band. The player lifts their knees 6 times, alternating, and at maximum speed, coordinating with the natural movements of the arms, trying to reach the furthest cone (cone at 1 – 2 m, cone at 2 – 3 m). After 2 sets, the player gets rid of the rubber band and makes a 5 m sprint with the running technique just employed in place.

Direct connection to tennis: Coordination in running and sprinting.



Figure 4. Station 4: Forward movement & sprint technique

Station 5: Lateral plank with elastic rubber band with leg extension

Static balance is an indispensable motor skill for tennis, facilitated by muscular synergies that keep the player in an upright position and correct shape when the player is not in movement (Samson, Sandrey & Hetrick, 2007).

Equipment: Mat, elastic rubber band - low tension.

Protocol: Player A takes a side plank position holding one end of the rubber band with the hand of the elevated arm while player B works on static balance on one leg. The rubber band is around the standing foot of the player balancing on one-leg. The player makes a complete set in plank position / balancing, changing sides / legs in the second set.

Direct connection to tennis: CORE, knee and ankle stability.



Figure 5. Station 5: Lateral plank with elastic rubber band with leg extension

Station 6: Proactive dynamic balance with Swiss ball and unstable bases

Dynamic balance is the motor capability to keep the body in balance when the tennis player is in movement. The characteristics of tennis make this a key aspect for performance (Reid & Schneiker, 2008).

Equipment: 6 rings, 1 Swiss ball and 2 Bosu Balance Trainers.

Protocol: Moving from platform/ring to another every few seconds, the player must keep balance inside each ring or unstable platform for 3 seconds on one leg, following the circuit and alternating tennis specific open and closed positions.

Direct connection to tennis: Body control and balance during strokes.



Figure 6. Station 6: Proactive dynamic balance with Swiss ball and unstable bases

CONCLUSIONS

Circuit training is a highly recommended method to work different physical qualities simultaneously with a group or tennis players. It is possible to control the content, volume and intensity of the appropriate work in an easy and effective way. It may be directed by a single coach using basic material on the tennis court. Finally, its use improves the physical qualities in 12 and under players.

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RECOMMENDED ITF TENNIS COACH CONTENT (CLICK BELOW)



Tennis teaching as a business: coaches as creators of added value

Andrés Crespo Dualde (ESP)

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ABSTRACT

The objective of this article is to promote tennis and tennis teaching as a business, and share some strategies that coaches can use to add value to the services and products they provide. In short, it presents four main areas in which coaches may add significant value for their clients: service quality; variety in the tools used; interaction with clients; and, adaptation of services to clients.

Key words: Marketing, promotion, business, economy

Corresponding author: crespoandres9@gmail.com

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INTRODUCTION

Tennis is a very popular sport all over the world; 87 million people play tennis in over 200 countries, there are over half a million tennis courts and more than 150.000 coaches (ITF, 2019). During the period between the 1970s, and the end of the century, there was a considerable increase in the number of recreational players and clubs (Barget, 2006). Some authors noted a social and institutional crisis in tennis during this period due: clubs starting to consider their members as clients, rather than partners; and, due to greater inter-sport competition starting (Waser, 1995). Large wage disparity between players at the professional level as well as the economic difficulties encountered by some clubs and federations added to this crisis.

In the 21st century, tennis has become an activity that provides a number of business opportunities, all of which have come to be as a result of the economic, social and cultural evolution of the current world. Possibilities are huge, from "big data" to electronic sports, social media, the internet of things (IoT), virtual reality and many other technologies that contribute to tennis evolution and its adaptation to new trends (Infosys, 2020).

The economic impact of tennis has given rise to a great number of businesses over the last years. And not only does it happen in professional tennis (tours, organizations, events, etc.) but also from federations, clubs and free-lance professionals. In fact, in Europe in particular, it is consumer demand that has become the main driving factor for change in the business. Thus, new activities are appearing in the industry, in fields such as sport psychology and conditioning, organization and event management, and marketing and communication management, among others. The business initiatives that coaches have developed also reflect the new market trends (Euroseen, 2006).

