International Tennis Federation

# COACHING & SPORT SCIENCE REVIEW

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Contents Issue 55

International Tennis Federation

# COACHING & SPORT SCIENCE REVIEW

The Official Coaching and Sport Science Publication of the International Tennis Federation

# Editorial

Welcome to issue 55 of the ITF Coaching and Sport Science Review, which is the final edition for 2011. November saw the highly successful staging of the 17th ITF Worldwide Coaches Conference by BNP Paribas in Port Ghalib, Egypt, with the theme "The long-term development of the high performance player". The 2011 event attracted 541 attendants from 94 countries.

The five-day conference, which was officially opened by the Chairman of the ITF Coaches Commission, Ismael El Shafei, brought together leading experts in coaches' education, player performance and sports science to present on the latest developments in these fields. The programme consisted of lecture room and on-court presentations which were translated into Arabic and Spanish, as well as concurrent break-out sessions in the afternoons.


*Wayne Black presenting at the Worldwide Coaches Conference.*

Keynote speakers included four-time Grand Slam Doubles Champion Wayne Black, ATP touring coach Miles Maclagan, as well as Vlado Platenik and Carl Maes - the long-term coach of former world number one and Grand Slam Champion, Kim Clijsters.

Other notable speakers included well renowned touring doubles coach Louis Cayer, who presented on Tactical Planning as well as world renowned tennis psychologist Antoni Girod, who covered 'the Long-term Development of Emotional Control'. Contributions also came from Mario Bravo, the former coach of Juan Martin Del Potro, Max de Vylder of Britain's Lawn Tennis Association, Bruce Elliot and Machar Reid of Tennis Australia and Mark Kovacs from the USTA.

The majority of the presentations from the conference will become available on the Tennis iCoach website throughout 2012 and will be available to all current 8000 members to view. If you are not already a member, you can join now by visiting http://www.tennisicoach.com/amember/signup.php

In 2012, the ITF Coaching Department will be pleased to announce the launch of the "Coaching Beginner and Intermediate Tennis Players" in the French language. With this important manual soon to be available in the three official languages of the ITF, we hope that it will benefit coaches around the world to improve their level of expertise when coaching beginner and intermediate players. All ITF publications are available at https://store.itftennis.com

Throughout 2011 we saw the successful implementation of phase 1 of the Recognition of Coaches Education Systems of National Associations. Following the successful pilot phase that recognized Spain and Australia's coach education system in 2010, this year saw the successful recognition of 9 new nations. Canada, Great Britain, Netherlands, Switzerland, Belgium, Italy, Germany, France and Austria were all approved. Moving forward, 2012 will see other nations having their coach education systems recognised by the ITF.

Looking forward to 2012, more courses and conferences are planned including the 5 ITF Regional Coaches Conferences. Details of these will appear in the next issue and we look forward to seeing many of our readers in attendance. Finally, we hope you continue to take advantage of the resources provided on the coaching weblet (www.itftennis.com/coaching) and that you enjoy the 55th issue of the ITF Coaching Sport Science Review.

**Dave Miley**
**Executive Director,**
**Tennis Development**

**Miguel Crespo**
**Research Officer,**
**Tennis Development/Coaching**

**Merlin Van de Braam**
**Assistant Research Officer,**
**Tennis Development/Coaching**

# Fit to Play™ & perform-rules of recovery (part 1)

Carl Petersen (Canada) & Nina Nittinger (Germany)

ITF Coaching and Sport Science Review 2011; 55 (19): 3 - 5

ABSTRACT

*This article, the first in a four part series, will provide the reader with insight into overtraining and recovery. It will allow them to recognize stressors, signs and symptoms of overstress and underrecovery. It will also explore responsibilities for recovery and prevention of overstress (overtraining ) and underrecovery in the short and long term for both players and coaches.*

**Key words:** Recovery, overstress, overtraining

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**Corresponding author**: carl@citysportsphysio.com

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## INTRODUCTION

Training and subsequent overtraining concerns have been recognized in the literature for over 75 years. (Herxheimer, 1930) and the existence of the condition 'overtraining syndrome' has been well documented in the recent literature (Mackinnon & Hooper, 1991; Fry, 1991; Krieder et al, 1998; Uusitalo, 2001).

Overtraining, staleness, burnout, overstress, overreaching and underrecovery are all terms bantered around when talking about problems associated with too much training and too little recovery. This can be confusing for the athlete. This series of articles will use overtraining and overstress as synonymous terms for a condition in which an athlete suffers from a number of signs and symptoms which may include overuse injuries, chronic fatigue, mood disturbances and blood chemistry changes.

In general overtraining is described as an imbalance between training and recovery (Kuipers & Keizer, 1988) or an imbalance between stress and recovery- that is too much stress combined with too little regeneration (Lehman et al, 1999). Overtraining syndrome is a serious problem marked by decreased performance, increased fatigue, persistent muscle soreness, mood disturbances, and feeling 'burnt out' or 'stale' (Uusitalo, 2001). Recently, Olympians reported overtraining as a significant reason for their competitive difficulties (Gould et al., 2001).

## RECOGNIZING STRESSORS

The body responds to the stress of training and practice in a manner known as the General Adaptation Syndrome (Selye, 1974). This three stage response to stress includes; 1) alarm 2) resistance and 3) exhaustion. The first phase (alarm) is experienced when your body comes under new or more intense stress stimuli (e.g., training longer or harder, running farther, starting strength programs etc.).This shock or alarm phase may last several days or weeks depending on the amount of stress. Athletes may feel excessive soreness, stiffness and a temporary drop in their ability to perform.

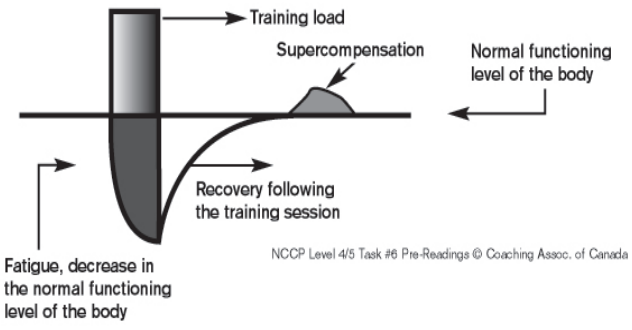


*Figure 1. Super Compensation. (with permission Coaching Association of Canada, 1995).*

The second phase (resistance) is the phase whereby your body adapts to the new loads or increased stress stimuli and becomes stronger, allowing the athlete to return to normal functioning. The body can withstand and adapt to this type of stress for an extended period of time by making various physiological adaptations in the neurological, biochemical, structural and mechanical systems that help to improve performance. This is often called super-compensation.

The body tolerates greater training loads and you can increase them by manipulating training variables like frequency, duration and intensity of activity. Beginning athletes can see large performance improvements with small training loads, but more elite athletes require larger loads to elicit even small performance improvements. Therefore these athletes need to ensure optimum recovery strategies are followed to minimize the potential for overtraining. Being aware of potential stressors that may be both internal and external and taking steps to minimize there impact on you can help prevent overstress.

## STRESSORS (ADAPTED AFTER PETERSEN, 2003)

### Training and practice stressors

- Too much training or practice done too hard, too fast, too soon (main cause).
- Lack of recovery time.
- Too many tournaments.
- Training or playing while injured or ill.
- Returning from injury or illness too quickly.

-Compensation from weak and damaged tissues that are unable to fully bear weight.

-Potential increased damage to already vulnerable injured tissue.
-Prolonged recovery time.

### Travel and lifestyle stressors

- Unfamiliar or poor quality of food.
- Poor accommodation or living conditions.
- Irregular routine.
- Lack of sleep (quality and quantity).
- Jet lag and travel concerns.

### Environmental stressors

- Constant competitive environment.
- Inadequate acclimatization to heat, cold, humidity or altitude.
- Lack of support from family and friends.
- Lack of adequate finances.
- Employment or scholastic concerns.
- Personal relationships.

### Health stressors

- Illness or injury.
- Medication, alcohol and other substances.
- Cold and Flu, infections, allergies or other health concerns.
- Poor nutrition and/or hydration.
- Large fluctuations in body weight and composition.

## RECOGNITION OF OVERSTRESS AND UNDERRECOVERY

Detecting underrecovery, overstress and subsequent overtraining can be a big problem for athletes and coaches alike. This is because the underlying mechanisms and causes remain, for the most part, unknown. Coaches who know their athletes well have a distinct advantage in early detection of overtraining and can minimize the potential for overstress or overtraining and optimize performance. Reliable clinically proven tests for diagnosis have not been established, and the underlying mechanism for performance decreases is not known (Urhausen & Kinderman, 2002; Armstrong & VanHeest, 2002; Hawley & Schoene, 2003) or fully understood. The factors contributing to the increase or decrease of overstress are complex and multifaceted and the response to overstress and overtraining appears to be highly individual with the signs and symptoms varying greatly from player to player. Thus a particular training schedule may improve the performance of one individual, be insufficient for another, and be damaging for a third (Raglin, 1993).

## PHYSICAL AND PSYCHOLOGICAL SIGNS & SYMPTOMS

Overtraining remains more easily detected by decreases in physical performance and alterations in mood state than by changes in immune or physiological functions (Shephard & Shek, 1998). Subjective symptoms remain the most sensitive indicators of overtraining syndrome (Fry et al, 1991; Uusitalo, 2001; Urhausen & Kinderman, 2002; Marion, 1995; Armstrong & VanHeest, 2002). Symptoms can include persistent fatigue, muscle soreness, reduced coordination, weight loss, mood changes. Frequent illness may accompany performance decrements, but they may also be signs of underlying medical conditions (Hawley & Schoene, 2003). One of the best indicators of overstress or overtraining is how well the athlete is coping. A decrease in their general sense of well-being, pain in muscles upon rising, and poor quality of sleep appear to be linked with excessive fatigue, and could be signs that precede overtraining (Marion, 1995).

| PHYSICAL | PSYCHOLOGICAL |
|---|---|
| Increased feeling of fatigue. | Decreased motivation to train. |
| Decrease in performance. | Decreased motivation to compete. |
| Increased muscle tension and tenderness. | Disturbed sleep or ability to relax. |
| Increased susceptibility to illness or injury. | Increased irritability. |
| Decreased appetite & weight. | Decline in feelings of self-worth. |
| Increased resting heart rate. | Uncontrollable emotions. |
| Increased blood pressure. | Increased anxiety or insecurity. |
| | Oversensitive about criticism. |
| | Listlessness or melancholy. |

*Table 1. Commonly agreed upon overtraining signs & symptoms (Shephard & Shek, 1998; Uusitalo, 2001; Urhausen& Kinderman, 2002; MacKinnon & Hooper, 1991; Kreider et al, 1998a; Kuipers & Keizer, 1988).*

## FATIGUE – UNDERRECOVERY – OVERTRAINING CONTINUUM

A certain amount of fatigue is necessary to develop the physical abilities or fitness factors of stamina, strength, speed, skill and power. Fatigue is usually a temporary condition which disappears within a few hours or few days if the athlete has access to adequate and appropriate recovery strategies including nutritional, physical, psychological and emotional support. If too much training is done too fast and too soon (before recovery has occurred) the fatigue level can remain and lead to a decrease in performance in the immediate, short or longer term. Under such conditions, the reaction of many athletes is to increase the volume and/or intensity of their training, thus establishing a vicious circle that only serves to aggravate the problem.

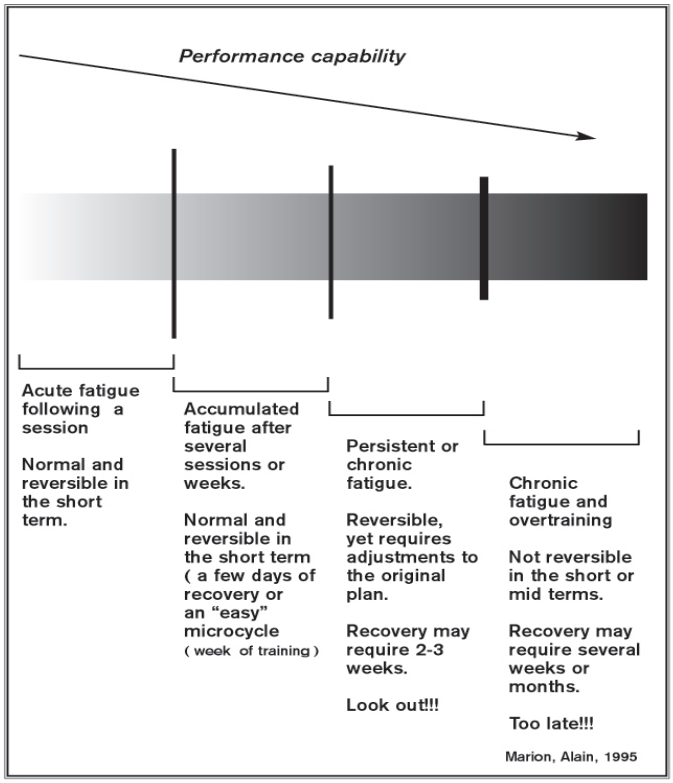


*Figure 2. The Fatigue-Overtraining Continuum diagram (with permission Coaching Association of Canada).*

## PERIODIZING YOUR RECOVERY STRATEGIES

Ideally you should divide your yearly training plan into five phases as outlined below (Petersen, 2006). The recovery program may vary with the phase of training as the athlete needs to recover from the fatigue of whatever fitness characteristics are being developed in the short term and continue to practice applicable longer term recovery strategies.

