International Tennis Federation

COACHING & SPORT SCIENCE REVIEW

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

Editorial

Welcome to issue 37 of the ITF Coaching and Sport Science Review, which is the final edition for 2005. This year has seen the transition of the Coaching and Sport Science Review from a hard copy version to an electronic only publication. We believe, according to your feedback and the fact that over 180,000 issues have been downloaded during 2005, that this has been a successful change and we would welcome any further feedback or suggestions that you might have in order to help us with the continued improvement of this important coaching publication.

October saw the staging of the 14th ITF Worldwide Coaches Workshop, entitled 'Quality Coaching for the Future', in Antalya, Turkey. In attendance, were two hundred and ninety coaches from 90 nations and it featured over 60 presentations from a series of renowned international speakers.

Keynote speaker Arantxa Sanchez-Vicario presented on-court about the process and drills required to bring female players to the top level. She was also involved in a round-table panel discussion with experts in women's tennis that included Steven Martens (Belgium's current Davis Cup and former Fed Cup Captain), Kathleen Stroia (Vice-President of the WTA Sport Sciences & Medicine and Professional Department) and Georges Goven (France's Fed Cup Captain).

Sixty per cent of the presentations took place o-court, which provided participants with valuable practical information. Steven Martens and Kenneth Bastiaens (BEL), both presenting for the first time at a Worldwide Coaches Workshop, gave two excellent sessions, as did Bruce Elliott and Machar Reid (AUS). Rohan Goetzke former coach of Richard Krajicek, Gustavo Luza, former Davis Cup Captain of Argentina and coach of Nalbandian and Coria, Eliot Teltscher, Director of Tennis Operations for the USTA High Performance, and Craig Tiley, recently appointed Director of Player Development for Tennis Australia, also presented on court.

Lecture room presenters included Jofre Porta, current coach of Carlos Moya and Ann Quinn, former National Director of Coach Education for Tennis Australia. For those readers who were unable to attend you can download all of the summaries from: http://www.itftennis.com/coaching/wwcw05/preliminaryprogrammeandsummaries/index.asp.

The ITF would again like to thank the Turkish Tennis Federation, Tennis Europe and Club Ali Bey staff for their hard work in assisting the ITF, as well as all the participants, speakers and ITF staff involved.

Arantxa Sanchez-Vicario presenting at the 14th ITF Worldwide Workshop

December will see Thailand host the second ever ITF level 3 course. One more level 3 course is planned for 2006 as are the 5 ITF regional workshops at which we look forward to seeing many of our readers in attendance.

In this issue you will no doubt be interested to read about the research on coach education programmes worldwide. This research was undertaken at the request of the ITF Coaches Commission and asked all ITF member nations to provide details of the number of tutor contact hours necessary to complete the various levels of courses in the respective nations. We are grateful for the information provided by these nations and the comparison charts make for interesting reading.

Finally, we hope you enjoy edition 37 of the Coaching and Sport Science Review.

Dave Miley
Executive Director,
Tennis Development

Miguel Crespo
Research Officer,
Tennis Development

Patrick McInerney
Assistant Research Officer,
Tennis Development

Contents

The Unbalanced Tennis Player

By Scott Riewald (USTA Player Development) & Todd Ellenbecker (Chairman, USTA Sport Science Committee)

INTRODUCTION

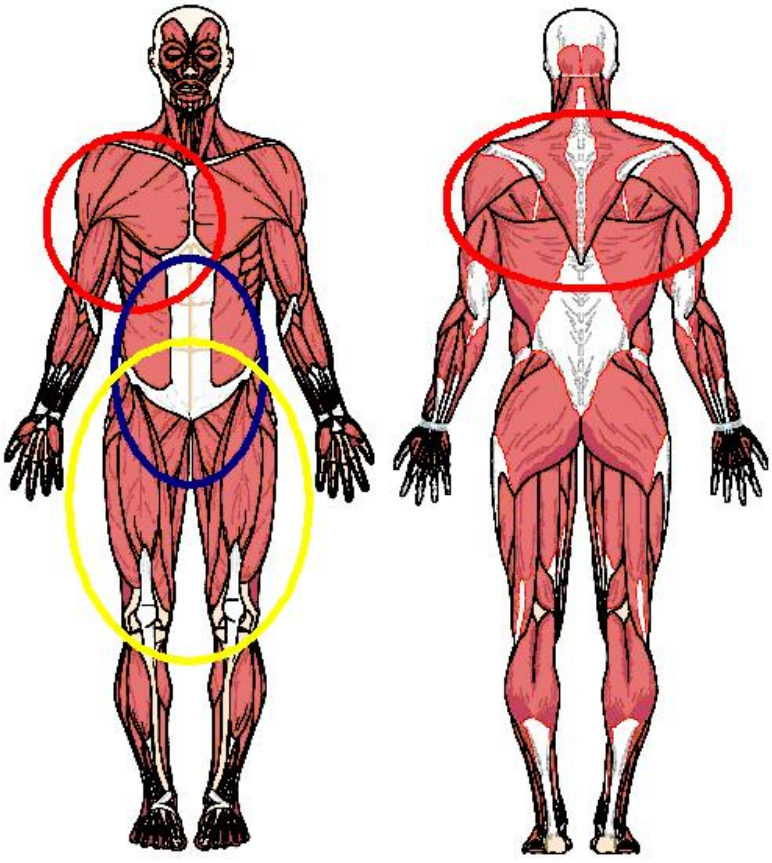
Tennis is a game of repetition. Whether it is hitting hundreds of serves during the course of a tournament or running several kilometres during a practice, the basic movements of tennis are performed over and over and over again. With such a great amount of repetition it is easy to see how a tennis player could develop strength and flexibility imbalances throughout their body - imbalances that could lead to injury or limit performance if not corrected.

Some muscular imbalances are to be expected in a tennis player; for example, it is natural for a player to be stronger on his or her dominant side. But what happens when one muscle group is stronger than all the others that are acting at a given joint? What happens if flexibility is limited? These types of imbalances are often a cause for concern since, in many instances they can impair performance and / or lead to injury.

All parts of the body are linked together in a kinetic chain. Force and power generated in the legs, for example, can be transferred from the legs through the body and ultimately be used to generate racket head speed. A weak link, or a break in the kinetic chain, brought about by limitations in strength or flexibility, can lead to injury as muscles throughout the body are forced to handle abnormal loads.

HIGH PERFORMANCE PROFILE

The US Tennis Association's Sport Science Committee has developed a series of tests, called the High Performance Profile (www.playerdevelopment.usta.com), to identify some of the more common muscular imbalances seen in tennis players. These tests are designed to provide information that can be used in constructing appropriate strength and conditioning programmes to prevent potential injuries before they occur. Below we will discuss some of these imbalances in the tennis player and ways to address them will be presented.



The body is linked together into a kinetic chain. A weak link in the chain, due to muscle weakness or inflexibility, can place added stress on other areas of the body potentially leading to injury. Highlighted here are several of the areas where strength imbalances commonly occur in tennis players: the legs, core, shoulder and upper back.

Leg Strength

Leg strength is essential for all tennis players, however if you look at a typical player, you will find strength and flexibility deficits throughout the lower limb. These deficits can be seen in the serve. Kibler (2005), measured muscular activity throughout the body during the serve and found two distinct patterns of muscular activity. One group of players used the legs to drive up to the ball and develop much of the power for the serve. The second group, which did not use the legs as much, instead compensated by using the abdominal muscles to "pull the body through" when serving. Failure to use the legs, which is thought to be due to a lack of strength, can lead to performance limitations (e.g. slower serve) and / or injury (e.g. abdominal muscle strain). Testing performed by the US Tennis Association supports this conclusion as it has been found that a great number of top junior players lack the leg strength necessary to perform a single leg squat exercise properly. Players who exhibit a weakness in the lower body musculature should engage in an aggressive strengthening programme that targets the gluteal and quadriceps muscles. These players must firstly work to develop a base level of strength before undertaking any power training.

Leg Flexibility

Flexibility in the lower limb is also essential to facilitate efficient movement and to protect the joints. Tennis players typically need to improve flexibility in the following areas:

- *The hip flexors in the front of the pelvis.* These muscles are not only important for maintaining stride length when running, but Vad and Gebeh (2003) have found that limitations in hip flexibility are linked to lower back pain.
- *The hip external rotators.* The ability for the hips to rotate is important for generating power in virtually every shot and for linking the lower body to the upper body.
- *The hamstrings and quadriceps.* These muscles are found in the back and front of the thigh, respectively, and flexibility is needed to move efficiently, maintain the muscles' peak force generating capacity, and prevent injury to the legs and lower back.

