



Editorial

Welcome to issue 28 of the ITF Coaching & Sport Science Review – the third and final issue of 2002.

In the last quarter of this year, some of our readers will have attended the Regional Coaches Workshops most of which were held in conjunction with Olympic Solidarity and the Regional Tennis Associations. In Fort Lauderdale, approximately 120 coaches representing 20 countries from the region participated in the Central American and Caribbean Coaches Workshop. Tennis Europe, together with the Portuguese Tennis Association, organised its annual Coaches Symposium in Algarve, Portugal, with 90 high level European coaches representing 33 countries in attendance. This year for the first time, two Asian Coaches Workshops were held. In mid-October, 90 coaches from 14 countries participated in the workshop in Dubai, while a similar event staged in Beijing a week later saw 110 coaches from 26 nations take part.

In South America, more than 300 coaches representing all South American countries absorbed the information on offer during the South American Workshop held in Rosario, Argentina. One-hundred coaches from 17 countries also attended the African Coaches Workshop held in Pretoria at the High Performance Centre. In addition a second African Regional Workshop was held in Benin and attended to by 100 coaches from 22 African nations.

In summary, 2002 saw close to 1000 coaches from 78 countries attend an ITF Regional Coaches Workshop. These biennial events help to ensure that not only do the coaches from a region gather together to discuss specific issues related to coaching in their respective regions but also that these coaches have the opportunity to have access to the most up to date coaching information. We hope that those of you that attended a workshop found it beneficial to you in your coaching.

We would like to take this opportunity to thank the ITF experts that presented at these workshops and to once again recognise the scores of coaching experts that continue to assist the ITF with our coach education programme. Finally, we would like to extend an additional thanks to all of the contributors to this issue and remind all of you that our Review is available in the “Coaches News” section of the ITF website, www.itftennis.com.

We hope you enjoy the 28th issue of ITF Coaching Sport & Science Review.



Workshop attendees at the 9th ITF/OS/COSAT Coaches Workshop, Rosario, Argentina.

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Fast Court Tactics - Part 2

By Tom Gullikson (Former US Davis Cup Captain) and Doug MacCurdy (Head Tennis Coach, University of Santa Fe)

Tactics in the Five Game Situations

Serving – The serve itself and how it is used tactically is of great importance in fast court tennis. The ability to slice the serve allows the player to swing the ball out wide or into the body of the receiver since the ball continues to curve after the bounce. The serve can be used to win points outright, create openings, or, at the very least, prevent opponents from attacking you.

While serving predominantly to the weaker side is an obvious tactic, there are many players today that receive very effectively off both wings. So, moving the serve around regularly will keep the receiver from developing good rhythm and confidence. The body serve, which is particularly effective on fast courts, is underutilized and adds another variable for the receiver to contend with. Heavy topspin can be used for variety, but is less effective than on slower courts. Serving out wide to a receiver's strength opens the court to volley to the weakness.

For big servers, the second serve can be a huge weapon. Many players seem to feel that the benefits of trying for big second serves outweigh the risks of occasional double faults.

It is certainly possible to win on fast courts without a tremendous serve, but the volleying or aggressive baseline skills must be executed at a near perfect level.

Return of Serve – Ideally, the service returns on fast courts should be hit as aggressively as possible. However, rather large target areas should be chosen. The receiver should endeavour to plan the return against big serves, yet be prepared to hit many "emergency"

returns, where putting the ball into play, through whatever means, becomes the overriding priority.

The ready position of the receiver should generally be fairly close to the baseline, even against fast serves. Typically, standing way back and taking full swings is not that effective on fast courts.

In planning the return of first serves, the following could serve as a list of priorities:

- If a weaker side exists, return to that side of the server.
- If the server does not have an obvious weakness, return deep down the middle or crosscourt.
- Make the volleyer hit a first volley – direct the ball to the weaker side if possible.
- If you are seeing the ball well, the down the line return can put the server on the defensive right away.

Second serves present more of an opportunity for the receiver to attack. Down the line returns become easier to control with the extra time available. "Chip and charge" tactics work well and "hit and charge" patterns can be equally, or more effective. Mixing these return and volley tactics is frustrating for the server.

After a good return, do not retreat, but be ready to move forward for a groundstroke or swinging volley when the server is on the defensive.