### Pre-competition

1 Phase A-'Training for Training'

2 Phase B-'Building the Base'

3 Phase C -'Getting Specific'

### In-competition

4 Phase D-'Tournament Competition & Maintenance

### Post-competition

5 Phase E-'Rest & Recovery'

The yearly training plan must be treated as a flexible tool. The types of recovery strategies one uses will remain somewhat constant but the weighting of each may vary with the phase of training. For example

during the in-competition phase more weighting may be put on psychological and emotional recovery strategies and recovery from travel.

During the post-competition phase and immediatley pre-competition, one should familiarize themselves with the recovery menu and start self-monitoring. During phase A, Training for Training, pay particular attention to the physiological recovery that is needed to alleviate symptoms associated with heavy training loads. During phase B and C as the training gets more sport specific and one is doing more speed and power work, neurological or CNS recovery must be optimized- which will be covered later in editions of this series. Psychological and emotional recovery should be reinforced throughout the pre-competition training and recovery process.

During the in-competition- phase D- recovery strategies should be automated and built into the daily, weekly and multi-week training routine. Psychological and emotional recovery strategies that may involve others are important to be implemented during this time. It is important to provide adequate time for recovery when planning the training program. This should include at least one recovery day or rest day in the weekly microcycle, an easier week each three-four weeks in the longer term macrocycle and rest periods (away from competition) of up to four to six weeks should be included in the yearly training cycle.

The following is a list of short term and longer term recovery strategies that athletes can do for themselves or others can do for athletes to aid recovery. They have been developed with the help of current literature as well as from anecdotal evidence from athletes, coaches and sports medicine and science personnel. Ensuring that the short and long term 'Rules of Recovery' are implemented on a regular basis will help optimize recovery and prevent overstress.

| SHORT TERM RECOVERY STRATEGIES (DAILY) | LONG TERM RECOVERY STRATEGIES (WEEKLY AND MONTHLY) |
|---|---|
| Re-hydrate | Resynchronize |
| Re-fuel | Rest (active) |
| Re-align | Refresh with variety |
| Recovery work (within & post session) | Record & monitor |
| Regain and maintain muscle length | Retail therapy (shopping) |
| Re-set the balance clock | Re-balance your life |
| Re-connect the core | Reinvest in yourself |
| Release the soft tissue | Resist illness |
| Re-play & review your training or match | |
| Reinvigorate with recovery menu | |
| Relaxation | |
| Rest (passive) | |

*Table 2. Short and long term recovery strategies: What athletes do for themselves.*

| RECOVERY STRATEGIES |
|---|
| Reassess, re-evaluate and re-plan |
| Recognize & reassure |
| Role model & mentor |

*Table 3. What others can do for athletes.*

## CONCLUSION

Training for and playing tennis is both physically and mentally demanding and recovery sessions must be incorporated into sports specific training programs. There is little hard scientific research on overtraining and recovery and what has been done is somewhat unsystematic with overlapping terminology and varied study protocols. Never the less many practical solutions can be implemented. Proper recovery depends on many factors and individuals who know and understand this can selectively apply techniques on an individual basis to facilitate recovery and improve performnce. The upcoming articles that will complete this series of papers- Rules of Recovery part 2, 3 and 4- will elaborate specifically on short and long term recovery strategies.

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# Self-identified teaching styles of junior development and club professional tennis coaches in Australia

Mitchell Hewitt & Kenneth Edwards (Uni. of Southern Queensland, Australia)

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ABSTRACT

*This paper presents the findings of research completed on the self-identified teaching styles of 165 tennis coaches in Australia using Mosston and Ashworth's Spectrum of Teaching Styles (2002) as a basis for identification. Exploring the teaching styles of Australian tennis coaches is significant because understanding what teaching styles tennis coaches are using can be used in the design of coach education programs and professional development initiatives.*

**Key words:** Teaching styles, development coach, club professional coach

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**Corresponding author:** mitch_hewitt@hotmail.com

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## INTRODUCTION

The manner which tennis coaches organise and configure practice, deliver information and offer feedback has been represented by numerous terms including; strategies, styles, approaches, frameworks and methods (terms which are viewed as interchangeable). This paper refers to the term 'teaching styles.' According to Ashworth (2009) a teaching style can be defined as;

"A plan of action that defines the specific decision interaction of the teacher or coach and the learner for the purpose of leading to the development of specific objectives in subject matter and behavior " (S. Ashworth, personal communication, March 2, 2010).[1]

Tennis coaching has typically been represented by the coach dominating the decisions regarding the 'how', 'why' and 'what' of student learning. The coach typically explains, demonstrates, organizes and conducts the lesson in addition to providing feedback in order to correct players' errors (Crespo & Reid, 2009, p.179). Other terms that have been used to describe this instructional process include; direct, command, explicit, prescriptive and teacher-centered.

An alternative instructional process, however, that invites greater student decision-making in relation to the 'how', 'why' and 'what' of learning has found a place in the teaching repertoires of tennis coaches. This instructional process regards the coach as a facilitator of the learning process while students are encouraged to problem-solve and explore solutions to various movement challenges. Other terms such as; student-centered, indirect, implicit and guided discovery have been used to describe common pedagogical principles related to this instructional process.

So what is the 'best' teaching style for developing tennis players? This question has prompted considerable debate amongst tennis coaching practitioners.

| LANDMARK STYLES | |
|---|---|
| *Reproduction* | *Production* |
| Command (A) | Guided Discovery (F) |
| Practice (B) | Convergent Discovery (G) |
| Reciprocal (C) | Divergent Discovery (H) |
| Self-Check (D) | Learner-Designed Individual Program (I) |
| Inclusion (E) | Learner-Initiated (J) |
| | Self-Teaching (K) |

*Table 1. Spectrum of teaching styles (Mosston & Ashworth, 2002).*

According to Rukavina and Foxworth (2009) using only one style of teaching is limiting. Possibly the most comprehensive teaching style framework is Mosston's Spectrum of Teaching Styles (Mosston & Ashworth, 2002). The Spectrum has been widely employed in Physical Education and has been refined since its origin in the mid-1960s (Sicilia-Camacho & Brown, 2008). The latest version of the spectrum consists of 11 different landmark teaching styles (Table 1). The first five styles (A-E) form a cluster that represents teaching options that foster reproduction of existing (known, past) information and knowledge. The remaining styles (F-K) form a cluster that represents options that invite production (discovery) of new knowledge. There has been no research to date that has attempted to explore the self-identified use of various teaching styles that Australian tennis coaches use during coaching sessions throughout the year. This paper outlines research that has been undertaken to address this gap in the literature.

## RESEARCH METHOD

This study employed a survey questionnaire to determine which teaching styles Australian tennis coaches reported using. The survey questionnaire used an adapted description inventory (Hewitt, Edwards, Ashworth & SueSee, 2010)[2] of Mosston and Ashworth's landmark teaching styles designed for collecting teacher's beliefs about the teaching styles they use (SueSee, Ashworth & Edwards, 2006). The first part of the questionnaire posed questions relating to socio-demographic information (Gender, Age, and State/Territory where you currently coach). The second part of the questionnaire presented one question relating to each of the 11 teaching style descriptions. Each teaching description was followed by the question: 'How frequently do I use this teaching style in my coaching sessions throughout the year?'

| SCENARIO STYLE | SCENARIO DESCRIPTION OF TEACHING STYLE | | | | |
|---|---|---|---|---|---|
| A | The students perform the task, selected by the coach, in a unison, choreographed, or precision performance image following the exact pacing (cues) set by the coach. | | | | |
| How frequently do I use this teaching style in my coaching sessions throughout the year? | Not at all | Minimally | Here and there | Often | Most of the time |
| | 1 | 2 | 3 | ④ | 5 |

*Table 2. An example of one scenario description from the Spectrum Inventory (2010) which shows a 5-point scale used to measure how frequently a teaching style was used.*

A 5-point scale was used for participant ratings. The items used for the question consisted of, 'Not at all', 'Minimally', 'Here and there', 'Often' and 'Most of the time' (Table 2).

Participants for the study were recruited from two different coach accreditation course levels that were conducted by Tennis Australia (TA). These include the Junior Development (JD) and Club Professional (CP) coaching qualification. Overall a total of 165 tennis coaches enrolled in the (JD) accreditation courses (n=91) and the Club Professional (CP) accreditation courses (n=74) between the later part of 2010 and early 2011 agreed to participate in the study. A total of 139 respondents were male and 26 were female. The age of the respondents were; 15-20 years of age (n=49), 20-30 (n=72), 30-40 (n=23) and over 40 years of age (n=21). The estimated mean age of the total sample (N=165) was 27 years.

## RESULTS

The table below (Table 3) shows the self-identified teaching styles of JD and CP tennis coaches who reported using the teaching styles 'Most of the Time' to 'Often'. The Practice Style – Style B is reported by respondents as their most frequent teaching style. This style was employed from 'Often' to 'Most of the Time' by over 60 percent of the participants. Results also reveal that JD and CP coaches spend most of their time using teaching styles located in the reproduction cluster of the Spectrum of Teaching Styles.

| TEACHING STYLES | % of Junior Development tennis coaches' self-identified use of teaching styles 'Often to Most of the Time' n=91 | % of Club Professional tennis coaches' self-identified use of teaching styles 'Often to Most of the Time' n=74 |
|---|---|---|
| Command – Style A | 50.3% | 52.8% |
| Practice – Style B | 60.1% | 63.5% |
| Reciprocal – Style C | 15.1% | 20.3% |
| Self Check – Style D | 19.8% | 20.3% |
| Inclusion – Style E | 23.1% | 32.4% |
| Guided Discovery – Style F | 41.8% | 41.9% |
| Convergent Discovery – Style G | 22% | 23% |
| Divergent Discovery – Style H | 27.5% | 45.9% |
| Learner Designated Individual Program –Style I | 8.8% | 8.2% |
| Learner Initiated Program – Style J | 5.5% | 0% |
| Self Teaching – Style K | 11% | 1.4% |

*Table 3. Percentage of Junior Development and Club Professional tennis coaches' self-identified use of teaching styles 'Often' to 'Most of the Time'.*

## DISCUSSION

Tennis coaches reported to using all of the teaching styles in their coaching sessions throughout the year. However, only one teaching style (Practice Style-Style B) was employed from 'Often' to 'Most of the Time' by over 60 percent of tennis coaches. The Command Style-Style A was ranked second with over 50 percent of all coaches reportedly using this style from 'Often' to 'Most of the Time'. Although coaches reported to using teaching styles in the production cluster less frequently, two styles from this cluster were in the top four styles used by coaches. These styles included; Guided Discovery Style-Style F (JD =41.8%; CP=41.9%) and Divergent Discovery Style-Style H (JD=27.5%; CP=45.9%).

The results of this study have implications for coach education curriculum initiatives as well as future professional development opportunities. Despite the fact that two styles located in the production cluster were in the top four styles (ranked 3rd and 4th), the predominant use of teaching styles in the reproduction cluster (as reported by coaches) is not necessarily compatible with the pedagogical anticipations of Australian tennis coach accreditation manuals. In interpreting the results it is conceivable that some respondents lacked an understanding and/or misinterpreted the teaching style descriptions. For instance, coaches reported usage of the Self-Teaching Style – Style K despite Mosston and Ashworth (2002) stating that "this teaching style does not exist in the classroom" (Mosston & Ashworth, p.290). Additionally, the teaching style description used in the survey questionnaire to describe Style K clearly states that "this style is independent of a coach and not initiated by a coach" (Hewitt, Edwards & Ashworth, 2011).