Shoulder Strength

The internal rotators of the shoulder, the subscapularis (one of the muscles of the rotator cuff), the latissimus dorsi in the middle / lower back, and the pectoralis major in the chest are typically quite strong in tennis players. If you think of the number of serves and forehands a player hits, each of which uses internal rotation, it is easy to see why these muscles can become particularly strong simply by playing tennis. At the same time, however, the muscles that externally rotate the shoulder are typically weak (Ellenbecker and Roetert, 2003) and fatigue more quickly (Ellenbecker and Roetert, 1999) when compared to the internal rotators, creating a strength imbalance that can put the shoulder at risk of injury. Strong external rotators are not only necessary for properly stabilising the shoulder joint, but they must also contract eccentrically (lengthening contraction) to decelerate the arm after a serve or forehand, and hence are prone to injury and breakdown.

It is also important to realise that the shoulder is more than just a ball and socket joint; the shoulder blade (scapula) should also be thought of as part of the shoulder. The muscles in the torso and upper back that control the movement of the shoulder blades work in tandem with the rotator cuff muscles to ensure that the entire shoulder functions properly. Any weakness in the muscles that control the shoulder blade will have a direct impact on how the rotator cuff muscles function as well as the frequency and types of injuries seen in the shoulder. Performing a simple test in which the player lifts and then lowers the arms in the plane of the shoulder blades, laterally, while holding small hand weights will show if "scapular winging" occurs. This winging is characterised by the shoulder blades "popping off" the chest wall and indicates a weakness in the muscles that control the shoulder blades. This is typically seen as the arms are lowered.

Strengthening of the shoulder muscles, including the external rotators and scapular stabilisers can be accomplished by performing external rotation and rowing type exercises. Players should keep the shoulder blades pinched together in the upper back while performing these exercises.

Shoulder Flexibility

In addition to strength, players need adequate flexibility in the dominant shoulder to protect against injury. However, tennis players consistently show deficits in the total range of motion in their dominant shoulder, 149.1° compared to 158.3° in the non-dominant arm (Ellenbecker et. al., 2002). This difference is largely due to limitations in internal rotation of the dominant shoulder, 45.4° compared to 56.3° in the non-dominant shoulder. In separate studies, Kibler et. al. (1996) and Roetert et. al. (2000) both found that internal rotation decreases as the number of years playing tennis increases. Hence, the longer a person plays tennis, the more internal rotation becomes limited and the greater the likelihood that this inflexibility will lead to technique flaws and injury. Therefore, it is important for all players to stretch regularly to improve the internal rotation of the shoulder and prevent injury.

Core Strength

What about the trunk and the need for balance in the core of the body? If you select a normal person from the street and test their core strength you will find that the muscles of the lower back are slightly stronger than those of the abdominal. This helps in maintaining a healthy posture as the stronger back muscles keep the body from "rolling forward". In tennis players, however, this is not the case. Roetert and colleagues (1996) found that the abdominal muscles that flex the trunk are actually stronger than the back muscles in elite junior tennis players. It is likely that this is due to the fact that these players use the abdominal muscles to generate the trunk flexion that occurs with every serve that is hit. This strength imbalance is particularly important since a strong core essentially allows a player to link the lower and upper body together in a healthy kinetic chain. It is also important to address this strength imbalance because weak musculature in the lower back may contribute to low back injury which is the number one injury sustained in tennis. To help prevent injuries in the future, players should work to strengthen the entire core, paying particular attention to strengthening the muscles of the lower back.

REFERENCES

Ellenbecker, T. S. and Roetert, E. P. (1999). Testing isokinetic muscular fatigue of shoulder internal and external rotation in elite junior tennis players. *J Orthop Sports Phys Ther*. 29(5): 275-81.

Ellenbecker, T. S. and Roetert, E. P. (2003). Age specific isokinetic glenohumeral internal and external rotation strength in elite junior tennis players. *J Sci Med Sport*. 6(1): 63-70.

Ellenbecker, T. S., Roetert, E. P., Bailie, D. S., Davies, G. J., and Brown, S.W. (2002). Glenohumeral joint total rotation range of motion in elite tennis players and baseball pitchers. *Med. Sci. Sports Exerc.*, 34(12): 2052-2056.

Kibler, W. B. (2005). Personal correspondence.

Kibler, W.B., Chandler, T. J., Livingston, B. P., and Roetert, E. P. (1996). Shoulder range of motion in elite tennis players. Effect of age and years of tournament play. *Am. J. Sports Med.* 24: 279-285.

Roetert, E. P., Ellenbecker, T. S., and Brown, S. W. (2000). Shoulder internal and external rotation range of motion in nationally ranked junior tennis players: a longitudinal analysis. *J. Strength Condition. Res*. 14: 140-143.

Roetert, E. P., McKormick, T. J., Brown, S. B., and Ellenbecker, T. S. (1996). Relationship between isokinetic and functional trunk strength in elite junior tennis players. *Isok Exercise Science.* 6: 15-20.

Vad, V. B., Gebeh, A., Dines, D., Altchek, D., and Norris, B. (2003). Hip and shoulder internal rotation range of motion deficits in professional tennis players. *J Sci Med Sport*. 6(1): 71-5.

With the number of serves and forehands a player hits, each of which uses internal rotation, it is easy to see why these muscles can become particularly strong. Therefore, it is important for all players to stretch regularly to improve the internal rotation of the shoulder and prevent injury.

Pilates & Tennis

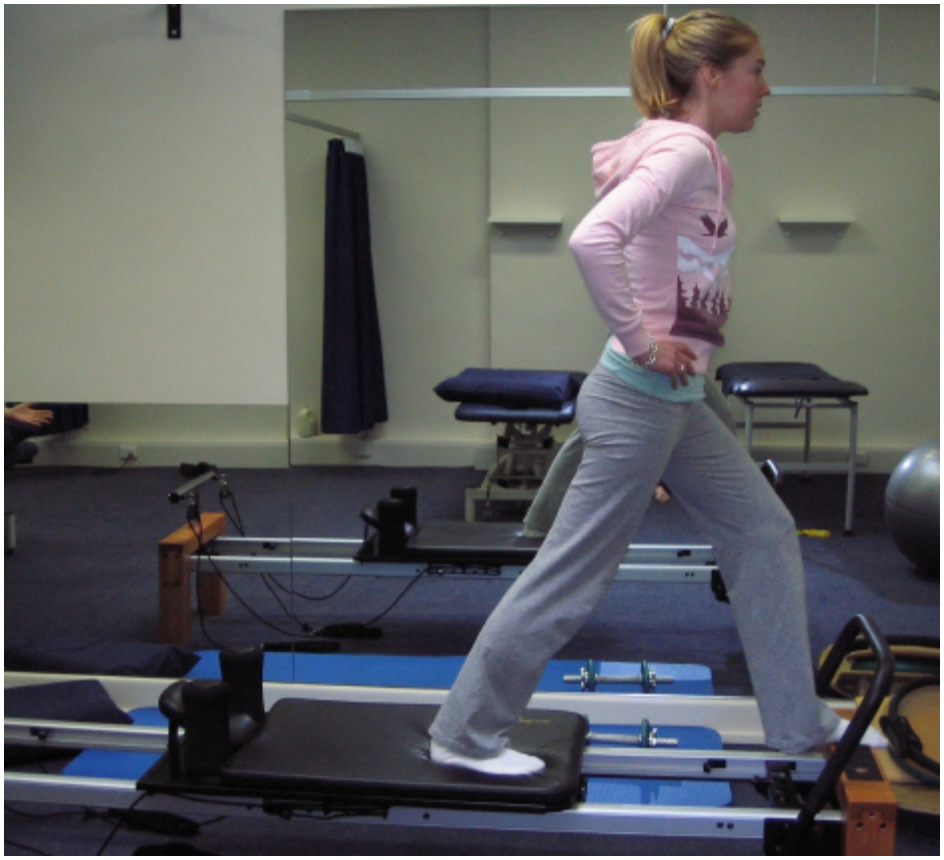
By Daniel Hornery (Australian Institute of Sport / Tennis Australia)

Developed in the early 1900's by Joseph Pilates, the exercise modality of the same name - Pilates - was used to assist dancers with muscle balance, flexibility, coordination and injury rehabilitation. Since this time it has evolved to assume a prominent role in the weekly training / conditioning programme of many elite athletes. In this respect, its application lies in the development of core strength and stability: ingredients ubiquitous to the kinetic chain underlining functional movements as simple as getting out of bed in the morning to more complex tasks such as hitting forehand winners down the line.

PILATES: THE METHOD

Pilates is a unique method of total body conditioning that integrates muscular control, flexibility, joint range of motion, strength, coordination, concentration, breathing and proprioception. There are two manners in which Pilates can be performed, on the floor or using machines, both with the common aim to enhance core strength and stability. Floor Pilates comprises of a series of closed kinetic chain exercises generally performed on a mat, while Apparatus Pilates utilises a number of pulley and spring-driven machines (i.e. the Reformer, see picture) to further challenge athletes as they improve. Every exercise emphasises breathing and abdominal support in addition to a number of inherent principles listed below (Kiley & Potter, 1998; Pilates et. al., 2000; Reid, Quinn, & Crespo, 2003).