TENNIS ECONOMY AND RECREATIONAL PARTICIPATION ACTIVITY

It has already been stated that in general, and since the 90s, tennis economy has experienced a huge growth all over the world. Tennis practice and equipment purchasing are an economic activity that has already reached its maturity (Bayle & Maltese, 2009).

The world tennis equipment market is expected to reach US\$ 845.7 million by 2022; in the racket market alone, some seven million rackets are sold annually all over the world. The world tennis racket market will grow by approximately 0.9% over the next five years, from USD 330 million in 2019, to USD 350 million in 2024 (Absolute Report, 2019).

Van Wyk y Dvies (2009, p. 12) indicate that: "The tennis business implies understanding certain components of the business which, once understood, can be adapted to the game of tennis. The main objective for clubs and federations is the general promotion of tennis. There is a commercial incentive for both clubs and federations in making more people play. The principles included are the AIDA (Awareness, Interest, Desire, Action) and the 4 P's of the marketing mix" (Price, Promotion, Place and Product).

When analysing the tennis global supply and demand, and studying the three 'production' axes of products, services and sport events (consumer experiences), we agree with Bayle and Maltese (2009, p. 25) who state: "there seems to be a recreational activity potential to be exploited at the clubs, which are still very concerned (too?) with the competitive aspect but lack the professionalism in development and services to cater the various different tennis related aspects: education, insertion, disabilities, tourism, corporate sport."

Therefore, the more modern tennis increasingly operates in the corporate sector, the more customer satisfaction with tennis products and services contributes significantly to the sustained competitiveness of tennis organisations.

In fact, the tennis participation sector, made up of recreational or amateur players, plays a crucial role in the economy of our sport. However, as Barget (2006, p. 430) points out, "there has never been a global valuation in monetary terms of the whole external effects of tennis participation. It would be of interest to determine the net social benefit or cost of amateur tennis for society – a controversial question".



COACHES AS AGENTS OF VALUE CREATION IN THE TEACHING TENNIS BUSINESS

Tennis teaching as a business can be included in the service sector, and as such it calls for continuous social interaction. Thus, coaches interact with many people, from amateur players and the media to sport directors, other professionals (coaches, managers, for instance) and tennis players. For example, for coaches who work in junior tennis, parents are one of the most important groups of people they interact with (Knight y Harwood, 2009).

Research suggests that there is a relationship between the quality of tennis coaching, learner success and satisfaction and finally, willingness to stay in tennis (Crespo, McInerney & Reid, 2006). Even though the quality of tennis coaching is not the only variable in continuous participation, it significantly contributes to player development and retention (Misener and Danylchuk, 2009).

Tennis coaches play a key role in the process of creating added value to the business, they are an important agent in the creation of this added value. As Tennant and Marklow (2009) say: "coaches must think and work in a professional way in order to develop a successful and profitable business".

The role of coaches is key from the tennis business and economic point of view, so much so, that Mäenpää, Jobson and Löffler (2009) state that "coaches are taking on the role of the consultant and advisor in equipment and sponsorship issues".

This article highlights four main areas in which coaches may create added value for their clients: service quality, variety in the tools being used, interaction with the clients and adaptation of the services to the clients.

In this context, we are including among the clients, all the learners and other stakeholders who are present in the "client path/experience".

Table 1 summarizes some ideas that may help coaches to create value in their business proposition.

ASPECT	EXAMPLE
Quality of service	Analysing the players' strokes more accurately, by means of electronic devices (cameras, tablets, smart phones...).
	Video recording their strokes and sending them to their phones.
	Suggesting they use their phones to control their heart rate and other physical parameters.
Variety of tools used	Offering cardio tennis lessons and other modalities.
	Setting up a beach tennis court or using an existing court.
Interaction with clients	Having a set of updated exercises available and using them continuously.
	Organizing social activities before, during or after the lessons for interested pupils, parents, children and friends to attend.
	Asking learners to evaluate and share ideas regarding training sessions and exercises.
Adaptation of the services to the clients	Programmes for children under 4 years of age.
	Programmes for juniors 17 – 35 years of age.
	Programmes for adults 40 – 65 years of age.
	Programmes for wheelchair players, persons with visual difficulties.