## CONCLUSION

This paper reported on the self-identified teaching styles of 165 tennis coaches in Australia using Mosston and Ashworth's Spectrum of Teaching Styles (2002) as a basis for identification. Understanding what teaching styles Australian tennis coaches are using can be used in the design of coach education programs and professional development initiatives. Results indicate that Junior Development and Club Professional tennis coaches predominantly use one teaching style (Practice Style – Style B) during their coaching sessions throughout the year. It was evident that all coaches spent most of their time using teaching styles located in the reproduction cluster of the Spectrum of Teaching Styles. Through an awareness of a range of teaching styles, coaches may gain a better understanding of their instructional practices. The information outlined in this paper forms part of a larger doctoral study. Further research will include the observation of coaches to verify the teaching styles they use as well as interviewing coaches to reveal insights into how they decide what teaching styles to use and when to use them.

Notes:

1 The term teaching style is synonymous with coaching style in this paper.

2 Adaption of instrument for collecting teachers' beliefs about their teaching styles used in physical education. Unpublished doctoral dissertation University of Southern Queensland.

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# Motor imagery and serving precision: A case study

Simon Desliens, Aymeric Guillot & Isabelle Rogowski (University of Lyon, France)

ITF Coaching and Sport Science Review 2011; 55 (19): 9 - 10

ABSTRACT

*The goal of this case study was to outline the influence of practice setting conditions and motor imagery on service precision. The eight conditions that were conducted showed that mentally imagining the serve four times whilst in the service position improved the accuracy and location of the ball bounce on the opponent's court and that using visual imagery whilst in the service position itself helped to improve consistency. The results have enabled the researchers to identify the strengths and weaknesses of the motor imagery ability of the evaluated player with a view to defining mental preparation goals for coaching sessions, as well as making the participant's serve more efficient in competitive situations.*

**Key words:** Imagery, psychology, service precision

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**Corresponding author:** isabelle.rogowski@univ-lyon1.fr

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## INTRODUCTION

In the search towards greater efficiency, the serve must combine speed and precision in order to increase its percentage level of success, thereby augmenting the number of easily won points (Brody, 2003). Improving efficiency in the serve involves the optimization of the technical, physical and mental abilities of the player so as to produce the best possible outcome. Motor imagery techniques are commonly used for mental preparation (Mamassis, 2005) and consist in forming mental representations of an action without concomitant movement (Guillot & Collet, 2008). Motor imagery presents applications in four different fields, including that of performance (Guillot & Collet, 2008). Previous research has shown that motor imagery helps improve the precision of the serve for advanced tennis players (Guillot et al., 2011). The purpose of this work was to study the influence of different practice conditions using motor imagery and their associated effect on service precision. Using experimental design methodology, this research specifically aimed to study the influence of the type of imagery, the number of mental repetitions and the practice setting (where the imagery is performed) on the precision of the serve.

## METHOD

Three experimental variables were studied: type of imagery (TI), number of repetitions (NbR) and practice setting of imagery (S). Each one of these variables was divided into two modalities corresponding to two levels (-1 and +1), namely visual imagery vs. kinaesthetic imagery for TI, one vs. four repetitions for NbR, and off-court vs. in serve position for S.

A 23 full factorial design was used to define the 8 experiments/conditions to be conducted (Table 1) and to quantify the main effects and interactions between the variables of serve precision, based on the following mathematical model:

$$Y = b0 + b1*TI + b2*NbR + b3*S + b12*TI*NbR + b13*TI*S + b23*NbR*S + b123*TI*NbR*S$$

Y represents the response (serve precision), b0 the constant of the model, bi the coefficient of the main effects of the experimental variables (TI, NbR and S), bij the coefficients of level 1 interaction effects between the experimental variables, bijk the coefficient of level 2 interaction effects between the experimental variables.

The experimental protocol consisted of motor imagery of a serve (according to the conditions described in table 1) followed by the performance of an actual serve. All of the conditions were repeated 10 times (5 serves in each diagonal) on a hard in-door court and were performed by a volunteer tennis player (24-years-old; French ranking = 5/6). The performance instructions were to hit a precise and powerful serve on the "T" (i.e. to seek an ace). The precision was evaluated based on the location of the rebound of the ball in the opponent's box. The most accurate bounces within the 0.5*0.5m area (determined from the central line and the service box lines) yielded 5 points; a rebound located in the 1*1 m area yielded 3 points; a rebound located elsewhere in the box yielded 1 point. The precision was quantified by two parameters: the score corresponding to the sum of the points obtained after performing the 10 actual serves of each condition (the higher the score, the better the precision) and the consistency corresponding to the coefficient of variation (CV) of the score (the lower CV, the higher the consistency).

The coefficients of the models were calculated through multiple linear regressions by using the NEMROD-W program (LPRAI, Marseille, France). The level of significance of the coefficients was set to $p \leq 0.05$.

| EXP. | *TI* | | *NbR* | | *S* | | *Score* | *CV* |
|---|---|---|---|---|---|---|---|---|
| | Modality | Level | Modality | Level | Modality | Level | (points) | (%) |
| 1 | Visual | -1 | 1 | -1 | Off-court | -1 | 9 | 97 |
| 2 | Kinaesth. | +1 | 1 | -1 | Off-court | -1 | 8 | 115 |
| 3 | Visual | -1 | 4 | +1 | Off-court | -1 | 15 | 110 |
| 4 | Kinaesth. | +1 | 4 | +1 | Off-court | -1 | 14 | 122 |
| 5 | Visual | -1 | 1 | -1 | In serve position | +1 | 16 | 79 |
| 6 | Kinaesth. | +1 | 1 | -1 | In serve position | +1 | 19 | 104 |
| 7 | Visual | -1 | 4 | +1 | In serve position | +1 | 21 | 69 |
| 8 | Kinaesth. | +1 | 4 | +1 | In serve position | +1 | 18 | 101 |

*Table 1. Matrix of experiments showing the modalities and levels of the three experimental variables (TI: type of imagery; NbR: number of mental repetitions; S: practice setting of imagery), and responses corresponding to each experiment (CV: coefficient of variation).*

## RESULTS

Results showed that the best compromise for optimal accuracy is to perform four mental repetitions whilst in the service position.

The model calculated for the precision score is the following:

Score = 15 – 0.25*TI + 2*NbR+ 3*S – 0.75*TI*NbR + 0.25*TI*S - 1*NbR*S - 0.75*TI*NbR*S

Only the coefficients associated with variables NbR and S are statistically significant (p=0.03 and p=0.003, respectively).

Furthermore, results showed that the best way to increase consistency (lower CV) according to this study is to use visual imagery whilst in the serve position. The model calculated for CV is the following:

CV = 15 + 10.7*TI + 0.9*NbR – 11.5*S + 0.2*TI*NbR + 3.3*TI*S – 4.1*NbR*S + 1.5*TI*NbR*S

Only the coefficients associated with variables TI and S are statistically significant (p=0.008 and p=0.006, respectively). The number of mental repetitions and the interactions between the experimental variables had no significant influence on CV.

## DISCUSSION

The main results show that four mental repetitions performed in the service position help improve the precision score of the serve and that using visual imagery in the service position improves consistency in the serve. This information makes it possible to refine the instructions and practice conditions associated with imagery in order to increase its effectiveness.

First and foremost, the results of this case study confirm the efficiency of motor imagery in tennis performance (Coehlo et al., 2007 ; Noel, 1980 ; Robin et al., 2007). They also confirm the importance of the practice setting of motor imagery, which means that it must be used preferentially in a context close to the environment of actual practice (Holmes & Collins, 2001 ; Guillot et al., 2005). Indeed, mentally simulating the movement using data from the visual, kinaesthetic, auditory and proprioceptive senses can facilitate the production of mental representations. These data are first memorized during practice before being recognized, selected and retained, which helps form a better representation of the situation.

The results also show that using visual imagery prompted a better consistency in the serve of the evaluated player. This modality gives the player the opportunity of visualising the outcome of the movement, including the trajectory and the impact of the ball in the opponent's box. Likewise, repeating the serve four times has allowed the player to improve the precision of his serve. The choice of the modality of imagery, as well as the number of repetitions will be considered as conditions that remain specific to the evaluated player since no previous study has really established the superiority of visual imagery over kinaesthetic imagery, nor has determined a specific number of repetitions for optimal efficiency. However, this study allows us to formulate recommendations for improving efficiency in the serve of the tested player.

In competitive situations, this player will use preferentially visual imagery several times before serving and will endeavour to do it while in serve position. Integrating these modalities of imagery into the preparation routine seems to be the best compromise; however, it will be necessary to adapt the number of repetitions in order to avoid exceeding the 20 seconds limit between points imposed by the rules of tennis. It may therefore be possible to propose to players a concentration routine based on motor imagery that would really optimize their serve, distinguishing itself from the usual bounce-the-ball ritual. During coaching sessions, it will be recommended to develop the ability of modalities of imagery other than visual in order to diversify training and avoid any sense of weariness due to using only the visual channel. For instance it would be possible to devise an imagery protocol based on kinaesthetic information (relaxation during preparation, muscle activation, and explosiveness when hitting the ball), and then to make it evolve towards the visualization of the ball bouncing off the racket strings all the way to the opponent's box. Similarly, a complementary work could be undertaken in order to reduce the number of repetitions necessary for the imagery to be efficient, and therefore limit the mental load before serving.

## CONCLUSION

This study confirms the fact that imagery contributes to improving the precision and consistency of the serve in tennis. Based on a simple and rigorous methodology, this study has allowed us to identify the strengths and weaknesses of the motor imagery of the tested player in order to define mental preparation objectives for that player in coaching sessions, and to make the participant's serve more efficient in competitive situations.

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# Making the Top 100: ITF Top 10 junior transition to Top 100 ATP tour (1996 – 2005)

Peter D. McCraw (Australia)

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ABSTRACT

*This study investigated transition from a Top 10 ITF Junior rank to Top 100 ATP Tour rank over a ten-year period between 1996 and 2005. It provides an insight into the development variables of ITF junior win: loss ratios, number of junior and ITF Pro-Circuit events played between 14-18 years of age and ranking in the years prior to entering the Top 100. The results of this study can help to establish a range of statistical benchmarks coaches and Federations can use for players aspiring at a professional career on the ATP Tour.*

**Key words:** Junior to senior transition, statistical analysis, Top 100 ATP

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**Corresponding author:** peter@mccrawmethod.com

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## INTRODUCTION & BACKGROUND

Achieving a Top 100 ATP rank is a significant achievement in men's professional tennis. Much discussion surrounds the path a player and time a player should take in achieving this goal.

There have been a number of studies that have profiled average age of top-ranked male and female tennis players (Tennis Canada, Treleven & Miley). This study investigated transition from a Top 10 ITF Junior rank to Top 100 ATP Tour rank over a ten-year period between 1996 and 2005. It provides an insight into the development variables of ITF junior win: loss ratios, number of junior and ITF Pro-Circuit events played between 14-18 years of age and ranking in the years prior to entering the Top 100. The intended use of this study was to establish a range of statistical benchmarks coaches and Federations can use for players aspiring at a professional career on the ATP Tour.

## METHODOLOGY

- The study's data was obtained from the ITF and ATP Tour websites:

  www.itftennis.com/juniors/ www.itftennis.com/mens/ www.atpworldtour.com

- Data was collated on players meeting the criteria of:

  Top 10 ITF Junior year-end rank between 1996 – 2005. (85 players*)

  Top 100 ATP Tour Players as at February 2 2009. (100 players)

- Basic statistical measures of mean, median, standard deviation, minimum, maximum, were used to profile players.

| TOP 100 JUNIOR (1996 – 2005) TO TOP 100 ATP | | | | | | |
|---|---|---|---|---|---|---|
| | | *Average* | *Std. Dev* | *Min* | *Max* | *Median* |
| SENIOR PROFILE | | | | | | |
| Highest ATP Rank | | 36 | 28 | 1 | 92 | 33 |
| Age at Highest ATP Rank | | 23.0 | 1.7 | 18.8 | 26.5 | 22.6 |
| Age at First Year End Rank | | 17.6 | 1.6 | 15.0 | 22.0 | 18.0 |
| Age at Top 100 Rank | | 20.8 | 1.9 | 17.0 | 25.0 | 21.0 |
| Years in Top 100 | | 3.7 | 2.7 | 1.0 | 10.0 | 3.0 |
| Transition Time Top 100 (yrs) | | 4.3 | 2.1 | 1.0 | 9.0 | 4.0 |
| W:L Ratio – Career (MD) | | 1.6 | 0.5 | 0.1 | 3.9 | 1.5 |
| - ATP Tour (MD) | | 1.2 | 0.7 | 0.3 | 4.1 | 1.0 |
| - ITF Pro Circuit (MD) | | 1.9 | 0.5 | 1.1 | 3.7 | 1.8 |
| JUNIOR PROFILE | | | | | | |
| ITF Junior W:L Ratio | | 3.3 | 1.0 | 1.7 | 6.3 | 3.1 |
| ITF Junior Matches Played | | 110 | 34 | 36 | 188 | 108 |
| ITF Junior Tournaments Played | | 36 | 12 | 12 | 61 | 38 |
| ITF Pro Circuit Matches Played | | 84 | 25 | 32 | 152 | 80 |
| ITF Pro Circuit Tournaments Played | | 41 | 22 | 0 | 95 | 39 |
| | | | | | | |
| YEARS PRIOR TO TOP 100 RANK | **5** | **4** | **3** | **2** | **1** | **(0)** |
| Average Year End Rank | 783 | 440 | 208 | 127 | 102 | 99 |
| APPROX. YEAR END RANK | **800** | **450** | **200** | **125** | **100** | **Top 100** |

*Table 1. Profile of forty-nine* boys who finished with a Top 10 Junior ITF Year End Rank between 1996 – 2005 who have achieved a Top 100 ATP Senior Rank. (MD) = Main Draw. * - Duplicate names removed.*

* - Duplicate names were removed as players finished in Top 10 for more than one year in a row. Also some players achieved a Top 100 Rank during the calendar year but failed to stay inside the Top 100 at year-end. These players were included in the study and categorised as having achieved a Top 100 ATP Tour rank.