- **Breathing:** A structured breathing technique is an effective tool that enhances and eases movements. It initiates and assists in performing the exercise with strength, control and coordination.



The Standing Lunge, performed on the Reformer.

- **Concentration:** Intense mental focus on the exercise, the movement required and the required muscle recruitment, timing, speed and force.

- **Control:** Pilates requires the complete control of the body by the mind. While the limbs are moved through their full range and the body's neuromuscular system is increasingly challenged, a stable core, good posture and joint alignment, should be maintained.

- **Centring:** The centre is the foundation for all movements. Pilates is movement flowing out from a strong centre. It develops support and control of the trunk and the limbs during static and dynamic activity.

- **Precision:** Precision is required in one's approach, focus and form. This refines and reinforces correct neuromuscular patterns for functional movement.

- **Flow:** Movement is by nature continuous and in Pilates the focus is on movement flow, with an emphasis on efficiency of effort, and not the generation of extreme force.

THE POTENTIAL BENEFITS FOR TENNIS PLAYERS

The selection of training exercises, and more globally, training modalities that are specific to the demands of the game is fundamental to efficacious exercise prescription. Tennis stroke play is characterised by high intensity force production: generated from the ground, and transferred sequentially through the body's segments, culminating in an explosive racquet-ball impact. Central to this kinetic chain is the core musculature which must withstand and produce rapid torques in all three rotational planes. Noteworthy, early research by Quinn (1986), that measured muscle activity during a variety of tennis strokes, demonstrated that core muscle activation incrementally increased from the stability role during performance of a volley to contribute more positively to power generation when serving.

Around the World Thoracic Rotation on the Trap Table

Similarly a range of intrinsic and extrinsic factors (i.e. biomechanical, physical and equipment) are noted to affect the development of stroke velocity in high-performance tennis. Intrinsically we can consider muscle performance, and more specifically muscular strength (to stabilise the lumbar spine), muscular power (in stretch-shortening cycle activities such as trunk rotation) and muscular / joint range of motion (to facilitate racquet displacement through increased hip-shoulder separation during stroke preparation) as key contributors to racquet head speed (Elliot, Reid, & Crespo, 2003). Analysis of the muscle actions in parentheses further highlights the importance of training these qualities in the core musculature of tennis players. These trainable physical characteristics are synonymous with the Pilates training philosophy, and this is the likely reason why several professional tennis players, currently competing on the ATP circuit, have recently embraced Pilates as an adjunctive method to total body conditioning and performance enhancement (Katlan, 2003).

Furthermore, from an injury prevention standpoint, a common affliction of both junior and senior tennis players is an upper body, bilateral (dominant v non-dominant side) muscular imbalance which largely affects the arm, shoulder and trunk (Roetert & Ellenbecker, 2002). Indeed, Joseph Pilates observed as much himself and was reported to advocate the playing of tennis with both hands to promote symmetric muscular development (LaBrusciano & Lonergan, 1996). While elite players may be some way off realising Pilates' recommendation, if ever, it does highlight the need to incorporate conditioning modes such as Pilates in an athlete's weekly training regimen.

CONCLUSION

Fundamentally, performance of Pilates exercise with correct technique is a must. It is for this reason that athletes are encouraged to consult a physiotherapist or an accredited Pilates instructor to ensure session quality and thus gain maximum benefit. Those who would like to further explore Pilates and its application are referred to the following text; The Complete Writings of Joseph H. Pilates: Your Health and Return to Life Through Contrology.

REFERENCES

Elliot, B., Reid, M., & Crespo, M. (Eds.). (2003). *ITF biomechanics of advanced tennis.* London: International Tennis Federation Ltd.

Katlan, M. (2003). Pilates, anyone? The core-training method is more popular than ever, and it's perfect for tennis players. *Tennis (New York)*, 39: 80 - 82.

Kiley, G., & Potter, N. (1998). Pilates and sports performance. *Paper presented at the National Coaching and Officiating Conference*, Melbourne, Victoria, Australia.

LaBrusciano, G., & Lonergan, S. (1996). Pilates: A method ahead of its time. *Strength and Conditioning*, 18(4): 74 - 75.

Pilates, J. H., Miller, W.J., Gallagher, S.P., Kryzanowska, R. (Ed.). (2000). *The complete writings of Joseph H. Pilates: Your health and return to life through contrology.* Philadelphia: Bainbridge Books.

Reid, M., Quinn, A., & Crespo, M. (Eds.). (2003). *Strength and conditioning for tennis.* London: International Tennis Federation Ltd.

Roetert, E. P., & Ellenbecker, T. S. (2002). Strength training, flexibility training and physical conditioning. *In P. Renstrom (Ed.), Handbook of sport medicine and science: Tennis* (pp. 103 - 123). Oxford: Blackwell Science Ltd.

"To the Good Player the Ball Comes": A Reflection on Player-induced Anticipation

By Lionel Crognier (University of Dijon, France) and Yves-André Féry (University of the French West Indies and Guiana, France)

Tennis players known to be excellent returners, such as Agassi or Hewitt, are able to consistently return first serves hit at more than 200 km/h, and sometimes transform them into winning returns. Given that the time available to react and hit a return is very limited (< 600 ms), it is generally accepted that the returner's level of success is somewhat dependant upon their ability to read and interpret visual cues early in their opponent's movement (Shim et al., 2005). As Fabrice Santoro (2002) explains, players can not afford to overlook that aspect of performance: "I often sit courtside to scout my colleagues on the tour. I watch the orientation of the racket, the position of their feet and hands and their level of relaxation so that I am better able to anticipate their shots when I face them on the court".

The idea, of anticipation, is not new. In 1690, Furetière's universal dictionary of the French language already contained the metaphorical expression "to the good player the ball comes" to describe the amazing ability of real tennis (precursor of the modern game of tennis) players to get into position early in the ball's flight. By observing the way an opponent strikes the ball, players can pick up useful information to anticipate the direction of their shots. There is another specific source of information that could potentially play a key role in the anticipation of tennis strokes: it is linked to the fact that players can, by controlling rallies, influence their opponents' shot selection.

Firstly, it is important to remember that all events on a tennis court do not have the same chance of occurring. If a player moves inside the court and dominates the rally, their opponent will expect a forcing shot rather than an attacking shot hit straight at them. These expected events can be inferred from each player's usual patterns of play. For example, Yannick Noah would normally hit crosscourt on high backhand volleys. Knowing this, his opponents could rule out, with a high success rate, other possible ball trajectories. Maria Sharapova, following her victory over Mary Pierce at Indian Wells (2005), gave another example of how to use this type of knowledge: "I know that Mary likes to serve to the T (down the middle) and, usually, when under pressure, you go for your best shot; that's why I could anticipate those serves fairly well and react better!"

Players should not just react to their opponents' shots by deducing anticipatory elements from their knowledge of their opponents' game; they should also anticipate events by inducing them. History shows that anticipation is much more than using your knowledge of your opponent's playing patterns or reading visual cues from the way they strike the ball. In the 1980s, John McEnroe's tactical plan was to step inside the baseline and give his opponents as little time as possible by hitting the ball on the rise. By using this tactic, McEnroe was attempting to gain ground by controlling the rally and forcing his opponent to play specific strokes, thus making it easier for him to anticipate their stroke.

When at the net, the experienced player can attempt to make their opponent hit a passing shot in a specific direction by pretending to move in the other direction, which gives him the opportunity to anticipate. Roberto Brogin (2004), former coach of Marat Safin, highlights Coria's chess playing and anticipatory skills: "His strength is that he reads the game very well; he is able to foresee the way the point is going to be played. He can set up every point he plays five or six strokes in advance. Each decision he makes is correct". Another tactic commonly used by players is to assume a somewhat off-centre position for the return of serve, by doing this the player can force his opponent to serve in the expected direction.

Therefore, it would seem that the possibility to anticipate is also linked to the player's ability to influence his opponent's responses. However, until recently, there was no scientific data available on this source of anticipation. The purpose of this article is therefore to review the results of a recent study (Crognier & Féry, 2005a) in order to describe this often overlooked source of anticipation.

REVIEW OF A RECENT RESEARCH ARTICLE TITLE: THE EFFECT OF TACTICAL INITIATIVE (CROGNIER & FÉRY, 2005A)

Hypothesis

This study aims to demonstrate that if players are in control of the game (high level of tactical initiative) they can reduce their opponents' possible responses and therefore better anticipate ball trajectories.

Participants

Seventeen experienced male tennis players ranked in the "second series", between +15 and -30, of the ranking system used by the French Tennis Federation participated in the study. The players had fifteen years of practice and had played on average 465 competitive matches. All players played played against player A, who was an experienced player also ranked in the French "second series" (see Figure 1).