Table 1. Ideas to create value in the tennis business proposition.

CONCLUSIONS

Regardless of the popularity and the benefits that top professional tennis entails, it is important to understand that amateur tennis, within the framework of participation and massification, is an immense business opportunity for all those involved.

Further to the example of coaches discussed in this article, CEOs, managers and others involved in tennis, in any responsibility area, should develop programmes, projects and initiatives that create value in the tennis business proposition.

We hope that the ideas shared in this article will help to foster creativity and inventiveness in order to adapt the supply of tennis products and services to satisfy customer demand.

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RECOMMENDED ITF TENNIS COACH CONTENT (CLICK BELOW)



The impact of biological age vs. chronological age on the development of the young tennis athlete

André Vilela Brito (POR)

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ABSTRACT

The aim of this paper is to understand how various factors such as maturation, peak height velocity, body growth and the effect of relative age can interfere with the athlete's development in sports and in personal terms. Studies indicate that athletes' development is made up of several stages of maturation, and it is likely that they may occur at different timings depending on the athlete, their birth date, their upbringing, and the type of practice they have undertaken. Thus, we will have to be aware of the prediction we make of an athlete's progression because this maturational timing influences both the physical and mental progression of the athlete. This is especially true given that evidence shows that those born in the first semester of the season or year may have early advantages over those born in the second semester. This may include finding ways to limit the ability to give more means and selection to teams or players that are stronger or more mature.

Key words: maturation, chronological age, biological age, development

Corresponding author: abritovilela@hotmail.com

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INTRODUCTION

Recently, study on biological age has gained a significant amount of attention, and this in turn is due to the increasing scrutiny and analysis given to the study of factors affecting human and athlete performance. When we quantify biological age, we consider variables that may be important in determining the windows of opportunity for a particular component to develop.

Maturational biological age and chronological age are two important but different concepts. Chronological age is a probable index of the length of life a person has left, while biological age is the progression and direction to the state of maturity (Bacil, Junior, Rech, Legnani, and Campos, 2014).

Adolescence begins with puberty and ends when there is a cessation of skeletal growth, dental development and sexual maturation. This happens between 18 and 21 years old. Puberty is an unstable period, marked by body changes, where the peak height velocity (PHV) phenomenon is one of the most important aspects, along with the biological maturation of sexual organs, metabolic functions and gender differences (Bogin, 2011).

One of the most commonly used indicators for the investigation of maturation processes is and adolescent's PHV. This is a measure of the maximum growth rate in height during the growth phase (Gosselin-Despres, 2007).

The effect of relative age (ERA) "is the deviation of distribution of the selected athletes' birth dates from the normal distribution in the population. This means that means that the birth dates of selected groups of athletes are not distributed normally, i.e. approximately evenly throughout the whole year" (Zhanel, & Hubacek, 2013, p. 27). This has been shown to be an influence on the athlete's development and training. Therefore, the use of the year of birth as a criterion to group different competitive categories has benefited young people born in the first months of each year (Junior, et al., 2013).

METHOD

This research conducted took the form of a systematic bibliographic review of scientific journal articles. The electronic databases searched were: Scielo; Google Scholar and Academy. Articles between 1993 and 2019 were searched using the following keywords: age; biological; chronological; young; and, athlete.

The keywords in the databases were introduced and the evaluation of the titles and abstracts of each article was done following the following criteria: first, the population covered, if it was a young sample, and then we proceeded to the analysis of the specific characteristics of the tennis players.

RESULTS AND DISCUSSION

A considerable amount of tennis specific studies has been produced in this field. For clarification purposes, the articles will be summarised into two topics.

Effect of relative age

Agricola, Zhanel, & Hubacek (2013) studied the influence of the effect of relative age on a population of junior tennis players aged 13-14 years old who participated in the ITF world junior tennis finals. They concluded that births of players fell into the first semester of the year more than 65% of the time for all years. In total 73.2% of the players were born in the first half of the year.