Baseline play – The best fast court players do not retreat much behind the baseline. In match-ups involving very successful fast court players like Davenport-V. Williams or Sampras-Agassi, the players tend to stay close to the baseline and slug it out. Safin and Kafelnikov execute this tactical approach well. Current men's #1 Lleyton Hewitt generally stays in close to the baseline and tries to dominate. However, when he is pushed off the baseline, he exhibits lightning speed, great balance and counter-punching abilities. This combination of skills makes him extremely difficult to beat.

On fast courts, long baseline rallies are rare. Taking advantage of the first

chance to approach the net or hit a winning groundstroke should be foremost in the player's mind. The player must be eager to attack whenever the opportunity presents itself. In general, the player should increase his number of offensive shots and decrease his number of defensive shots.

One of the major attributes of successful fast court players is the flexibility to either shorten the swing or lengthen it depending on the speed of the oncoming ball.

Approaching the Net – The bread and butter for a serve and volleyer is to make the receiver run by hitting firm volleys to the open court when serving wide. After serves down the centre, hitting the volley to the weaker side or directing it behind the player are both good choices. Whichever volley is chosen, the server should follow the flight of the ball and cover the line (be on the same side of the court as the ball). On the second volley, dropping the ball short or hitting an angle volley to the open side of the court can be effective. While drop volleys will "die" on the grass, be careful in playing them on hard courts where balls tend to bounce higher, which can give opponents ample time to run drop shots down.

Exceptional volleyers like Edberg and Rafter used quite a bit of spin on the first serve. Their serves were primarily used to set up the volley as opposed to winning the points outright. If you are confident with your volleys, this tactic ensures a high percentage of first serves go in and allows the server to get closer to the net for the first volley. It also requires an outstanding level of athleticism.

Approach shots are usually hit with power, and certainly should be on fast courts. A penetrating slice backhand however, is also very effective. Consider the following on approach shots:

- Down the line approaches put you in a better position to cover the attempted passing shot.
- Execute well when approaching to the forehand. Most players are more consistently dangerous with their forehands.
- A genuine weakness should be attacked without mercy.
- A deep approach down the middle reduces the possible angles for



Kafelnikov, like other good fast court players, does not retreat much behind the baseline.

passing shots.

- Varying the depth with short angle approaches can work well on grass.

Against a Net player – The quickest way to pass a volleyer is down the line. If the volleyer starts anticipating and cutting off the down the line passes, the player should mix it up. One of the best ways to open up the options for both the down the line and the crosscourt pass is to lob quite a bit early in the match. If the volleyer is not crowding the net, driven or angled passing shots become easier to execute.

Two-shot passing shot combinations are also a good tactic. The first shot is generally a dipping crosscourt, often resulting in a weak volley that can be driven down the line. Additionally, there is a real possibility that the first volley will be missed.

When in doubt, ripping the ball straight at the volleyer will often produce an error.

Topspin lobs are an integral part of the modern game and are a deadly alternative to passing shots.

General Considerations for Fast Court Tennis

“All court” players without tremendous weapons can enjoy success on fast courts because the surface will make

more of their shots fairly effective. They can use their opponent’s power rather than generating their own, a skill that is needed on slower courts. Players that try to play too defensively struggle on fast courts, yet powerful, but erratic players can succeed. Playing the ball early and stealing time from your opponent works well.

It is more difficult to employ the tactic of hitting the ball high (out of a player’s strike zone) than on slow courts. However, keeping the ball low with slice (e.g. Graf backhand) can be very effective.

Focus and concentrate early in the games. Establish momentum. When serving, it is helpful to get ahead to avoid problems. When receiving, try to get into the points. You can be a little bit more aggressive when opportunities arise to break serve.

Attitude has a lot to do with playing well on grass. It is fast, the footing can be awkward, and there can be irregular bounces. Approach the conditions as a challenge and enjoy it.

Any combination of fast courts, altitude or light balls may cause a loss of control. Tighter string tensions than a player would normally use for slower conditions are worth experimentation.

Playing doubles is a very effective



Rafter is a master of the serve and volley game.

means of developing and maintaining the skills that are required to play well on fast courts.

Power, speed, athleticism and close matches are hallmarks of fast court tennis. Those that have the courage to hit out and go for it; taking the play to the opponent, rather than reacting to whatever might be offered, are often in the winner’s circle on Sunday afternoon!

The Most Important Aspects of Modern Technique and How to Develop Them

By Richard Schönborn (Former Head Coach of German Tennis Federation)

What is technique?

Technique can be characterised as a specific sequence of movements or part of movements used to solve movement-related tasks in sport situations. It should be considered in connection to movement, which, in turn, has particular application to modern technique training.