Method

On a fast court, participants had to anticipate the direction of passing shots hit by player A in three situations reflecting the different possibilities of controlling rallies (levels of tactical initiative). Eighteen trials were performed for each situation. In the situation of high tactical initiative (HTI), participants had to play a three-shot baseline rally, impose their game and go to the net with an approach shot towards one of the three zones illustrated in figure 1. In this situation player A was put on the defensive before attempting to hit a passing shot. In the situation of moderate tactical initiative (MTI), participants got into position at the net and hit the ball into play in direction of one of the three zones (see Photo). Then, player A hit a passing shot. In the situation of low tactical initiative (LTI), player A got into position in one of the three zones and directly hit a passing shot.

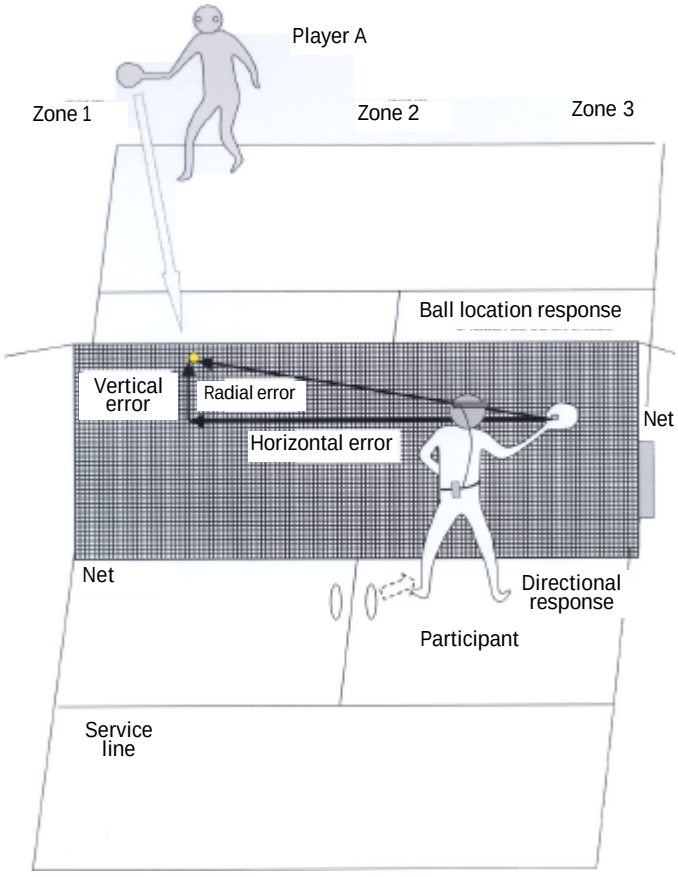


Figure 1 - *Schematic diagram of the experimental setup (seen from behind the participant)*

Participants wore liquid-crystal glasses that can be made opaque (for a description of how this works, see Féry & Crognier, 2001). Passing shots were stopped by a 10 m by 2 m protective net which remained on the ground during the rally and was then raised as soon as the passing shot was hit. The participants' vision was manually occluded 240 ± 40 ms before the racket-ball impact. Once the glasses were made opaque, participants were instructed to move in the direction they thought the ball was going and play a volley as they usually would.

Results

Participants anticipated the direction of player A's passing shots with an accuracy rate of 78% in HTI situations. In MTI and LTI situations, the percentage of correct directional responses was ~55%, which means that the rate of successful anticipation in these cases was no better than chance. Therefore, directional responses improve significantly when the situation is such that the tactical initiative is high (HTI), i.e. when players are able to dictate the game. In terms of ball location responses (see Figure 1) the average radial error was 1.5 m. It is likely that occlusion occurred too early to allow participants to pick up enough information to be extremely accurate. Finally, a further analysis, focusing on to the types of passing shots produced (forehand vs. backhand) and their direction (crosscourt vs. down the line), showed that the down-the-line backhand shot was the most easily anticipated.

DISCUSSION OF RESEARCH

The results obtained offer some interesting information on the prospect of training anticipation in tennis. Recent studies suggest that by using video to learn how to focus attention on specific cues the speed of decision-making can be improved (Farrow et al., 1998). However, scientific research is yet to be completed about the impact that player-induced anticipation training could have. Close collaboration between researchers and coaches is therefore needed to think of the possible contents of this type of training.

On the tennis court, a potential training situation would be to ask the player to prevent his opponent from playing his usual game style. This would see the player trying to impose his game and dictate play in order to force his opponent to produce predictable shots (Crognier & Féry, 2005b). In the laboratory, research work could focus on the nature of the tactical patterns to be used and the type of knowledge - implicit or explicit - to be developed in learning.

Important work still needs to be done to build perceptive and cognitive training programmes that can be used as a useful supplement to existing physical or technical training plans.

REFERENCES

Crognier, L. & Féry, Y.-A. (2005a). Effect of tactical initiative on predicting passing shots in tennis. *Applied Cognitive Psychology*, 19 (5), 637-649.

Crognier, L. & Féry, Y.-A. (2005b). L'anticipation : un facteur négligé de l'entraînement. *La Lettre du Club Fédéral des Enseignants Professionnels (FFT)*, 34, 1-2.

Farrow, D., Chivers, P., Hardingham, C. & Sachse, S. (1998). The effect of video-based perceptual training on the tennis return of serve. *International Journal of Sport Psychology*, 29, 231-242.

Féry, Y.-A. & Crognier, L. (2001). On the tactical significance of game situations in anticipating ball trajectories in tennis. *Research Quarterly for Exercise and Sport*, 72 (2), 143-149.

Shim, J., Carlton, L.G., Chow, J.W., & Chae, W. (2005). The use of anticipatory visual cues by highly skilled tennis players. *Journal of Motor Behavior*, 37 (2), 164-175.

QUOTES

Brogin, R. (2004). L'Equipe (1 June, p.5).

Santoro, F. (2002). Le journal du dimanche (15 September).

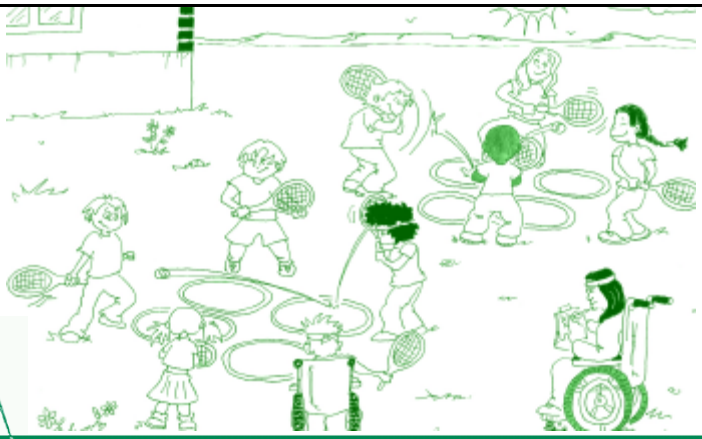
Sharapova, M. (2005). L'Equipe (19 March, p.18).

Participant at the net wearing liquid-crystal glasses in the MTI situation.

2 ONE HOUR LESSONS FOR CHILDREN 5 - 8 YRS OLD

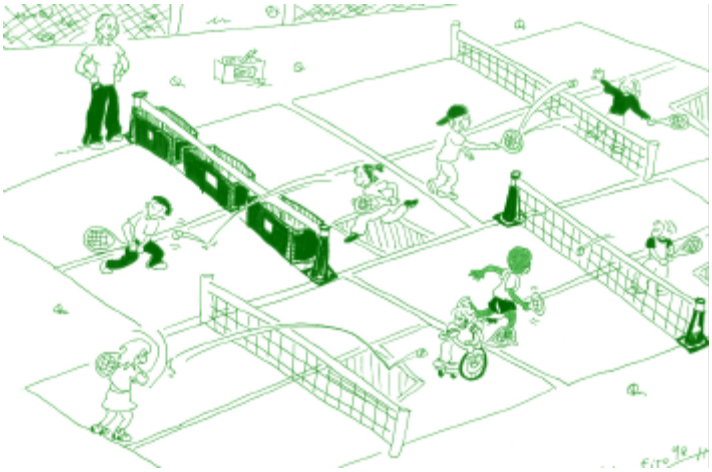
LESSON 25	**Theme**: RECEIVING, PROPELLING, CO-OPERATING AND MOVING
Objective	To rally over an obstacle using only one racket as many times as possible.
Warm up	Ice tennis hockey with racket: Students are divided into two teams. They play hockey with tennis rackets rolling, blocking and hitting the ball with the tip of the racket.
Games/Exercises	One racket rally: Students are divided into two teams with one racket per team. They play over the net or an obstacle. Each student hits once with the racket, gives the racket to his next partner and goes back to the end of his line.
Variations	With one bounce, using both faces of the racket, backing away or coming closer to the obstacle, at various heights, etc.