## DISCUSSION

### Top 10 ITF Junior Circuit Player who achieved Top 100 ATP Tour Rank

Table 1 outlines the profile (mean) of a Top 10 ITF Junior Circuit player (1996 – 2005) who achieved a Top 100 ATP Tour rank. Forty-nine (49) players comprised this group after duplicate names were removed as some players finished with Top 10 rank for more than one year in a row.

### ITF Junior Circuit Profile

• An average W:L Ratio of 3.3:1 (min 1.7/ max 6.3) was required in the ITF Junior Circuit to achieve a Top 10 year end rank. Players competed in 36 (min 12 / max 61) ITF Junior Circuit events and participated 110 (min 36 / max 188) matches during their junior career.

• Players competed in 41 (min 0 / max 95) ITF Pro Circuit events and participated in 84 (min 32 / max 152) matches between 15 – 18 years.

| | ITF JUNIOR PROFILE- AGE & NUMBER OF EVENTS PER YEAR | | | | | |
|---|---|---|---|---|---|---|
| ***Years*** | ***13*** | ***14*** | ***15*** | ***16*** | ***17*** | ***18*** |
| *Mean* | 0 | 4 | 7 | 11 | 12 | 8 |
| *Std Dev* | 0 | 5 | 5 | 5 | 5 | 6 |
| *Min* | 0 | 1 | 2 | 0 | 1 | 1 |
| *Max* | 0 | 19 | 28 | 18 | 22 | 18 |
| *Median* | 0 | 1 | 5 | 13 | 13 | 8 |
| *%* | *0%* | *78%* | *95%* | *88%* | *84%* | *46%* |

*Table 2. The number of ITF Junior events players competed in by age.*

Table 2 above illustrates the number of ITF Junior events players competed in by age.

• 78% had begun playing by age 14.

• This peaked to 95% at 15 years and dropped to 88% by year 16.

• It continued to fall, with only 84% at 17 years and 46% by 18 years competing on the ITF Junior Circuit.

| | ATP TOUR + ITF PRO CIRCUIT PROFILE- AGE & NUMBER OF EVENTS PER YEAR | | | | | |
|---|---|---|---|---|---|---|
| ***Years*** | **13** | **14** | **15** | **16** | **17** | **18** |
| *Mean* | 0 | 0 | 4 | 7 | 13 | 22 |
| *Std Dev* | 0 | 0 | 3 | 6 | 8 | 8 |
| *Min* | 0 | 0 | 0 | 1 | 1 | 5 |
| *Max* | 0 | 0 | 13 | 23 | 30 | 38 |
| *Median* | 0 | 0 | 3 | 5 | 12 | 22 |
| *%* | *0%* | *0%* | *57%* | *82%* | *96%* | *96%* |

*Table 3. The number of ATP Tour and ITF Pro Circuit events players competed in by age.*

Table 3 above illustrates the number of ATP Tour and ITF Pro Circuit events players competed in by age. 57% had begun playing by age 15. This rose to 82% at 16 years and peaked at 96% by year 17 and 18.

Table 4 below illustrates the combined number of ITF Junior, ATP Tour and ITF Pro Circuit events players competed in by age:

• At age 15, a total of 11 events were played with a 65/35% proportion to junior circuit.

• By age 16 this had increased to 18 events with a 60/40% split to Junior circuit.

• At age 17, players competed in 25 events with a 50/50% swing towards Senior circuit events.

• By the 18th year, the Top 10 ITF juniors that achieved a Top 100 ATP rank competed in 30 events with a further swing toward Senior circuit events of 25/75%.

| TOURNAMENT PROFILE (ITF JUNIOR & ATP / ITF PRO CIRCUIT) AGE & NUMBER OF EVENTS PER YEAR | | | | |
|---|---|---|---|---|
| **Age Profile** | **15** | **16** | **17** | **18** |
| **Total Events** | **11** | **18** | **25** | **30** |
| Junior | 7 | 11 | 12 | 8 |
| Senior | 4 | 7 | 13 | 22 |
| Junior % | 64% | 61% | 48% | 27% |
| Senior % | 36% | 39% | 52% | 73% |
| *Est. %* | *65* | *60* | *50* | *25* |
| | *35* | *40* | *50* | *75* |
| 5% shift to Seniors from Juniors at year 16.<br>10% shift to Seniors from Juniors at year 17.<br>25% shift to Seniors from Juniors at year 18. | | | | |

*Table 4. The combined number of ITF Junior; ATP Tour and ITF Pro Circuit events players competed in by age.*

### ITF Pro Circuit & ATP Tour Profile

• The first ITF Pro Circuit rank was obtained at 17.6 years (min 15.0 / max 22.0) and a Top 100 ATP Tour rank at 20.8 years (min 17.0 / max 25.0). Players remained in the Top 100 for 3.7 years (min 1.0 / max 10.0).

• The highest ATP rank was obtained at age 23.0 (min 18.8 / max 26.5), with a transition time of 4.3 years (min 1.0 / max 9.0). To achieve this the player initially required a W:L Ratio of 1.9:1 (min 1.1 / max 3.7) on the ITF Pro Circuit, then 1.2:1 (min 0.3 / max 4.1) on ATP Tour. A career W:L Ratio of 1.6:1 (min 0.1 / max 3.9) was required.

• The average year-end rank was calculated for up to 5 years from a Top 100 rank. Results are below with an approximate ranking proposed also.

| YEARS PRIOR TO TOP 100 RANK | **5** | **4** | **3** | **2** | **1** | **(0)** |
|---|---|---|---|---|---|---|
| Average Year End Rank | 783 | 440 | 208 | 127 | 102 | 92 |
| *Approx. Year End Rank* | *800* | *450* | *200* | *125* | *100* | *Top 100* |

*Table 5. Years prior to top 100 rank.*

## FINDINGS

Analysis of Top 10 ITF Junior Circuit players from 1996 – 2005 who achieved a Top 100 ATP Tour rank in their career, indicated:

(1) 58% of players who achieved a Top 10 ITF Junior rank between 1996-2005 achieved a career high Top 100 ATP Tour Rank.

(2) First ITF Pro Circuit rank achieved at 17.6 years.

(3) Transition time from first year-end rank to Top 100 ATP Tour of 4.3 years at an age of 20.8 years.

(4) Highest ATP Tour rank achieved approximately two years after entering ATP Tour Top 100 at 23.0 years with an average of 3.7 years inside Top 100 rank.

(5) Players competed in 36 ITF Junior Circuit events and participated in 110 matches between age 14-18 years.

(6) Players competed in 41 ITF Pro Circuit / ATP Tour events and participated in 84 matches between age 15 – 18 years.

(7) Career W:L Ratio of 1.6:1 on ATP Tour, 1.9:1 on the ITF Pro Circuit and 3.3:1 on the ITF Junior Circuit.

(8) The ranking benchmarks from Table 5 could be used as an indicator prior to a Top 100 ATP Tour ranking.

## SUMMARY

The best Juniors players over a 10 year period achieved an ATP rank before their 18th birthday and entered the Top 100 ATP Tour, four to five years later before the age of 22 yrs. They competed in over 40 ITF Pro Circuit events between 15-18 yrs while continuing to compete on the ITF Junior Circuit playing 36 events in the same period. They achieved a win:loss ration of over 3:1 in juniors and almost 2:1 in the Pro Circuit. They halved their ATP ranking each year for 4 years before entering the Top 100.

## DEVELOPMENT IMPLICATIONS

It is recommended Federations and Coaches create 'Development Schedules' for players which are underpinned by the findings of this study. The cornerstone of a players schedule should be periods of technical, tactical, physical and mental 'development'. Competition plans should be appropriate to the players' stage of development. Performance benchmarks of win:loss ratios and ranking timelines should be used as a guide to a player's overall development.

## GLOSSARY

• Age at Highest ATP Rank – The chronological of player at time of highest ATP rank.

• Age at First Year End Rank – The chronological age of player at time of ranking.

• Age at Top 100 Rank – The chronological age of player when first Top 100 rank achieved.

• Years in Top 100 – The number of years a player was ranked inside the Top 100 on ATP Tour.

• Transition Time – The number of years taken to achieve Top 100 ATP Tour rank from first year-end rank.

• Win:Loss (W:L) Ratio (MD) – Calculation of Career (ITF Pro Circuit & ATP Tour) win / loss ratio in main draw matches. Breakdown of ATP Tour, ITF Pro Circuit and ITF Junior Circuit.

• ITF Junior Circuit – The world governing body tournament circuit for age 18/U tennis players.

• ITF Pro Circuit (PC) - The world governing body tournament circuit for over 18 yrs. tennis players.

• ATP Tour – The Men's Tennis Association professional tournament circuit.

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# Tennis Anatomy: Conditioning for the arms and wrists

E. Paul Roetert (AAHPERD) & Mark Kovacs (USTA)

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ABSTRACT

*For a tennis player, the arms and wrists link the lower body and torso to the racket, which is the last link before ball contact. If the arms and wrists are not strong or flexible, the power produced throughout the lower body and core will not efficiently transition into the ball. This results in reduced power and spin on the stroke. This article will outline exercises applied to tennis that can help not only to strengthen the wrists and forearms, but also to prevent injury in a vital area of the athlete's body.*

**Key words:** Conditioning, injury prevention, forearms, wrists

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**Corresponding author:** Kovacs@usta.com, eproetert@gmail.com

## TENNIS STROKES AND ARM AND WRIST MOVEMENT

Tennis has evolved much over the past 30 years, due in part to racket and string technology. Because of these advances, we see many more open-stance groundstrokes. The strokes have become more violent, requiring more strength to help protect the surrounding joints, especially for the arm muscles. The muscles of the upper arm must contract concentrically to provide force for the different strokes, but they also need to provide eccentric strength to slow down the swing during the follow-through. We have seen an increase in wrist injuries due to the more vigorous radial and ulnar deviations modern rackets allow. Strengthening the flexors and extensors and the abductors and adductors is a must. Proper balance in each of these muscle groups is the key.

The triceps at the back of the upper arm is an important muscle for a tennis player because it provides support for the shoulder and elbow. From a performance perspective, the triceps plays an important role in the serve, overhead, backhand, and volley. For example, one of the last segments of the kinetic chain in a tennis serve or overhead is extension at the elbow just before contact with the ball. This motion is produced by a forceful contraction of the triceps that transfers forces from the trunk and upper arm into the racket. From an injury prevention perspective, a strong triceps alleviates stress on the wrist, elbow, and shoulder joints, reducing the risk of injury. Because tennis is played with a racket and matches can last many hours, grip and forearm strength and muscular endurance are vital for a tennis player to develop. The more grip and forearm strength a tennis player has, the less stress she will place on the wrist and elbow joints. Sufficient forearm and grip strength also can reduce the likelihood of shoulder-related injuries. A player who has a weak grip or forearm may try to overcompensate with the shoulder, increasing the risk of injury.

## EXERCISES FOR THE ARMS AND WRISTS

When applied correctly, the following exercises will develop arm strength and muscular balance. In general, you want to strengthen the dominant and non-dominant arms equally. This is appropriate for both the upper and lower arms, even though the dominant arm will develop more strength because of the nature of the sport. Strengthening exercises should focus on muscular balance and endurance. Therefore, it is recommended to use lighter weights and more repetitions, especially for the lower arms. Weights typically won't exceed 8 pounds (3.63 kg), and the number of repetitions will usually be 12 to 15 unless otherwise noted. Movements in several directions that are similar to the movement path of the strokes should be incorporated into a training program and have been outlined in the following exercises. Properly strengthened arms will help you perform better on the court and also protect the shoulders, elbows, and wrists from injury.