In a study to determine whether there was an effect of relative age on Swedish male and female junior tennis players born between 1998 and 2001, Gerdin, Hedberg and Hageskog (2018) found out that 52% of the Swedish population was born in the first half of the year, whereas 55% of the players ranked were born in the first half of the year. It was also observed that 60.2% of the top 50 ranked were born in the first half of the year. The authors concluded that there was an ERA when comparing the Swedish population with ranked players.



Another study by Ulbricht, Fernandez, Villanueva, & Ferrauti (2015) tested the existence of ERA in young tennis players. They investigated whether the male players 11-17 years old selected went later on to national teams. The authors concluded that 65.1% of the players who played for the regional teams were born in the 1st half of the year and 34.9% in the 2nd half, and as per the national team, 70.2% of the players were born in the 1st half and 29.8% in the 2nd half of the year.

Junior et al. (2014) studied the distribution of players, according to the relative age in the different age groups (U14, U16 and U18) with data from COSAT, ITF, ATP and WTA. They found a predominance of players who were born in the first semester of the year. In females, there were more players who willingly moved played in higher age groups. The greatest variation occurred in the males, reaching a difference of 51 months in the age group of 18&U. They concluded that there was an association between the effect of relative age and the ranking position in the age groups of 14&U and 18&U.

The effect of relative age on the ranking of junior tennis players was investigated by Moreira, Lopes, Faria & Albuquerque (2017) who further studied how “year” and “month” influence ranking. These authors found significant differences between birth quartiles. They concluded that there was a higher probability of athletes being born in the initial quartiles of the year than in the last quartile.

Loffing, Cogley & Schorer (2010) studied whether left-handed players in tennis circumvent the ERA inequality. They found that ERA showed significant differences in right-handed, but in left-handed tennis players, no ERA was demonstrated. The highest percentage of right-handed players were born in the first semester while in left-handed players they showed an inverted trend, that is, in the second semester.

The occurrence of relative age in the 12&U, 14&U, 16&U, 18&U and professional tennis categories of Brazilian (CBT), South American (COSAT) and international (ATP and ITF) players was investigated by Aoki, Moreira, Costa & Massa (2014). They found significant differences between the expected birth distribution and the observed birth distribution. They concluded that, in most cases, the highest percentage of births occurred in the first quarter of each year, followed by the second highest percentage in the second quarter.

Development and maturity

Parera Madruga et al. (2019) assessed and quantified the level of muscular asymmetry in limbs in chronological and maturational groups. Differences were found between the strongest and weakest limbs (between 3.5 and 5.5%) in all groups but with larger asymmetries in the maturational groups. Asymmetries decreased with age and with the maturation level, with 12&U athletes showing higher values than 16&U athletes.



The effects of variations related to age and maturity on anthropometric characteristics, muscle strength and agility among young competitive athletes aged 10 to 13 years old were investigated by Sogut, et al. (2019). The authors found an effect for age on height, leg length and grip strength in favour of older players. In girls, results differed in most anthropometric measures due to the difference in maturation.

Kramer, Huijgen, Efenink-Gemser, Lyons & Visscher (2019) investigated whether age, maturation or physical fitness in junior tennis players (U13) can explain the current state and future of tennis. They concluded that in the 13&U category, there were positive correlations between upper body power and tennis performance. In female players, there was a positive correlation between maturation, lower body power and performance in tennis. Players who matured earlier performed better, whereas late maturing players tended to perform well at 16&U.

Somatic growth, sexual maturation and final height in female adolescent athletes (gymnasts, swimmers and tennis players) was compared by Erlandson, Sherar, Mirwald & Maffulli (2008). They found that adolescent gymnasts reached menarche (the age at which menstruation starts) later and were shorter than swimmers and tennis players of the same age. There were no differences in height in adults.

A study to understand whether individual differences in growth and maturity can provide a performance advantage was conducted by Myburgh, Cumming, Coelho-e-Silva, & Cooke (2016) with players aged 8-17 years old. They found that the average height and body mass of the players varied between the 50th and 90th percentiles for age and gender. Female athletes from the age of 8 had an advanced estimated bone age relative to chronological age. The study also observed that male 8-12-year-old athletes had average to delayed maturation (skeletal age to chronological age) but had advanced skeletal compared to chronological age from 14 to 16 year old categories.