LESSON 26	**Theme:** RECEIVING, PROPELLING, CO-OPERATING AND MOVING
Objective	Rally with a partner letting the ball bounce in between each stroke.
Warm up	Bounce and block: Students bounce the ball with the racket. At a signal, they try to block it with the racket against the ground.
Games/Exercises	Circle with hoops: Students in groups of 4-6 stand around a circle with several hoops in the centre. They send the ball to each other hitting it with the racket and trying to get the ball to bounce into one of the hoops. A point is awarded when they succeed in making it bounce in the hoop.
Variations	To bounce many times, to bounce once, limiting the area, using a target, placing in various positions, etc.

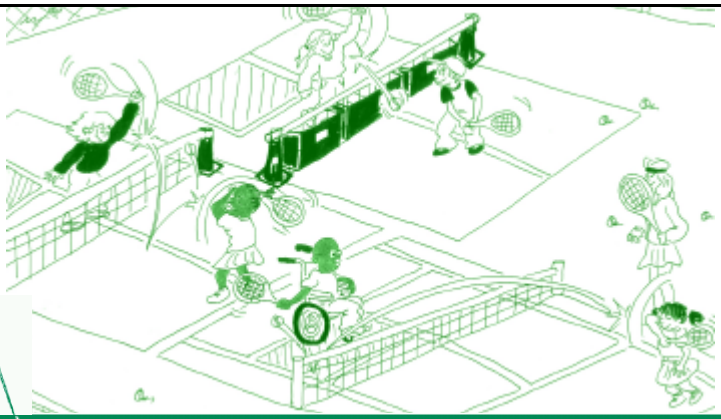


2 ONE HOUR LESSONS FOR CHILDREN 8 - 10 YRS OLD

LESSON 25	**Theme:** PROPELLING, RECEIVING, CO-OPERATING AND COMPETING: PLAYING SINGLES
Objective	To develop various strategies designed to help the student reach an attacking position at the net.
Warm up	Always bouncing the ball: Students are scattered randomly around the court, each with a ball. Students bounce it, when control is lost, student kneels and bounces, sits and bounces or lies and bounces. Students standing and bouncing are winners.
Games/Exercises	Mars Attacks!!: Students rally in 2's. Student A serves to a specific zone in the court, B returns the serve and runs to the net and they play the point. Students rotate positions.
Variations	Attacking short balls and return and volley, etc.



LESSON 26	**Theme:** PROPELLING, RECEIVING AND COMPETING: ATTACK
Objective	To create situations where the students should attack using various ball control concepts.
Warm up	Water polo tennis: Teams of 4 students. 2 kneeling on a line and the other 2 kneeling on another line in front. Students pass the ball rolling between them and trying to score a goal into their opponents' goalkeeper. Students can move but should always touch their line. They can intercept their opponents' shots. The team with more goals wins.
Games/Exercises	Breakdown!: Students rally in 2's. Student A serves to a specific zone in the court, B returns the serve and they play the point. Both students can run to the net hitting to the weakest side of their opponent. Students rotate positions.
Variations	Attacking the opposite corner, attacking the net, etc.



A Different Look at the 2005 US Open

By Josef Brabenec (Former ITF Touring Coach, Canada)

INTRODUCTION

The 2005 US Open brought some very exciting tennis matches. Apart from the excitement, it also presented the opportunity to perform some statistical analysis indicating the quality of a match. Personally, I believe that the quality of any tennis match is given by the ratio of errors committed to each winning shot (winner). In this circumstance there is no differentiation between an unforced error or any other error. This is because the result is always the same, the loss of one point. Furthermore, the classification of an unforced error is always subjective and dependant upon who is the judge, where as an error without any denomination is absolutely objective - the loss of a point.

RESULTS AND DISCUSSION

Presented in table 1 (men's) and table 2 (women's) are the rankings of the top 10 performances with regard to match quality, according to the previous definition, at the 2005 US Open. It can be seen in both categories that it was not the US Open champion who had the highest quality performance.

In fact in the men's it was Muller from Luxembourg, who is currently ranked 70 in the INDESIT ATP Race, who ranked number 1 for his outstanding performance against Roddick. In this match he hit 65 winners and committed only 67 errors!! This equates to a fabulous ratio of 1 winner for every 1.03 errors. In the same match Roddick had nothing to be ashamed of with his performance in a losing match making 1 winner for every 1.18 errors. This performance held the second place until the last 40 minutes of the men's singles final when the eventual champion Federer put on display his amazing array of different shots against Agassi to hit 69 winners and commit only 72 errors. This equates to a ratio of 1 winner for every 1.04 errors ranking him in the 2nd place in terms of the match quality ranking. Federer also earned the 4th, 6th and 10th places for his performances against Nalbandian, Hewitt and Kiefer, respectively. The sign that Federer is a true champion is that he had his best performance, statistically, in the final when playing against his most experienced and dangerous opponent, Agassi.

James Blake, who performed extremely well and possibly had the best tournament of his career, ranked 5th and 9th for his performances against Nadal (53 winners and 68 errors for a ratio of 1:1.28), and Agassi respectively (60 winners and 106 errors for a ratio of 1:1.76). Agassi, who ranked 8th with his win over Blake, had 56 winners and 96 errors for that match with a ratio of 1:1.71. However, during this match Agassi actually performed at 2 different levels. During the first 2 sets he hit only 14 winners and made 44 errors (ratio 1:3.1), but then in the fifth and deciding set he hit 19 winners and made only 16 errors, for an amazing ratio of 1 winner for 0.84 errors!!, the sign of a true master and experienced player. Also for his great effort in the final against Federer, he had a ratio 1.83 which would give him the 11th place in my match quality ranking.

Further analysis of the achievements of Federer shows that he hit the most number of aces (77), followed by Agassi (76), and Ginepri (75). His average 1st serve percentage was 63%, while in his last four matches the lowest was 54% against Nalbandian and the highest was 76% in the final. Federer proved to not only be the best server but also the best receiver. He won 38% points as a receiver against Kiefer, who won 33%, 55% against Nalbandian, who won 32%, 42% against Hewitt, who won 36%, and finally 44% points against Agassi who won 30%. This further demonstrates that Federer is the complete package of power, ingenuity, shot making ability, speed and grace.

However, if there is a slight statistical weakness in the game of Federer it is that his break point conversion rate could be better. With his returning skills he should be capable of breaking serve constantly, at at least in 35-45% of the opportunities created. Against Agassi he won 4 of 18 breakpoints and against Hewitt 4 of 15, which is not good enough for his ability. This "weakness" showed up not only in those 2 matches but in several of his matches which I have charted in the past 2 years.

Match Ranking	Player	Winner / Error	Ratio	Opponent	Ratio	Total No of Points	Score
1	G. Muller	65 / 67	1 : 1.03	A. Roddick	1 : 1.18	217	7/6, 7/6, 7/6
2	R. Federer	69 / 72	1: 1.04	A. Agassi	1 : 1.82	238	6/3, 2/6, 7/6, 6/1
3	A. Roddick	39 / 46	1: 1.18	G. Muller	1 : 1.03	217	6/7, 6/7, 6/7
4	R. Federer	31 / 48	1: 1.26	D. Nalbandian	1 : 6	149	6/2, 6/4, 6/1
5	J. Blake	53 / 68	1: 1.28	R. Nadal	1 : 2.37	219	6/3, 4/6, 6/3, 6/1
6	R. Federer	59 /90	1: 1.52	L. Hewitt	1 : 2	290	6/3, 7/6, 4/6, 6/3
7	R. Ginepri	57 / 88	1: 1.54	R. Gasquet	1 : 1.96	302	6/3, 3/6, 6/7, 6/4, 6/0
8	A. Agassi	56 / 96	1: 1.71	J. Blake	1 : 1.76	318	3/6, 3/6, 6/3, 6/3, 7/6
9	J. Blake	60 / 106	1: 1.76	A. Agassi	1 : 1.71	318	6/3, 6/3, 3/6, 3/6, 6/7
10	R. Federer	43 / 79	1: 1.79	N. Kiefer	1 : 2	264	6/4, 6/7, 6/3, 6/4

Table 1. *The top 10 men's performances with regard to match quality at the 2005 US Open.*