## CABLE OVERHEAD TRICEPS EXTENSION

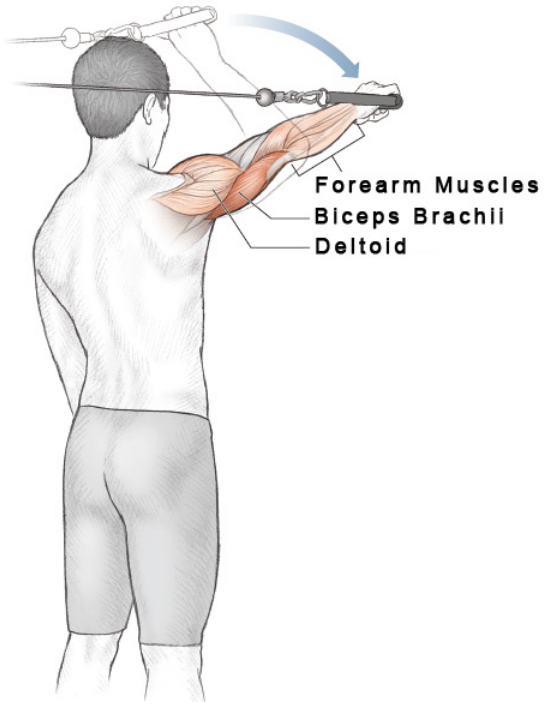


*Figure 1. Execution of cable overhead triceps extension.*

### Execution

1. Stand upright, feet together, and face away from the cable or pulley machine. Grasp the handle in one hand. Start with your arm bent, with approximately a 90-degree angle at the elbow.

2. Slowly extend your arm forward by contracting the triceps until the elbow straightens. Maintain a stable core and shoulder position.

3. At the end of the movement, pause and then slowly return the handle to the starting position via an eccentric triceps contraction. Repeat the movement for 10 to 12 repetitions, and then switch to the opposite arm.

### Muscles Involved

**Primary:** Triceps brachii

**Secondary:** Deltoid, forearm muscles

### Tennis Focus

The cable overhead triceps extension strengthens the triceps for both injury prevention, particularly of the shoulder and elbow joints, and performance enhancement (more powerful serves, overheads, and backhands). The upward phase of the swing in the serve and overhead requires significant triceps extension just before contact as well as during and immediately after contact. The cable overhead triceps extension exercise is highly specific to the serve and overhead movement. It develops the triceps to contract in a similar plane of movement to that experienced during the serve and overhead.

## WRIST CURL

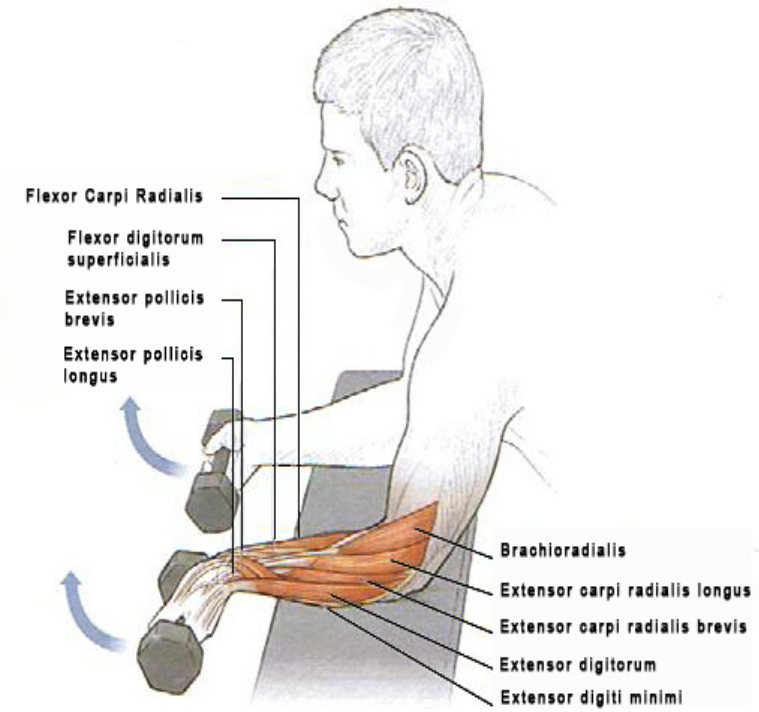


*Figure 2. Execution of wrist curl.*

### Execution

1. Kneel beside a weight bench. Prop your elbows on the bench, with your arms bent at approximately 90 degrees. Grasp two separate dumbbells using an underhand grip (palms turned up). Place your forearms on the edge of the weight bench.

2. Lower the dumbbells by bending (extending) your wrists, pointing your knuckles toward the floor.

3. Raise the weight by contracting the forearm flexors. Repeat for 10 to 12 repetitions.

### Muscles Involved

**Primary:** Forearm extensors (brachioradialis, extensor carpi radialis longus, extensor carpi radialis brevis), extensor digitorum, extensor carpi ulnaris, extensor pollicis brevis, extensor pollicis longus, flexor carpi radialis.

**Secondary:** Finger extensors and flexors

### Tennis Focus

The wrist curl works forearm strength. This is important from a number of perspectives. Forearm rotation (pronation and supination) and flexion and extension help prepare the muscles for repeated stresses from each of the strokes. In addition, open stances and modern equipment have changed the game. These advances, particularly new racket technology, allow for more forceful groundstrokes incorporating both ulnar and radial deviation. A well-rounded training program for the arms and wrists should incorporate each of these exercises.

## FOREARM SUPINATION

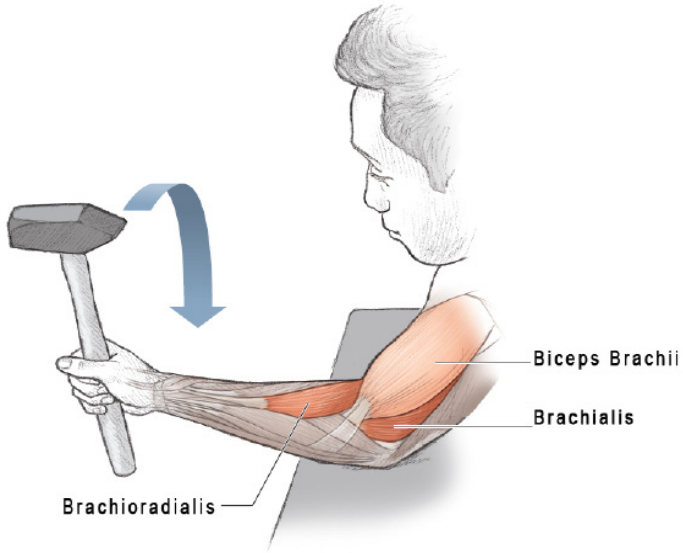


*Figure 3. Execution of forearm supination exercise.*

### Execution

1. Sit or kneel beside a weight bench. Position your forearm and elbow on the bench. Establish a stable and rigid shoulder position. Grasp a hammer or other piece of equipment with a weighted head in one hand. Begin with the hammer head pointed to the ceiling.

2. Slowly and with control rotate your forearm. Take two to four seconds to rotate your forearm to avoid using momentum. If the hammer is in your right hand, your thumb will move to the right as you rotate your forearm. At the end of the movement, hold the position for two seconds, and then slowly return to the starting position.

3. After performing a set with one arm, switch arms and perform the same movement pattern on the other arm.

### Muscles Involved

**Primary:** Brachioradialis, brachialis, supinator (anterior)

**Secondary:** Biceps brachii

### Tennis Focus

During the backswing and follow-through of a two-handed tennis stroke, the top hand facilitates supination of the forearm. Developing

appropriate strength and endurance in the forearm muscles will help with shot execution and also reduce the risk of wrist and shoulder injuries. Forearm supination helps involve the wrists in the stroke, allowing for greater spin and the potential to create angles that would not be possible without this movement. Developing strength in the forearm is also very beneficial to improve performance on both the forehand and backhand volley as well as the slice backhand.

## CONCLUSION

As a tennis players builds ground reaction forces from the ground up, these forces are transferred sequentially through the legs, hip, trunk, shoulder, arm and racket to form a linked system. This article has highlighted just one particular part of that kinetic chain- the arms and wrists. Exercises and their relevant application to tennis have been outlined in order to prepare a tennis player for the physical demands placed on them in the modern game.

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This article is an excerpt from Tennis Anatomy (Human Kinetics, 2011), written by E. Paul Roetert and Mark S. Kovics. Excerpted by permission of Human Kinetics.

# Remember parents and coaches are team members: Team work is required

Janet A. Young (Victoria University, Australia)

ITF Coaching and Sport Science Review 2011; 55 (19): 17 - 18

ABSTRACT

*This article features a study that was recently conducted in Australia with parents and coaches of Australia's top 10 professional female tennis players. The study's results highlight that parent and coach consider the other to be complementary and valuable team members who are focused on their player's well-being and pursuit of excellence.*

**Key words:** Parent, Coach, Player Development

Article received: 29 May 2011

**Corresponding author:** janet_young7@yahoo.com.au

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## INTRODUCTION

All champions have their own unique 'story' of their journey to the top echelons of tennis. Rarely is the story one of an easy road but rather is one of trials, setbacks, challenges and great moments of inspiration and perspiration! While stories differ in the detail, a common element appears to be the critical and influential roles played by a player's parents and coaches (e.g., Gould et al; 2005; Young and Pearce, 2011).

To date, research has generally focused on gaining an understanding of coach and parent contributions to talent development by asking coaches and parents about their own roles or asking players to describe the respective roles of their parents and coaches. This article takes a different perspective and reports on coach- and parent-understandings of the other's role. What do coaches think about parents and visa versa? What are their respective contributions and where can they add value? What can coaches and parents take from understanding the other person's perspective in a common endeavour to support and guide a player to fulfill her tennis dreams?

These were some of the questions I wanted to address when I recently conducted a study on parents and coaches in collaboration with Tennis Australia and The International Tennis Federation. Given my own background in the sport as a player, coach and administrator, I wanted to focus specifically on women's tennis to better understand the dynamics of talent development for aspiring female players.

## OVERVIEW OF AUSTRALIAN-BASED STUDY

The study involved 10 parents (8 female and 2 male) and 10 coaches (2 female and 8 male) nominated by Australia's 10 top-ranked professional female tennis players. All parents had sporting credentials with 5 having a background in tennis from social player to elite and veteran competitors. All coaches were former professional circuit players and, on average, had been a coach for over 17 years and had been working with their top-ranked professional female tennis player for over 3 years.

Data was collected from these coaches and parents by means of two questionnaires. Coaches were asked:

(a) What role do the player's parents currently play in their daughter's career?

(b) Has this role changed over the years, and if so how?

(c) What recommendations do they have for parents who want their daughter to develop her talents in tennis?

Parents were asked a similar set of questions about the role of the player's coach.

## STUDY'S KEY RESULTS

A series of inductive content analyses was conducted to analyse the data and revealed the following results.

### A. Coaches' Perspectives

In brief, coaches reported that they believed:

• A parent's role was to be supportive and, in some instances, to provide financial assistance if required.

• There had been changes over the years in the role of parents in their daughter's tennis careers. Most parents were less heavily involved once their daughter competed on the international circuit and became more successful. At this point parents continued to provide unconditional support and put their trust in coaches and their programs to best guide players.

• Parents who want to help their daughters to develop their talent should following the recommendations listed in Table 1.

| RECOMMENDATION | REPRESENTATIVE QUOTES |
|---|---|
| Empower player to take responsibility | *"Encourage player to become more responsible for her own actions and organisation of tennis matters"* |
| Provide unconditional support | *"Always be positive after a match. Give plenty of encouragement, comfort and love after a loss"* |
| Be a parent | *"Know your role as a parent and simply be a parent (not coach or manager) who provides a balanced and loving environment"* |
| Identify a good coach | *"Do your homework to find a good coach and then trust the coach chosen"* |
| Establish a sound relationship with the coach | *"Be part of a team with the coach but let him/her do the coaching! Support and allow the coach do his/her job. Be loyal, stick by the coach and leave the tennis to the coach. Do not attend practice sessions"* |
| Be respectful spectator | *"Do not sit courtside for every match. Watch matches without showing emotions but with encouraging smiles and nod of the head"* |
| Respect parent-coach-player team and communicate | *"Clearly define relationships and roles earlier rather than later and communicate regularly and openly to ensure expectations are managed"* |

*Table 1. Key recommendations to parents from coaches.*

### B. Parents' Perspectives

In brief, parents reported that they believed:

• Coaches were responsible for many roles including mentor, fitness and training advisor, support person, tournament scheduler and teacher of the technical and mental aspects of the game.