Associations of physical characteristics, functional to the training of competitive under-12 tennis players were examined by Sogut, Luz, Kaya, & Altunsoy (2019). The authors found that in relation to boys, girls were significantly taller and more advanced in maturation. In girls, the percentage of adult height prediction was significantly correlated with ranking. Variables related to experience, training volume and motor performance were significantly associated with ranking in both girls and boys.

CONCLUSIONS AND IMPLICATIONS

As it has been shown, one of the many variables that directly affects the level of tennis is the effect of relative age, both in terms of classification and in the development process of the player as a selection.

The effect of relative age corresponds to that of a child born in the early months of the year will have an advantage over the child born in the later months due to their maturity, thus a child born in January will tend to have an earlier maturation than a child who is born in December.

In morphological terms, the child born in January, will show higher stature, height and body weight indices which can cause increased strength, speed and power, aspects which are very important for the tennis.

Firstly, the way in which children are ranked may affect the dropout rate between children born in the same year where those born in the latter months of the year, and are thus less developed than their counterparts due to age differences, may be more likely to withdraw as they may feel that they cannot compete against their higher ranked peers.

Secondly, the selection process today is still too restrictive, utilising short-term selection variables. Therefore, if we have short-term variables in a selection process, the children who were born in the first trimester will be the most likely to be chosen, that is, those who demonstrate better strength, speed and power levels together with more height and weight. Consequently, we will be giving priority to certain children and leaving others out.

In terms of relative age, the selection process should be considered more in the long term and not in the short term, as the child born in the last trimester will mature later and when maturing will be at least as well-developed than the child that matured early.

Given the physical and functional demands of tennis, biological age tends to play a fundamental role in the sport and in the athletes' performance and evolution. Size, strength and power are associated with advanced maturation, particularly during adolescence. These changes in body composition are associated with early or advanced maturity in females.

Finally, since tennis requires special attention in terms of using coordinative capacities and aerobic and anaerobic conditioning capacities, coaches should, as soon as possible, create a development plan in maturational terms for each athlete, which will respect the biological individuality of the person (Myburgh, Cumming, Coelho-e-Silva, & Cooke, 2016).

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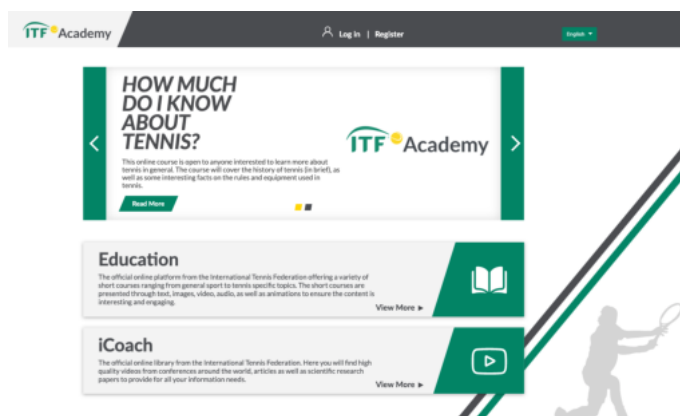