Match Ranking	Player	Winner / Error	Ratio	Opponent	Ratio	Total No of Points	Score
1	M. Pierce	16 / 19	1 : 1.19	A. Mauresmo	1 : 2	96	6/4, 6/1
2	M. Pierce	29 / 36	1: 1.5	E. Dementieva	1 : 2.5	160	3/6, 6/2, 6/2
3	K. Clijsters	24 / 57	1: 1.93	M. Pierce	1 : 6	96	6/1, 6/3
4	A. Mauresmo	20 / 41	1: 2	M. Pierce	1 : 1.19	96	1/6, 4/6
5	K. Clijsters	24 / 57	1: 2.37	M. Sharapova	1 : 2.4	200	6/2, 2/6, 2/6
6	M. Sharapova	35 / 84	1: 2.4	K. Clijsters	1 : 2.37	200	2/6, 6/2, 6/2
7	E. Dementieva	34 / 85	1: 2.5	M. Pierce	1 : 1.5	160	6/3, 2/6, 2/6
8	M. Sharapova	28 / 81	1: 2.89	N. Petrova	1 : 3.9	217	7/5, 4/6, 6/4
9	L. Davenport	24 / 81	1: 3.37	E. Dementieva	1 : 2.5	224	1/6, 6/1, 6/7
10	K. Clijsters	16 / 62	1: 3.87	V. Williams	1 : 4.2	182	4/6, 7/6, 6/1

Table 2. *The top 10 women's performances with regard to match quality at the 2005 US Open.*

Looking at the women's championships (table 2) we also saw some exciting matches like Clijsters against V. Williams, Dementieva against Davenport, Pierce against Dementieva, Clijsters against Sharapova, and Sharapova against Petrova. These matches were exciting because they went the distance, but statistically the quality with rare exceptions was doubtful. In comparison with the men's matches there were longer rallies, with minimal variety and creativity and many more points were "collected" on errors instead of being acquired by winning shots. Probably the most exciting moments were the under-pressure returns of the deserving Champion Clijsters and the accurate shots from both sides of Pierce in her matches against Mauresmo and Dementieva.

That was Pierce at her best. Unfortunately for Pierce she was not even close to her best during her second Grand Slam final of the year when she managed to hit only 7 winners and accumulated 42 errors for a ratio of 1:6!! Despite this, Pierce leads the match efficiency ranking for her performance against Mauresmo with a ratio of 1:1.19 and captured as well the 2nd place with her performance against Dementieva with a ratio of 1:1.5. Clijsters is third with her final performance against Pierce with a ratio of 1:1,93.

CONCLUSION

Analysing the quality of a tennis match using this system can provide some very interesting information about the performance of players, however as coaches we must also remember to analyse the strokes preceding the eventual winner or error.

Tennis and Neuro-Linguistic Programming

By Antoni Girod (NLP Trainer, France)

INTRODUCTION

Every tennis coach recognises the importance of the mental aspect of tennis in achieving high performance.

However, when can you define a tennis player as being 'mentally strong'? Quite simply it is when a player is able to use in competition, regardless of the circumstances, 100% of their physical, technical and tactical skills.

Hence, the purpose of a mental training programme is to allow players to realise their full potential and thus raise their level of performance. To achieve this, tennis coaches can choose between various methods and techniques such as Jacobson's progressive relaxation, Schultz's autogenic training, yoga, sophrology... and neuro-linguistic programming (NLP).

NLP has long been used as a mental preparation tool by many top coaches, including Gustavo Kuerten's coach, Brazilian Larri Passos. Goal setting is one of the most used and most powerful NLP techniques. The following paragraphs will describe the benefits of goal setting and outline the goal setting process.

GOAL SETTING

The motivation of both the coach and the player is essential in this process. Goal setting can help players clarify their motivation level and guide them on the path to improved performance. It is recommended to use this technique with players from the age of 13-14 as this is when young players have the experience and maturity to begin being involved in the planning of their training and competition programmes. Goal setting is also a valuable tool to assist professional players in planning their career.

Goal setting can be defined as the art of asking the right questions. In this sense questioning is designed to guide a person's thought process. Asking a person questions about their goals is like teaching them how to build a motivational strategy and will help them to acquire the ability to structure their thoughts in relation to the future. They can then use this ability independently, not only in relation to sporting pursuits but also in their personal and professional life. It is therefore an educational act in the noble sense of the word.

So what are the 5 basic questions of the goal setting process?

Question 1: CURRENT SITUATION
What is the current situation?
Where do you stand?
The purpose of this first question is to make the players aware of their current situation at the start so that they can set their goals as realistically and logically as possible. The tennis coach has many tools at their disposal to facilitate this initial assessment of the situation (physical tests, statistics, video footage, etc.).

Question 2: GOAL
What is your goal?
What do you want?
After bringing the player to the reality of the present with the first question, the coach then makes the player project themselves

Antoni Girod conducting an on court session, using the NLP technique of visualisation at the 2005 WWCW.

into the future with the second one. When you answer this question, you choose a target; you channel your energy into a specific direction. You start thinking of something that does not exist in the present, but that you want to see happen in the future.

Question 3: PURPOSE
What will achieving your goal do for you?
Why is it important to you?
This third question refers to the purpose behind your goal. The goal is the 'WHAT?' and the purpose is the 'WHY?'. By asking this question to the player, the coach invites them to get in touch with their deep and inner motivation. Motivation needs to be fuelled. The purpose behind your goal is that fuel. The purpose is what makes you want to achieve the goal. It has to do with the dreams and ambitions underlying the goal. To discover those, all you need to do is lift up your eyes and see written largely all the positive things that the goal can bring.

Question 4: MEANS
What means do you need to reach your goal?
How can you reach your goal?
With question number one, the coach led the player to define the current situation, i.e. the starting point. With question number two, to choose the ideal situation, i.e. the ending point. Question number three has made that ending point attractive and bright. What is important now is to draw / outline the path from the starting point to the ending point. Question number four is designed to show the way. It helps the player define the steps that will allow them to make their way towards their goal. Each mean identified is a sub-goal towards the overall goal.

Question 5: OBSTACLES
What are the obstacles?
What could prevent you from achieving your goal?
This question is sometimes perceived by some players as discouraging. Why should we talk about potential obstacles? What is the point in being negative? Isn't this question counterproductive in the player's search for motivation?

It can indeed be a source of discouragement or doubt if it is not immediately followed by an adapted and revised version of question number four:
'How can these obstacles be overcome?'

Identifying the obstacles on the path leading to the goal only makes sense as it can then help you find the means to overcome them. If you fail to anticipate an obstacle, it can unfortunately diminish your motivation or be used as an excuse for poor performance. It is important to remember that the point here is not to inspire fear. It is rather to prepare to overcome any potential obstacle / pitfalls in a practical and realistic way.

CONCLUSION

These five basic questions are essential features of goal setting and form a simple, logical and meaningful motivational strategy. By taking the time to ask the player the previous five questions, instead of imposing unfamiliar goals on them, it gives them the opportunity to be involved in the process and feel like the goals are their own. This method can be applied to short-term goals (the next training session, the next match, etc.), medium-term goals (a training cycle, a series of tournaments, etc.), as well as long-term goals (season, career). Besides these five fundamental questions, there are other more elaborate questions (which we will not discuss here) that can be useful to take goal setting to the next level.

After sometime, this process will become automatic and players will be able to set goals on their own in an efficient and structured manner. By instilling this motivational strategy into players, the tennis coach nurtures them not only for a day, but also for a lifetime, because he will teach them to become more and more independent.

Goal setting therefore plays a key role in mental preparation. Goal setting is only one of the NLP techniques coaches can use and others include techniques to work on the player's confidence level, their ability to focus and their ability to cope with stress. A number of these NLP techniques are intended to be used off the tennis court, while others can be applied very easily on the court.

Tennis Coaches Education: Comparison of Tutor-contact Hours Worldwide

By Miguel Crespo, Machar Reid, Patrick McInerney, and Dave Miley (International Tennis Federation)

INTRODUCTION

In 2003 the ITF Coaches' Commission asked the ITF Development Department to conduct research, by means of a survey, into the characteristics of the different Coaches Education Programmes (CEP's) worldwide (ITF, 2003). In issue 35 of the ITF Coaching and Sport Science Review, the preliminary findings of this study were presented (Crespo, Reid & Miley, 2005).

In the first part of this study, as per the top 23 tennis nations, it was found that most of them have their own CEP's, they exhibit control over and run the CEP by themselves, and that only a handful have outsourced coach education to a private or independent company (coaches' association, etc.). Data also revealed a diversity in the courses structure and the types of names, that there was a mean of 3-4 levels, and that most CEP's have fewer hours in the introductory levels than the higher levels. A significant variation in the number of hours per subject was also found, even though almost all courses include information on the majority of sport sciences applied to tennis. Finally, it was also found that most CEP's include diverse theoretical and practical assessment procedures, as well as pre-requisites such as age, playing level, education, and minimum time between courses / levels.

One issue that was noted from the data obtained was the considerable difference in the number of formal hours spent with a tutor present (tutor contact hours) in the different CEP's, with lower levels ranging from 6 tutor-coach contact hours to 270, and higher levels of certification ranging from 30 to 1300 hours or even a University degree (four years).