• The role of a coach was dynamic (changed over time).

• Changes in a coach's role moved from primarily one of 'instructor' to later being a 'collaborative support person' to the player.

• There are several ways coaches can assist and guide female players to develop their talent. Key recommendations are listed in Table 2.

| RECOMMENDATION | REPRESENTATIVE QUOTES |
|---|---|
| Adopt a positive and player-centered philosophy and approach | *"Know what the player wants and put processes into place to focus on developing the player and avoid putting too much emphasis just on results"*<br>*"Treat player as an individual and get to know how best they learn and interact"*<br>*"Encourage a sound work ethic but keep it fun and enjoyable"* |
| Be mindful of effective communication skills | *"Take care to use appropriate words because words are very powerful and can be very damaging if one says the wrong thing"*<br>*"Give constructive feedback"*<br>*"Always listen"* |
| Keep updating skills and knowledge | *"Understand how the ranking system works"*<br>*"Be knowledgeable about the sport"*<br>*"Continue to expand abilities to recognise and develop talent"* |

*Table 2. Key recommendations to coaches from parents.*

## WHAT DO THE STUDY'S RESULTS MEAN FOR COACHES AND PARENTS?

One can make some generalisations for parents and coaches including the importance for both to be mindful of the 3 'As' – Awareness, Acceptance and Acknowledgement. That is, both coach and parent need to:

(a) Be aware that they are members of the same (player) team. Both are focused on the best interests, well-being and dreams of the player.

(b) Accept each other as significant team members who have different but complementary roles to fulfill.

(c) Acknowledge the other for the contributions each can make. Open communication between coach and parent is essential.

## CONCLUSIONS

Adopting the notion of 3 'As' re-enforces the importance of sound interactions and communications between coach and parent. Both parent and coach are encouraged to view the other as a key member of a support team where each party's role may be different and dynamic yet complementary at all times.

In summary, to best nurture Australian female talent, this study's results suggest that strategies need to be in place to facilitate 'parents to be parents' and coaches to ensure an engaging and collaborative learning environment. Further, this study provides clues for achieving such (Tables 1 and 2). It is re-assuring to know that these recommendations are consistent with those found in the talent literature (e.g., Bloom, 1985).


Tennis is often thought of as an individual sport where a player competes against another on the singles court. This study highlights a 'team' element of tennis where outstanding results can be achieved when parent and coach combine to form a winning combination to support and guide their aspiring player. Like all effective teams, this requires many ingredients including team work, continual appraisal, a common goal and open communication. Let's not exclude either parent or coach from making valuable contributions to player development!

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# Tennis Metrics

Marcelo Albamonte (Argentina)

ITF Coaching and Sport Science Review 2011; 55 (19): 19 - 20

ABSTRACT

*"Tennis Metrics" is a system which uses video to analyse and collate data on players, the court and the relationship between the two. The system automatically sends and gathers 24 pieces of data per second- including stroke angles, distance run and running speed among many others. This article outlines and introduces readers to the system that has powerful potential for multiple types of analyses relating to tennis.*

**Key words:** Tactics, strategy, analysis, software

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**Corresponding author:** universitarios@aat.com.ar

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## INTRODUCTION

Our intuition is fundamental to coaching, but despite this invaluable tool, we never stop to think about how much information that a tennis match actually provides. The distance run during a point, a game, a set or a match, the speed of the sprints, the distances to the lines or the back fence, the net, or the side fence, the opponent, etc. Indirectly, all this information is related to the 'tempo' and time within a match and when harnessed can provide us with valuable information that can in turn inform our coaching.

In order to analyse a match using this system, all that is needed is a film made with a standard video camera, set in a fixed point behind the court. Once filmed, the recorded match can be loaded into the "Tennis Metrics" programme. This is when the system calculates and draws the lines that will automatically measure the requested items and will start sending data reports. (Figure 1).


*Figure 1. Data visualization in "Tennis Metrics".*

As with most statistical analysis, the evaluation does not end with the reception of the data, it is necessary to interpret the information and make the necessary recommendations about what is observed.

By way of example, we will show some of the data from "Tennis Metrics".

| NADAL SPRINTS | FEDERER SPRINTS |
|---|---|
| 7.053917844 | 7.303977878 |
| 7.727461778 | 8.812776917 |
| 9.118889512 | 7.209121385 |
| 10.02668024 | 7.277399239 |
| 7.788063934 | 7.864547467 |
| 8.308923621 | 8.359976818 |
| *Average of 6 sprints at random* | *Average of 6 sprints at random* |
| **8.337322821** | **7.804633284** |

*Table 1. Comparison of the sprints of Nadal and Federer.*

Table 1 previously shows some of the sprints of Nadal and Federer (taken at random). The information is expressed in meters per second.

Table 2 shows the meters run by outstanding players in the 14 year old category of the COSAT tour (South American Junior Tour). The figures were taken from one service game and one returning game. Note that these particular averages do not represent full match, just one game.

| | PLAYER 1 | PLAYER 2 | |
|---|---|---|---|
| *Serving* | 23.88 | 70.3147 | *Returning* |
| *Returning* | 55.8972 | 20.5146 | *Serving* |
| | 79.7772 | 90.8293 | |

*Table 2. Summary of the meters run by two players of the 14 year old category.*

The data indicate that when Player 2 was serving, he ran 36.70 % of the meters that his opponent ran. When he was receiving, his serving opponent ran 33.96% of the meters that he ran.

The above data are just two examples of the items that "Tennis Metrics" can measure.

## WHY "TENNIS METRICS"?

At first glance, it can be overwhelming and surprising to see the players followed by a number of lines, distance calculations and speed related information, but many of those who express surprise say: "Well, fine, this is incredible… but what is all this for?".

The origins of "Tennis Metrics" as with many tools, came from the developers needs- a necessity for information that could help develop players- and so was envisaged the idea over 20 years ago. Initially, most of the details that "Tennis Metrics" measures today were measured in a very simple and improvised "home-made" system in order to get the estimated data surrounding aspects such as court positioning, running lengths and so on, as they imperceptibly occur behind the scenes of a tennis match seen with the naked eye.

These improvised methods included tying ropes around the ankles of the two opponents to understand if the distance between them was generally consistent, and if the rope went loose, who won more points or what happened when they returned the service?

Methods to assess player movement in the beginning included flattening the clay behind the baseline after each point to see exactly in what zone each player moved, and how their effectiveness changed when they changed the playing area, either voluntarily or because they were forced to do so by the coach.

Another technique included blowing a whistle whereby at that precise time, the players would remain instantly static, so their playing positions could be analyzed.

Each one of these techniques, which were limited and still are to this day, "crashed" against two constraints:

• For obvious reasons, estimates from official competitions were not possible.

• Gathering data from the opponent was more difficult, in comparison with the coach's own player.

Luckily, and on a tennis court, engineers who specialized in non traditional software came together with coaches to create "Tennis Metrics".

## WHAT IS "TENNIS METRICS" FOR?

Table 3 presents some criteria and some questions that if answered provide useful data.

| CRITERION | QUESTIONS |
|---|---|
| Distance run | How many meters does a player run during a point?<br>How many meters does a player run during the whole match?<br>How many meters had the player and his opponent run before they met?<br>Would this information make me change my strategy for a match? |
| Speed | At what speed does a player move in different directions?<br>At what speed does the opponent move in different directions?<br>Does a player move faster and better in some direction?<br>Does the opponent move faster and better in some direction?<br>Would this information make me change my strategy for a match? |
| Reach | Are there players who reach all the balls and run less meters?<br>The players who reach all the balls, are they the fastest?<br>Do they run a similar number of meters in the games in which they serve and the games in which they return?<br>Would this information make me change my strategy for a match? |
| Trajectory towards the ball | If a player changes the route to the ball, can he save many meters in a point or not?<br>If a player changes the route to the ball, can he save many meters in a match or not?<br>If a player changes the route to the ball, can he save many meters in a tournament or not?<br>Would this previous information make me change my strategic, tactical and physical plan? |
| Position | What is the position of a player in relation to the probable striking angle?<br>What is the position of the opponent in relation to the probable striking angle?<br>What is the position of the best ranked players in the world in relation to the probable striking angle?<br>Would this information make me change my strategy for a match?<br>Would this previous information make me change my strategic, tactical and physical plan? |
| Distance on court | What is the average distance in meters from a player to his opponent, in which he wins more points?<br>What is the average distance in meters from a player to his opponent, in which he loses more points?<br>What is the average distance to the centre of the baseline and the net in which a player wins more points?<br>What is the average distance to the centre of the baseline and the net in which the opponent loses more points?<br>Are these parameters valid for different opponents?<br>What are the parameters for the top players in the world ranking?<br>Would this information make me change my strategy for a match?<br>Would this previous information make me change my strategic, tactical and physical plan? |
| Distance between players | What is the average distance in meters from a player to his opponent, when returning the first service?<br>What is the average distance in meters from a player to his opponent, when returning the second service?<br>At what distance is a player more effective when returning both services?<br>At what distance from the opponent player do the best players in the world |

*Table 3. Analysis opportunities with Tennis Metrics.*

## FINAL CONSIDERATIONS

Having a response to all these questions and to some others, would undoubtedly lead us to have to change not only game tactics and strategy but also the plan of our work as coaches and trainers because we would all have new information with data from the competition setting.

"Tennis Metrics" has begun making the first analyses and gleaning preliminary information to compile a database with the behaviour of different players from different categories and levels.

"Tennis Metrics" might bring about a change, not only as regards the new data from our own players but also as to the comprehensive analysis of the opponent. Technology goes forward, and so, it must help us to improve tennis on a daily basis. That is the task we are involved in.

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The Tennis and Science group created "Tennis Metrics"; its members are Marcelo Albamonte, Guillermo Lescano and Carlos Morales.

# Recovery and the young tennis athlete

Ellen Rome (USTA/ Cleveland Clinic) & Gordon Blackburn (Cleveland Clinic, USA)

ITF Coaching and Sport Science Review 2011; 55 (19): 21 - 23

ABSTRACT

*Recovery can be defined as the body's ability to return to a state of readiness following a physical and/or mental challenge. In tennis this applies to the player's ability to be ready to play the next shot, the next point, the next set or the next match. For optimal performance the player must be ready to execute each stroke at top ability and then recover from a physiological, psychological, tactical and skill standpoint for the next shot. This article will focus on issues of physiological as well as some psychological aspects of recovery as related to tennis for the youth player.*

**Key words:** Recovery, young athlete

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**Corresponding author:** romee@ccf.org

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## INTRODUCTION

Competitive tennis by its nature is a true interval type sport, challenging both aerobic and anaerobic abilities of the player. The days of arduous points earned with wooden racquets have been replaced by high technology equipment, with enhanced power, increased speed, and explosive athleticism on the court; serves of 210 km/h are now common (Kovacs 2007).

Recovery can be defined as the body's ability to return to a state of readiness following a physical and/or mental challenge. This article will address a number of ways in which to foster optimal recovery in young athletes.

## FACTORS THAT IMPACT PERFORMANCE

### Anaerobic and Aerobic Aspects of Play

The aerobic demands of tennis may be high, but not as high as would be expected in marathon runners for example. Pragmatically, adult elite tennis players require VO2max levels above 50 mL/kg/min to perform well on the court, but increasing their aerobic capacity to extremely high levels (e.g., >65 mL/kg/min) has not been shown to enhance performance (Kovacs 2007). To put this in simple terms, traditional aerobic training at moderate intensity for long duration will not optimize the performance during competition, where points often last less than ten seconds, and bursts of energy requiring anaerobic ATP production is required. Interval training with short duration bouts (lasting 10 to 60 seconds) with a 1:3 to 1:5 work-to-rest ratio should be incorporated into the training and conditioning schedule to simulate game play.

### Nutritional Recovery in the Young Athlete

Daily caloric intakes have been shown to be 4500 calories/day in male tennis players and 2800 calories per day in female tennis players (Bergeron et al 1995). In the young athlete, these numbers can vary tremendously based on the intensity of the training program and duration and frequency of tournament play. Parents, coaches, and trainers may be unaware of how little- or how out of balance- a particular teen's intake may be. Many children and adolescents do not realize that if they increase their energy expenditure, their regular quantities of food may not allow for adequate glycogen storage, which is essential for endurance for athletes working out more than 90 minutes per day (Rome and Blazar 2008). Good sources of carbohydrates include selections from breads, grains and fruits. For more rapid uptake of carbohydrates, simple sugars (juice, sweet foods) can be used, but the benefits can be short lived.