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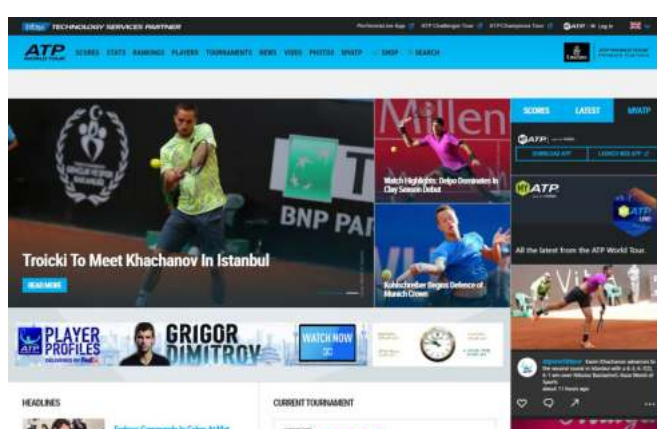
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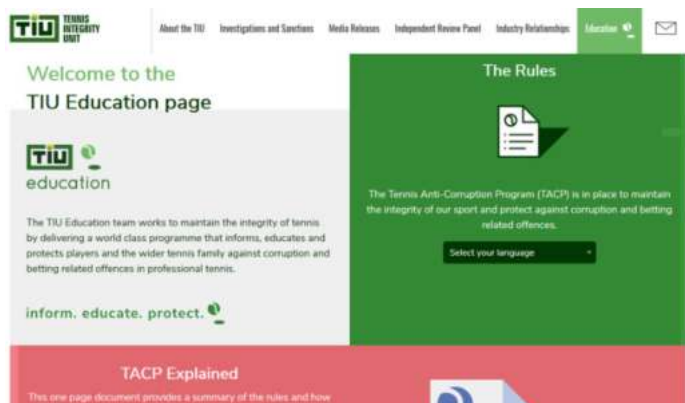
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ITF Ltd, Bank Lane, Roehampton,
London SW15 5XZ
Tel: 44 20 8878 6464
Fax: 44 20 8878 7799
E-mail: coaching@itftennis.com
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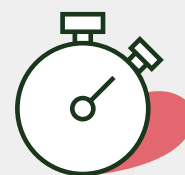
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The Tennis Anti-Corruption Program (TACP) is in place to protect the integrity of our sport and protect you as coaches and all those within tennis against corruption and betting related offences. This document provides a summary of the anti-corruption rules, for the full list please visit www.tennisintegrityunit.com.



Coaches

Betting

- ✗ **DO NOT** bet on any tennis event, at anytime, anywhere in the world or assist others to do so
- ✗ Betting companies **MUST NOT** sponsor, employ or provide any other benefits to you in exchange for yours or your player's services

Match Fixing

- ✗ **DO NOT** ask or help any player to fix the outcome or any aspect of a tennis event (this includes spot fixing of points, games or sets or attempting to manipulate the draw in any way)
- ✗ **DO NOT** ask or help any player to perform below their best efforts in a tennis event

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- ✗ **DO NOT** share non-public, sensitive information about a tennis event or a player for betting purposes with anyone
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Wild Cards

- ✗ **DO NOT** accept or give money or any form of compensation in exchange for a wild card on behalf of or for the benefit of a player, whether or not the player has knowledge of your actions

Reporting Obligations

- ✓ **YOU MUST** report any knowledge or suspicions of corruption to the TIU
- ✓ **YOU MUST** inform the TIU as soon as possible if you are approached by any person who offers money or any benefit to influence the outcome or any aspect of a tennis event or asks for inside information
- ✓ **YOU MUST** cooperate fully with investigations conducted by the TIU, which may include being interviewed or providing your mobile phone, other devices or relevant documents



You have a responsibility to ensure that you and your players are aware of and comply with the rules of the TACP. As a coach you are covered by the TACP and will remain covered for two years following the last event you received accreditation to.



If you break the rules, or conspire to do so, you could face a maximum fine of \$250 000 and a lifetime ban from participating in, or attending tennis events.

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The ITF Academy is available to National Associations, coaches, players, fans, parents and anyone interested in tennis or sport in general.

The ITF Academy will launch over three phases between 2019 and 2020:

- **Phase 1, March 2019:** The Information and Education phase will see the release of online short courses and a brand-new iCoach library within the ITF Academy.
- **Phase 2, from July to December 2019:** The Certification phase will see the launch of blended learning (online combined with face-to-face delivery) certification courses - the ITF Play Tennis course will be the first course to be made available, followed by the ITF Coaching Beginner and Intermediate players course.
- **Phase 3, through 2020:** The Continuous Professional Development (CPD) phase will build on the already available short (online) courses through automated tracking and calculation of CPD credits/hours.

Head to the ITF Academy to browse through the courses as well as the latest iCoach content from around the world.

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