When adding all tennis nations, it was found that of the 199 nations surveyed, 82.9% (165) have a CEP in place, 27.2% (45) of them have developed their own CEP, 65.4% (108) use the ITF syllabi, and 8.4% (12) combine their own CEP with that of the ITF, with Europe being the region in the world that possesses the highest number of nations with their own CEP.

We concluded this first phase of study with the statement that due to the diversity in the number of formal hours of the CEP's of the top 25 tennis nations, it seems advisable to establish some sort of equivalence between existing CEP's, which would lead to the establishment of more uniform guidelines, criteria, contents, entry standards, competencies and assessment procedures.

SECOND PHASE OF THE STUDY: COMPARISON OF TUTOR CONTACT HOURS

Goal

In this second phase of the study, it was decided to investigate in more depth the considerable difference of tutor-contact hours shown by the aforementioned data, in order to see the characteristics of these differences. The tutor-contact hours were taken as the main criteria due to the objective data it can provide. No pre-course hours, homework tasks, individual learning, supervised practice, or prior-learning were taken into account for the purpose of this study.

Methodology

A comparison of tutor-contact hours was completed using the ITF Level 1-2-3 tutor-contact hours approved and recommended by the ITF Coaches Commission (ITF, 1997) as the minimum criteria, which are the following:

- Level 1: 61 hours
- Level 2: 74 hours
- Level 3: 84 hours

The total number of tutor-contact hours for the 3 levels is 219 hours.

Results

Table 1 shows the results of the comparison among the top nations in the study. In brackets the number of tutor contact hours each nation should:

- add (+ in red means that they do less than the minimum requirements) or
- detract (- in black means that they do more than the minimum requirements for the 3 levels)

to have the same number of contact hours in each level as per the proposal.

The symbol (*) indicates nations that have more than 3 levels. For the purpose of this study, only tutor-contact hours in the first 3 levels have been taken into account when the country had more than the minimum hours. However, tutor-contact hours in all levels have been taken into account when the minimum hours were not reached in the first 3 levels.

Hours	Level 1 (61 hours)		Level 2 (74 hours)		Level 3 (84 hours)		Reaches 219 hrs in 3 levels?
Country	Course	±	Course	±	Course	±	
ITF	61		74		84		219
Australia	26	+35	70	+4	100	-16	+23
Austria	160	-99	212	-138	317	-233	√ (-470)
Belgium (*)	66	-5	80	-6	180	-96	√ (-107)
Brasil (*)	23	+38	28	+46	62	+22	+106
Canada (*)	16	+84	50	+24	160	-76	√ (-13)
China (*)	70	-9	72	+2	80	+4	√ (-3)
Croatia	240	-179	540	-466	-	-	√ (-561)
Czech Rep.	60	+1	180	-106	450	-366	√ (-471)
France (*)	105	-44	45	+29	770	-686	√ (-701)
Germany (*)	150	-89	150	-76	150	-66	√ (-231)
Great Britain (*)	91	-30	96	-22	144	-60	√ (-112)
Israel	220	-120	440	-366	-	-	√ (-441)
Italy (*)	30	+31	50	+24	240	-156	√ (-320)
Japan	60	+1	40	+34	40	+44	+79
Netherlands	270	-209	200	-126	180	-96	√ (-431)
Poland	140	-79	310	-236	-	-	√ (-231)
Portugal	60	+1	90	-16	120	-36	√ (-51)
Romania	225	-164	120	-46	80	+4	√ (-206)
Slovak Rep.	60	+1	150	-78	300	-216	√ (-291)
Spain	120	-20	310	-236	400	-316	√ (-611)
Sweden	36	+25	81	-7	108	-24	√ (-6)
Switzerland	35	+26	84	-10	105	-21	√ (-5)
USA	6	+55	30	+44	50	+34	+133

Table 1. *Comparison of tutor-contact hours among the top tennis nations.*

COMMENTS

Level 1:

- 11 nations do not reach 61 hours: Australia, Brazil, Canada, Czech Rep., Italy, Japan, Portugal, Slovak Rep., Sweden, Switzerland, and the USA.
- Note: 4 of them (Czech Rep., Japan, Portugal and Slovak Rep., have just 1 hour less). We can conclude that there are actually 7 nations that do not meet the minimum hours of the ITF level one syllabus.

Level 2:

- 8 nations do not reach 74 hours: Australia, Brazil, Canada, China, France, Italy, Japan, and the USA.
- Note: 2 of them (Australia and China, have just 4 or less hours less). We can conclude that there are actually 6 nations that do not meet the minimum hours of the ITF level Two syllabus.

Level 3:

- 5 nations do not reach 84 hours: Brazil, China, Japan, Romania, and the USA.
- Note: 2 of them (China and Romania have just 4 hours less). We can conclude that there are actually 3 nations that do not meet the minimum hours established by the ITF level 3 Syllabus.

All levels:

- 4 nations do not reach 219 hours: Australia, Brazil, Japan, and the USA.

CONCLUSION

Data from the study show that out of the top 23 nations in the world, just 4 of them do not reach the minimum tutor-contact hours established by the ITF syllabus.

REFERENCES

Crespo, M., Reid, M. & Miley. (2005). Tennis Coaches Education: A Worldwide Perspective. *ITF CSSR*, 35, 11-13.

ITF. (1997). ITF Coaches Commission Minutes. *Unpublished document*. ITF Ltd. London.

ITF. (2003). ITF Coaches Commission Minutes. *Unpublished document*. ITF Ltd. London.

Methods of Endurance Training for Tennis

By Anna Skorodumova
(Head of the Sport Science Committee, Russian Tennis Federation, Professor of the Institute of Physical Culture, Moscow)

This article is a continuation of the article published in edition 35 of the ITF CSSR, which focused on the physiological factors affecting endurance capacity, and will discuss the different types of exercises that can be used to train tennis specific endurance.

TYPES OF EXERCISES

There are many different ways to develop endurance for tennis, all of which can not be described in one article; however when planning endurance training it is very important to classify exercises into the following categories.

General

These exercises are selected according to the influence they have on the cardiovascular and respiratory systems and should be used largely during the preparatory phase. General exercises include all types of continuous running, swimming and cycling as well as different sports and active games. Activities such as swimming and running are particularly good for tennis players as they also involve the use of the muscles of the shoulder girdle, which increases the demand for oxygen and thus the output of the cardiovascular and respiratory systems.

Games such as football, basketball and handball are also particularly good but should be modified. For example, basketball should be played with only 3 players and they should be replaced every 3 minutes, and football and handball should be played on a smaller field, to ensure all players remain active. That is, rules should be modified with regard to the specific needs of the players. Another important consideration is the injury risk involved with playing games, so these activities should be played with caution and used during non competitive periods.

Special

Special exercises are predominantly used during the specific preparatory or pre-competitive phase and should be selected in accordance with the specific actions and movements of tennis play. Four types of special exercises can be performed and the load used must be higher than that during tournament play.

Drills consisting of only one stroke: This involves the frequent repetition of a single stroke from any zone of the court. These drills not only provide endurance training but they also allow for technical correction and improvement.

Combination exercises of multiple strokes: These can be simple "two-way" exercises, such as a forehand down the line and then crosscourt or multidirectional exercises, such as 3 cross court backhands, a forehand approach and a smash. A specific feature of these exercises is that players have to know from where each shot has to be hit, what type of shot is to be hit and at what intensity/rate the drill should be performed. These drills should be designed specifically for each individual player according to their game style and tactical patterns so that match play can be simulated.

Situational exercises: Are similar to combination exercises, however in this instance the player does not know from where each stroke will be played. These exercises can be used to train all game situations and the unexpectedness of the drill means that response time and movement capacity can also be trained. Even though the player does not know from where they will hit the ball they must still play the ball to a specific zone on the court.

Competition type situations: This involves game play with modified scoring. In this instance a game will never start with a score of 0:0. The initial score will be proposed according to the players needs, and for example could start at 15:30 or 30:30, so that the intensity of the point play is high but the rest is increased as they play fewer points per game. Additionally, these types of exercises allows for the training of psychological skills as players have to maintain a high level of concentration and emotion control, among other skills, due to the increased pressure created by the modified scoring.

Competition

As tennis players compete for approximately 9-10 months of the year it is important to consider the effect that tournament play has on their endurance capacity and the importance of endurance training during this period. With regard to endurance capacity it will decrease during this period because tennis players are unable to consistently perform the workload required due to competition play. Therefore, when creating a yearly plan it is extremely important to decide the importance / priority of each tournament, so that during periods of the competitive season that are of a lower priority, greater workloads can be performed. Endurance training during this period should predominantly consist of special exercises, as it will also allow for improvements of technical, tactical and other physical capacities.

CONCLUSION

By classifying exercises into the aforementioned categories it will help the coach train players more appropriately during each phase of the year. The examples mentioned were limited, in terms of numbers, so use your imagination, create new exercises, classify them into the appropriate category and use them in the appropriate phase of the annual plan.