### Heat and Hydration Concerns in the Prepubertal Child

In extreme temperatures, children are more prone to heat related consequences than adults, with their smaller surface areas for blood cooling at the skin. Additionally, pre- pubescent children do not have apoeccrine sweat glands, which only develop during puberty, and produce sweat rates seven times that of eccrine sweat glands found elsewhere in the body (Falk, 1998). The prepubertal child is therefore at a disadvantage athletically as compared to the postpubertal child, with recovery impacted by suboptimal rehydration, core cooling, and other factors. In some tournaments where prepubertal and postpubertal teens of the same age may compete, careful attention to hydration needs at this age may go someway to compensate for changes in strength, endurance, recovery, and other factors in the prepubertal child competing in the same arena.

| | CHILDREN | ADULTS |
|---|---|---|
| Surface area to mass ratio | Greater | lower |
| %Total Body Water | Greater (80%) | lower (60%) |
| Absolute blood volume | Lower | Greater |
| Cardiac output | Lower | Greater |
| Metabolic heat production per pound of body mass during exercise | Greater | Lower |
| Sweating mechanism | Less efficient | More efficient |

*Table 1. Differences in Physiology between Prepubertal Children and Adults, as adapted from Sinclair, Crowe et al 2007).*

### The Adolescent Mindset: Help or Hindrance?

"It can't happen to me." "That would never happen." "Long term consequences? You mean what happens tomorrow?" "I'll do it because I want to, not because you tell me to". Success for the adolescent elite athlete requires support from family, coaches, trainers, pediatrician and/or other medical caregivers to enhance physical performance while keeping the teen's "head in the game". Overinvolved parents have not been associated with improved tennis performance, but parental approval of the youth's athletic choices and success does correlate with better attitudes about play and competition (Ommundsen et al 2006).

When addressing questions of importance to a young athlete's career, the adolescent mindset and normal developmental tasks of adolescence need to be taken into account. Little data exists on optimal weeks in a row of competition for junior elite athletes, whether a 12 year old should be allowed to play 3 matches in a day, or how much time should be allowed between individual matches to allow for adequate recovery. Nutritionally, the young athlete already has been shown to underestimate their thirst and body's fluid and energy needs. Young athletes may also underestimate time needed for physiological recovery, asking for that third match to go on even when performance will likely be impacted. "Burnout" and overtraining can be self-induced by the overly conscientious or competitive teen, or by "achievement by proxy" from a parent or coach.

### Effects of Fatigue on Performance

Fatigue reduces tennis-hitting accuracy by up to 81% (Davey et al 2002; Davey et al 2003). Best training should include strategies to avoid fatigue during competition in order to remain injury free and improve chances of winning (Kovacs, 2007a). Research for Kovacs (2007b) has shown that prolonged breaks between matches without adequate supervised training may not be in competitive players' best interests. On the flip side, the problems of overtraining, which can also happen in the very competitive young athlete, can emerge; many teens feel that "more is better" and will far exceed recommendations of trainers, coaches, doctors, and parents in order to gain themselves a perceived competitive advantage. These results tend to backfire, as injuries occur, effects of overtraining on performance become evident, or they show the effects on the psyche ranging from maladaptive coping strategies such as disordered eating to full burnout.

### Musculoskeletal Injuries in the Young Tennis Player

Intensely active young tennis players are more at risk for severe injury than their recreational tennis-playing peers (Kibler and Safran 2000). Where the young elite player subjects his or her body to repetitive tensile overload, maladaptations in strength and flexibility can occur, compromising play and recovery. During physical screenings for young players, the pediatrician, sports medicine doc or clinician should pay attention specifically to the flexibility of the back, shoulder, and elbow; strength estimation through situps, pushups; power through the vertical jump and medicine ball; and anaerobic power through a brief sprint or shuttle run. Assessment of posture while standing can identify lumbar lordosis, which is common in young people and can decrease core trunk stability (Sciascia and Kibler 2006).

Other common specific injuries in young tennis players include rotator cuff inflammation in the shoulder, a common injury at all ages. In addition, "Tennis elbow" and wrist tendonitis can happen in players using lots of topspin and in novices with a mechanically improper technique (Kibler and Chandler 1993).

### Prevention: Prehabilitation and the Preparticipation Exam

Overtraining injuries and competitive staleness can be addressed by variations in the training focus and intensity of workouts. For training it can be efficient to break the season into one (or two) series of training phases: off-season; pre-season, and competitive-season. During the off-season, immediately following the competitive-season, training can be less intense and less sport specific. The player should focus on general fitness concepts, participate in fun, modified tennis games with an increased emphasis on pleasure versus winning. The off-season is also an excellent time to focus on basic skill development/refinement. In the pre-season training phase the intensity of the training increases and the training becomes more sport specific.

## SUMMARY

The structurally, physiologically and psychologically immature male or female elite athlete may be at more risk from environmental stressors, suboptimal nutrition, nutritional depletion, insufficient recovery time and orthopaedic stress when compared to mature adults.

## PRACTICAL APPLICATIONS:

- Skill development and technical aspects of training are best addressed when athletes are fresh and rested. Fatigue limits hitting accuracy by up to 81% and alters the motor-pattern sequencing.

- To optimize performance and recovery for tennis, conditioning drills should simulate game like conditions: the work-to-rest ratios for training should fall between 1:3 and 1:5, to best simulate match conditions.

- To optimize performance and recovery for speed, agility and power, the work-to-rest ratios for training should be from 1:25 to 1:40, with these far longer times allowing for appropriate recovery.

- Players whose game style is to be on the attack and play shorter points require more short, anaerobic-focused training with a focus on speed, strength, and power.

- Players with a more defensive game style require training to enhance muscular endurance.

- Athletes should start matches well hydrated and consume approximately 200 mL (6.6 ounces) of fluids per each change of ends in mild temperatures, with more recommended during warm weather play (200-400 mL). Young players are more likely to drink flavored sports drinks than water.

- Carbohydrate replacement during tournament play is also critical to help minimize the effects of energy depletion.

- Further data is needed to better address questions on the number of matches in junior tennis, the time between matches to ensure adequate recovery in the young athlete, and number of sequential weeks of competition without a break. These efforts help to avoid injury and burnout in the young athlete.

- To avoid overuse injuries, variety in intensity and duration is encouraged throughout the year and within each training session.

### Publication note:

This information has been reprinted in an adapted form with permission from: Kovacs, M. S., Ellenbecker, T. S., & Kibler, W. B. (Eds.). (2009). Tennis recovery: A comprehensive review of the research. Boca Raton, Florida: USTA.

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# The two-handed forehand (Part 1)

Alain Mourey (France)

ITF Coaching and Sport Science Review 2011; 55 (19): 24 - 25

ABSTRACT

*Why is this two-handed technique—so often preferred when it comes to teaching the backhand (BH)— not used as much for the forehand, when both strokes appear to be symmetrical? Is the one-handed forehand the only efficient one? This article is part one in a two part series which addresses the issues related to teaching a two-handed forehand.*

**Key words:** Technique, two- handed forehand, teaching methodology

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**Corresponding author:** edwige.mourey@nordnet.fr

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## WHY TEACH THE TWO-HANDED FOREHAND?

### Cultural reasons

Former champions such as Gene Mayer (n° 3), Gildmeister (n° 10) and more recently Monica Seles (ex n°1 WTA) as well as French players Fabrice Santoro and Marion Bartoli have developed a great game efficiency using a two-handed technique on both their forehand and backhand. Furthermore, Nadal is an example of a player that used to play this way up to the age of 10-years-old.

### Pedagogical reasons

If we have the wisdom to let very young players (4-5-6 years old) practise freely with balls, either bouncing or on the ground, they will, inter alia, do it using both hands on both sides.

This two-handed technique greatly assists children in the stroke learning process. In this regard, coaches have long been convinced of the benefits of teaching both the one-handed and the two-handed backhand. So, why is it not the same with the forehand?

Basics that the two handed technique facilitates:

- Positioning the body in relation to the ball: both arms are linked to the body right from the backswing and preparation phase, meaning that the lateral alignment of shoulders (parallel to the trajectory of the incoming ball) tends to be naturally more pronounced. As a consequence the player will have to adjust his position using closed stances, which promote a lateral body position before receiving the ball. The positioning process is therefore naturally better through those early body alignment conditions as a result of the two- handed technique.
- Rotation is more easily achieved (especially if the player wants to hit the ball with power) when both arms are linked to the body throughout the entire stroke. This rotation makes it easier to hit the ball ahead of the body and to follow through upwards in direction of the opposite shoulder.
- The general form and the rhythm of the stroke are ensured since the arms are connected to the body during the entire stroke, which automatically makes for less inadvertent movement (elbows, in particular, always move close to the body).

## EVIDENCE OF THE ADVANTAGES

During Tennis 10s sessions, making children perform two-handed strokes on balls situated on ground (then on low bouncing balls) using foam balls predisposes them to align, rotate and perform a full swing.

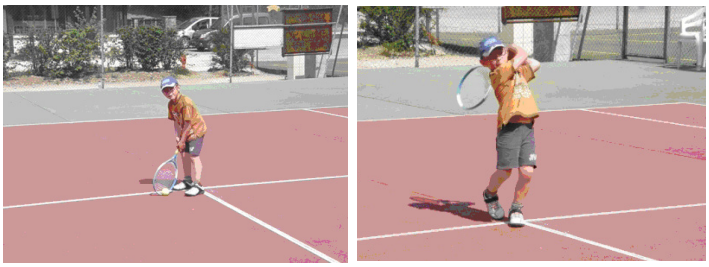

*Figure 1. Thomas, 5-years-old, lifts the ball off and away from the ground (2nd Tennis 10s session).*

*Figure 2. Marie, 5-years-old, hits the ball back during rally with low bouncing balls.*

Hitting the ball: Two-handed forehands (or backhands) are performed from a static vertical ball feed that gives children the time to get hold of their racket with both hands and to organize their body before hitting.

Two early and contrasted body positions can be used before the vertical feed is performed:

The body faces the net: here children have to learn to move around the ball in order to position themselves next to it and to hit it using both hands.

The body is perpendicular to the net: Here the player can adopt either a "closed stance", where feet are aligned with the direction of the outgoing ball flight, or a "semi closed" stance. The end result at contact being similar, with the same diagonal and upward forward swing extending from the front leg stance.

Hitting the ball back: Two-handed forehands and backhands should be performed at first on "easy" trajectories allowing children to hit back without having to reach for a distant ball with a one-handed stroke.

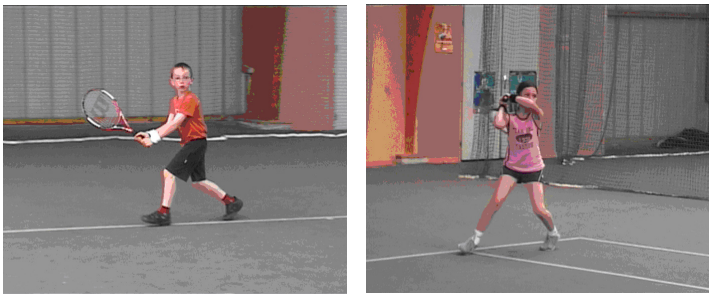

*Figure 3. Two-handed forehands.*

## MINIMUM REQUIREMENTS TO PERFORM THE STROKES

### In terms of desired outcome

When players hit from vertical feeds, at the beginning, favour long, horizontal trajectories in order to give them a better feel of the rotation of the shoulders and of the entire swing, with the racket head remaining at a distance from the body. However, in order to avoid excessive stance rotation or potential tensing when hitting the ball, you should propose variations in terms of length and power to ensure a balanced stroke as well as a proper follow through.

When players hit the ball back, at the beginning, make them use the swing technique they have already mastered with vertical feeds and transfer it to this new task. In order to do so, you have to considerably facilitate the task by feeding them "easy" balls, i.e. the trajectories must be directed towards a space close to them so that they don't need to move too much. Furthermore, the ball has to bounce ahead of them

and allow for a shot with a low contact point. Initially, you should encourage precision shots allowing a well-balanced swing but also various degrees of length and direction (swing amplitude) along with 'out in front' contact points…

## STROKE EXECUTION (FOR A RIGHT-HANDED PLAYER)

- The racket must be held with both hands from start to finish

- During the first attempts and trials, the position of the hands on the handle should be experimented with since young players will not yet be lateralized and might become ambidextrous as their motor experience progresses:

### Joint hands (one on top of the other) holding the small handle:

-Some beginner children instinctively choose this grip. It is one to be promoted by the coach who then doesn't have to worry about whether the players hit a forehand or a two-handed backhand: they just hit the ball on either the left side or the right side.