Further reading:

Ferrauti, A., Weber, K., & Wright, P. R. (2003). Endurance: Basic, Semi-Specific and Tennis-Specific. In Reid, M., Quinn, A., & Crespo, M. (Eds.), Strength and Conditioning for Tennis (93-112). London, ITF ltd.

Special exercises which replicate tennis play allow for the practice of both tactics and technique.

Training Junior Players - Midi Tennis

By Garry Cahill (Technical Director, Tennis Ireland)

Over the last number of years we have focused very hard in our regions on training players in midi tennis on the 18m x 6.5m courts. Prior to this, our players had moved from the mini tennis court to the full court without any transition. Our progression system now has players move from the mini tennis court at 7-8 years of age and then progress to full court at age 9. These ages are only a guideline, and it should be remembered that age is not the most important factor. In fact the more important aspect is that the players are able to play with good fundamental technical skills before they can progress.

In some countries the midi court was modified to be shorter but is kept at the same width, here in Ireland we do not believe in this system. Our theory is that the court should also be made proportionately narrower. The main reason for this is because we believe at this age balance is a key issue and if you leave the court the same width players will have to play almost every shot in an unbalanced position. Another factor that suggests that the court should be changed is that the stride length of junior players is very short. Hence, they can not cover the court and points can be easily won by making the player run wide and change direction, so rally length is short. Another major advantage of making the court narrower is that players will approach the net more often as the opponent has less room to pass.

Since introducing the midi tennis progression, the technical level of our players has improved greatly, however the court is only one factor in this improvement. We have also dedicated many hours to educating the parents with regard to the importance of using the appropriate equipment at this age. The equipment that should made suitable for this age and level includes the racquet size and weight, and ball type.

During an analysis of the regions, in the summer of 2005, there were some big technical improvements found in the following areas. I believe that this improvement was largely due to the introduction of the midi, 18 x 6.5 m, court.

1. Less extreme grips, due to the bounce of the ball being lower.
2. Less very open stances at this young age, enabling players to transfer their body weight in the direction on the ball more to create a more powerful stroke (width and length of court).
3. The players do not use a backswing, so much, on the volleys. Instead they use more angles with the volley to win the point (length of court).
4. Players have less of a tendency to over rotate, because of the shorter court (length of court).
5. Overall throwing action on the serve. In my opinion, this is mainly due to the length and weight of the racquets. We also put a lot of emphasis on throwing work in the co-ordination training for midi tennis.

Tactically at this stage players should experience the feeling of playing the real game. They should be put into tactical situations to force technical changes as much as possible, e.g. to teach topspin, the players should be taught through tactical situations that include angle shots. This forces the players to find solutions and discover the use of the technical skill. The basket of course should be used, but only for a short period of time until the "feeling" is achieved.

Coaches too often put players in a "box" by teaching in a constant manner, but the players actually need to experience varied situations as much as possible. This will give the players the ability to be more creative in the future, as they will be constantly making decisions and experimenting. At this age players should also be exposed to many different footwork patterns. Too often the situation is seen in coaching sessions where a player side steps, plays the perfect forehand, and moves backwards to the back of the line. These kinds of drills teach totally the wrong footwork pattern needed to succeed in tennis. Instead they should learn to use with all the different movement patterns, side step, cross step, combine steps, recover from different distances and hit from all stances. The drills should be made as realistic as possible even from the beginning.

Finally, I believe as coaches, that by teaching in this way we guide our players towards a more "rounded" tennis game in the future. And to this end we will end up with players that can play well technically and are tactically creative.

Standard Midi-Tennis Court **Modified Midi-Tennis Court**

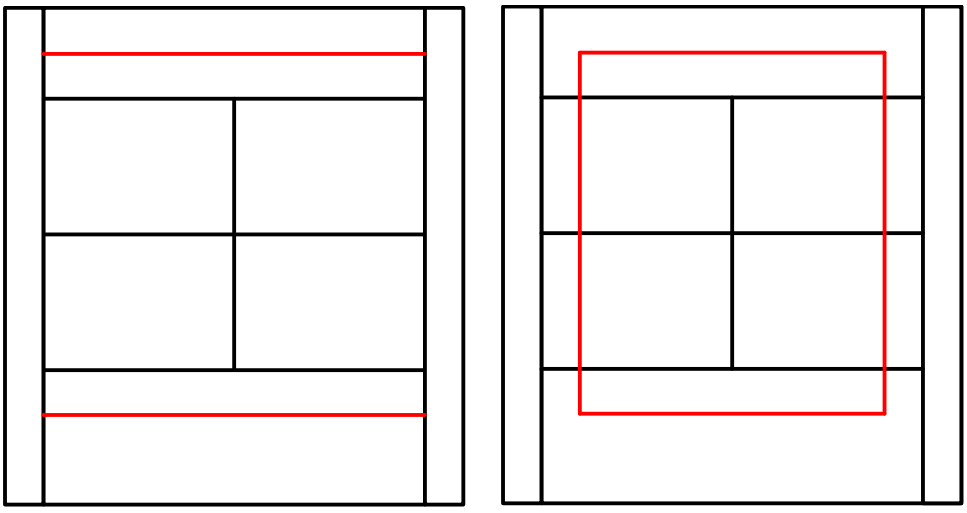


Figure 1. *The difference between the standard Midi-Tennis court (18 x 8.23 m) and the modified Midi-Tennis court (18 x 6.5 m) used by Tennis Ireland.*

Recommended Books

BOOKS

Preparación Física en el Tenis (Physical Preparation for Tennis) Author: José Antonio Aparicio Year: 1998 Language: Spanish Level: All levels ISBN: 84-8013-155-1

For those coaches who are keen to learn some of the basics with regard to physical preparation for tennis this book is a very good place to start. It presents the main concepts of preparing and conducting physical training sessions in a very simple and easy to understand format. The author has combined scientific data with experience to give examples of yearly, monthly, weekly and even daily plans. Furthermore, it also contains a large amount of normative data, for agility, speed and strength. Overall a very well constructed book and a good resource for coaches interested in physical preparation for tennis.

For more information contact: www.gymnos.com/

Technical Tennis: Racquets, Strings, Balls, Courts, Spin, and Bounce Author: Rod Cross and Crawford Lindsey Year: 2005 Language: English Level: All levels ISBN: 0-9722759-3-2

A truly comprehensive look at all the technical components involved in tennis play. This book will help you answer questions such as: What is the single most important variable in racquet performance? How do you create maximum spin? Where on your racquet should you hit the ball? Stuart Miller, Technical Manager for the International Tennis Federation says ¨From choosing a racquet to understanding the role of strings on the flight of the ball, Technical Tennis provides valuable information for the coach and player alike. If you want to enhance your game, this book should be at the top of your list¨.

For more information contact: www.racquettech.com

Tenis: Potencia, velocidad y movilidad (Tennis: Power, Speed and Mobility) Author: Rendey Horacio Ortiz Rodríguez Year: 2004 Language: Spanish Level: All levels ISBN: 84-95114-61-5

This book provides an in depth look at the physical requirements of tennis and the best training methods to improve these requirements. The information in this book was accumulated during a 12 year period during which the author worked as a physical trainer in numerous clubs and completed a Masters degree in high performance training. Using these experiences the author has put together one of the more complete books on physical preparation as it contains a great amount of research data, that is discussed along with practical experiences. If you already have knowledge in this area, you will really enjoy this book.

For more information contact: www.inde.com

Sport: Communication et pédagogie - La PNL pour un coaching efficace (Communication and pedagogy - NLP for efficient coaching) Author: Antoni Girod Year: 2005 Language: French Level: All levels ISBN: 2-85180-679-3

Communication and creating an optimal learning environment for players is essential and this book will help you achieve this. It covers topics such as: pedagogy, communication and the 4 stages of learning, and then details some methods / techniques that coaches need to understand and utilise when working with players. This book will definitely help coaches to improve the way they communicate with players, coaches and colleagues.

For more information contact: www.ed-amphora.fr

Training Aid

The Training Partner

The purpose of The Training Partner is to get the player to understand that he needs to adopt a semi-squat position from which power can be delivered to the forehand and backhand. ¨The Training Partner is an excellent device for developing kinaesthetic awareness of the correct posture¨ Simon Jones, LTA National Coach. The Training Partner is also very easy to use, comes in a number of sizes and is a good tool for coaches who want to give their players an extra learning aid.

For more information: www.overspeeduk.com

ITF Coaching

ITF Ltd, Bank Lane, Roehampton, London Sw15 5XZ
Tel: 44 20 8878 6464 Fax: 44 20 8878 7799
E-mail: itf@itftennis.com Website: www.itftennis.com
ISSN 1812-2302
Selected photo credits: Paul Zimmer, Ron Angle, Sergio Carmona