### Left hand on the bottom of the handle, right hand above and next to it (side to side):

Examples of this grip being effectively executed include the hockey grip (for right-handed players) where the right hand is sometimes placed very high on the stick handle.

Another example included the Golf grip (for right-handed players) where golfers swing or putt with joint hands (even slightly interlocked). Their swing looks a lot like the forehand of a tennis player (actually more like the two-handed backhand of a left- handed player, especially since the left hand grip of a golfer is continental grip).

### Right hand on the bottom of the handle, left hand above and next to it:

-Used by the best tennis players this grip is required for high-performance tennis due to the speed of rallies: changing grips between a forehand and a backhand and between a serve and a groundstroke (and to an even greater degree between a forehand volley and a backhand volley) is not possible given the speed of execution.

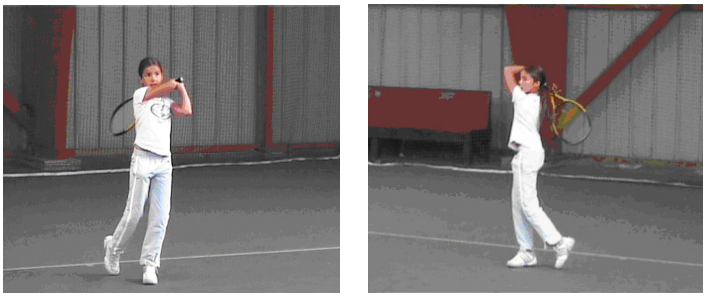

*Figure 4. Rachel's (left-handed) two-handed forehand and two-handed backhand : are those strokes symmetrical?*

## CONCLUSION

This article has begun to outline some technical features of the two-handed forehand, and how it may facilitate good technical check points for young players. Part two of this article will be published in a future CSSR issue in 2012.

### Publication note

This article is an extract from « Le point sur l'apprentissage du tennis, Du plaisir de la découverte à la maîtrise du jeu » and is printed with permission from the author.

# The role of parents in the training of beginner tennis players

Cyril Genevois (Sports Research and Innovation Centre, Lyon, France)

ITF Coaching and Sport Science Review 2011; 55 (19): 26 - 27

ABSTRACT

*This article focuses on the role of parents during the first development phase of the player towards high-performance. It is based on a scientific literature review correlated with the personal experience of the author as an expert in training young beginner players. Throughout the early development phase, parental behaviour can greatly influence long term development in either a positive or negative fashion. Research will be discussed in line with this suggestion.*

**Key words:** Tennis 10s, initial training, parental involvement, parents/child relationship

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**Corresponding author:** genevoiscyril@aol.com

## INTRODUCTION

Developing young players towards the elite is a gradual process (Coté, 1999) that includes an initial phase (6/12 years), a specialisation phase (13/15 years) and an investment phase (16+ years). Children showing predispositions for tennis are detected at the beginning of the initial phase (6/7) so that they can become part of a training and competition process (from 8 years old onwards) leading to parental investment in terms of time and money.

The individual nature of competitive tennis has triggered the emergence of parental behaviours that can have an influence on the anxiety of children (Blois, 2009). Parents bring their children to the competition venue and stay throughout the match, which means that parents have a number of instances where they can potentially affect the child and their behaviour. During this phase, it is essential that children develop self-confidence as well as confidence in their sport skill level (Lubbers, 2003).

Three major roles of the parent have been brought to light by the model defined by Fredricks and Eccles (2004):

- Purveying experience: transportation to training sessions and tournaments, money for lessons and equipment (logistical and financial support).

- Interpreting: reactions associated with the performance of children in relation to their expectations, how much importance is attached to the sport with regard to social acceptance etc.

- Acting as models: this is conveyed in various situations such as in the relationship with the other parents, the coach, the umpire, or as a player.

## RESEARCH ON PARENTS AND YOUNG TENNIS PLAYERS

The various roles and behaviours that parents exhibit have generally been studied using two methods. The first one is based on the administering of the Parental Involvement in Sport Questionnaire (PISQ – Lee et Mc Lean, 1997) to players (Lee et Mc Lean, 1997; Bois, 2009) or to players and their parents (Wuerth, 2004). The PISQ evaluates 4 aspects: (1) active involvement; (2) directive and controlling behaviours; (3) support and understanding; (4) pressure.

The second method of research in this area is by interviews with coaches working with young players only (Gould, 2006 ; Gould, 2008) or with the parents/coach/player triad (Wolfenden, 2005 ; Lauer, 2010).

Content analysis of these interviews has helped identify behaviours deemed either positive or negative, which were then ranked according to their rate of occurrence and impact on the child's behaviour.

### Main negative behaviours:

- Too much importance attached to victory: pressure is put on the child who may come to perceive his personal value only through his level of performance.

- Criticism and directive behaviours: loss of intrinsic motivation, loss of self-confidence and self-esteem (Lavoi, 2008).

- Lack of emotional control: heightened anxiety in competition (Bois, 2009).

### Main positive behaviours:

- Emotional support and unconditional love: presence during difficult times, affection regardless of the result, encouragement towards doing the best possible.

- Financial support: investment in individual lessons, camps, equipment, etc.

- Logistical support: transport to training sessions and tournaments, family planning, etc.

## PRACTICAL TIPS

In order to help parents fulfil their roles in a positive way, it is important to communicate with them and help them maintain an appropriate perspective.

- Focusing on the process rather than the result (Hatzigeorgiadis, 1999)

The dissimilarity of all aspects of a young player's development can have an influence upon short-term results. Also, progressive technical and tactical skills may not guarantee performance at this stage while they are essential in the long run. The coach will then have to propose developmental objectives that can be easily evaluated during lessons or matches (technical, tactical, physical and behavioural improvements) and the focus should not be solely about results right now.

- Placing tennis on an equal level with family and social activities

It can be interesting to establish a code whereby at home or during family time conversation topics should not be about tennis and to avoid playing during weekends, especially in the presence of siblings that aren't involved in tennis.

- Considering tennis as a lifestyle and not as an ultimate goal (attitude, moral values)

Through training sessions and tournaments, it is important to promote values of discipline, effort, self-respect and respect of others, which will later become transferable to other aspects of life even if the child doesn't continue playing.

It is also important to help parents improve their emotional control during competitions. For young players, competition is a factor of stress in itself that can be heightened by the presence and behaviour of parents (Bois, 2009). Displays of frustration, irritation and anxiety are negative signs sent out to the player, who at the time is seeking support as well as a reassuring presence. One useful but simple technique is to give parents the opportunity to fill in an observation sheet allowing for statistical analysis (Genevois, 2011), this way parents are more likely to maintain a certain level of neutrality in terms of body language while still being able to encourage their children verbally at key moments — since writing things down detaches them from their immediate emotions (Genevois, 2011). This observation sheet allows them to record the strokes performed by their child according to a predefined code. At the end of each rally the outcome is evaluated qualitatively or quantitatively (winner, point won, unforced error, forced error).

## CONCLUSION

To conclude, it is difficult for talented children to develop their full potential unless they benefit from a huge parental support, particularly during the first stages of their participation in the sport (Monsaas, 1885). Furthermore, the quality of parental behaviour is also a priority as the child grows up, for it has proved to be a determining factor in the development of children towards the elite level. The above recommendations should therefore be considered in order to optimise the positive development of a child both on- and off- court.

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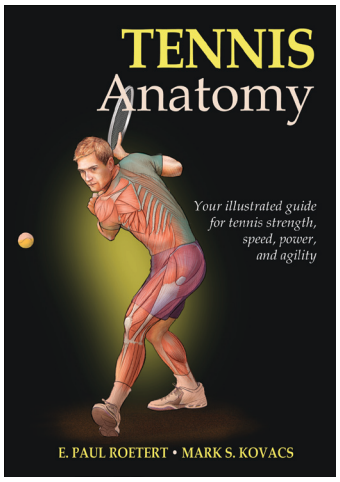
# Recommended books

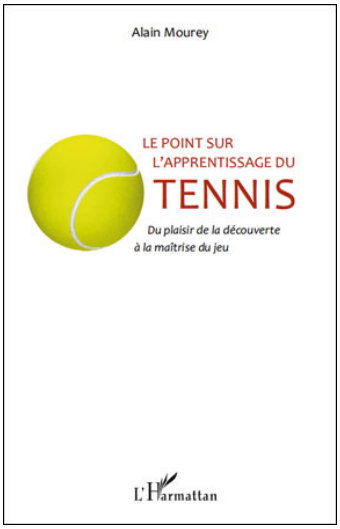
## TENNIS ANATOMY




**Authors:** E. Paul Roetert & Mark Kovacs. **Language**: English. **Type:** 205 page book. **Level:** All levels

Tennis anatomy is a unique physical conditioning resource suitable for anyone involved in tennis, from trainers and serious competitive players to recreational club members. Any serious tennis player looking to improve their performance on court with a highly tennis specific physical conditioning programme will find this text indispensable. Furthermore, the recreational club player looking to increase their physical capacity and avoid injury- and the associated aches and pains of tennis- will benefit from this text. Tennis Anatomy highlights the different muscle groups involved in each of the tennis strokes and shows you how to best train those specific muscle groups as part of a comprehensive approach to training for tennis. With excellent illustrations throughout, the reader will learn more about the anatomy of their body, learn how the game of tennis affects their body, and most importantly, readers will improve their game by adding tennis-specific conditioning methods to their training. Tennis Anatomy is now available in bookstores everywhere or online at www.HumanKinetics.com.

## LE POINT SUR L'APPRENTISSAGE DU TENNIS (POINTS ON LEARNING TENNIS)



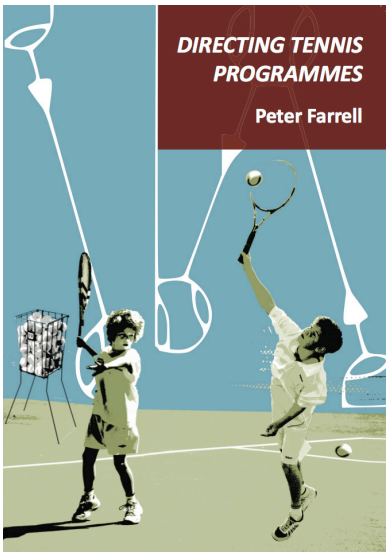

**Author:** Alain Mourey. **Language:** French. **Type:** 363 page book. **Level:** All levels

This book is a summary of research and experiences of the author in his attempt to disseminate ideas and principles for teaching tennis effectively. This resource is an encyclopaedia of new tennis methodology. It is full of practical ideas and exercises that will help coaches assist their players in the path to improvement of their game.

The book has a clearly defined purpose and philosophy: "the game is at the core of the learning process in tennis. Children do not attend the 'tennis school' to work: they come to play. The coach should address this desire and provide them the pleasure of play and wining points". Contents of the book include an initial theoretical section which covers fundamentals of teaching, competencies of the coach: knowledge of the player and the game, organisation, communication, teaching methodology, etc. The second part of the book is a practical section dedicated to mini-tennis, beginner, and intermediate tennis. This part includes a series of examples of sessions that include goals and exercises comprising tactical, technical, physical and psychological goals. This book is essential reading for any coach who is serious about himself, his players and his profession.

See http://www.editions-harmattan.fr/index.asp?navig=catalogue&obj=livre&no=31402

## DIRECTING TENNIS PROGRAMMES




**Author:** Peter Farrell. **Language:** English. **Type:** 100 page book. **Level:** All levels

Directing Tennis Programmes is a very usable and practical guide that provides the reader with information that can be implemented by coaches, clubs and directors focusing on promoting tennis through the club system. This brand new publication details what needs to be in place at a tennis club that wants to run the best possible events. Whether you are a coach about to start directing programmes or a club looking to appoint a Director of Tennis, you will find this manual indispensable as you plan to deliver top-quality service to your membership. The book provides useful and practical advice for recruitment and retaining quality coaches in a club as well as the importance of a quality coaching programme. Other important issues that are covered include child protection and risk management as well as a range of other practical pointers including working with committees and parents. Clubs and coaches that implement the advice recommended in this text are sure to maximize the potential for developing both participation and performance tennis through quality club coaching programmes. Directing Tennis Programmes serves as a very useful reference tool for fostering a positive club environment- which is often considered a key element to tennis growth around the world. For further information and to order the book, go to www.amazon.co.uk, or contact Peter at peter.farrell@tennisireland.ie.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