As a relevant requirement of technique, the above definition emphasises its situational task-solving character. This underlines that technique should never be taught as a goal in itself but as a means towards the attainment of a goal. Such an approach provides ample insight into subsequent, appropriate training methods. Indeed, it is only after acquiring the capacity to provide a flexible response, encompassing a variety of actions, that the adequate tactical versatility can be guaranteed.

Technique can be optimally developed if it is seen as part and parcel

of a whole system. This means, that primarily the system has to be developed!

Traditional technical analysis, referred to as sequence analysis, describes the movements of a model (a top player), which are presented as ideal and correct, and are established and learned accordingly (Figure 1). The primary disadvantages of this system are that it does not challenge the aims, purposes or goals of technique and that the optimal model cannot be applied to all players due to obvious anatomical and physiological differences.

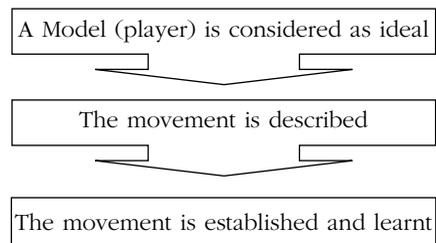


Figure 1.

Functional movement analysis (Figure 2), however, adopts a completely different approach. It involves the evaluation of the different parts of a movement through analysis procedures and theories derived from sport science, and then, the establishment of an optimal movement sequence based on these previous data. Finally, the technique of the world’s top players is analysed in relation to that which has been found. The tremendous advantage of this process is that it is objective, while allowing individual characteristics to be taken into account.

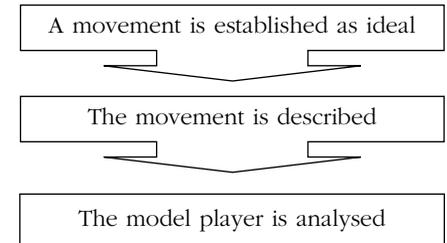


Figure 2.

The ideal stroke: Biomechanics and Biomechanical principles

The characteristics of an ideal stroke can be summarised as follows:

- **Simple:** The whole action contains no superfluous or conflicting movements.
- **Economical:** The movement should use the minimum necessary force. The whole kinematic chain should lead to optimal swing production and energy expenditure.
- **Effective:** The ball has to be successfully returned (accurately and at the desired velocity) to the other side of the net from any position and situation.

This search for the ideal stroke is related to the study of biomechanics and its principles. Biomechanics is the study of the structure and the function of the biological system, from which its main field of study relates to body movement. As part of this, biomechanical principles should, and do, provide for the evaluation of the appropriateness of this movement. On the one hand they are based on established "laws" that govern movement, while on the other, they help account for some favourable movement techniques, which are only applicable under certain conditions.

We can summarise this by saying that technique reaches a high standard when it not only complies with optimal biomechanics but also respects the individuality of the player and is, above all, successful.

Complexity of technique learning and training

The learning and training approaches to technique should, right from the beginning, be highly complex! This does not mean that technical training should be inordinately difficult but rather that it should, for example, include different critical elements such as coordination and condition, which will serve to help improve performance.

The complexity of movement actions can be defined by the following aspects:

- Stability and accuracy of technique.
- Variability of technique.
- Conditioning-energetic precondition.

Primary goals in technique development

When developing the technique of tennis players, there are several goals that should be set:

1. Perfect and consolidate the strokes.
2. Permanently integrate almost all of the conditioning-energetic preconditions.
3. Make available thousands of minimal, programme-altering possibilities.

4. Provide for variability of strokes.
5. Allow for application of extensive technique.
6. Develop flexible technique.
7. Provide for complexity of movement actions.

The development path

When learning and training the technical elements of tennis, players should follow a development path, which is depicted in Figure 3.

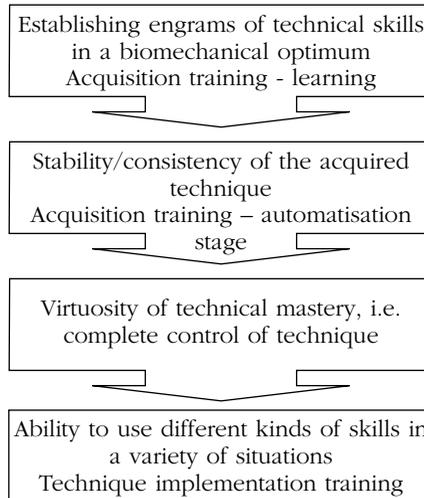


Figure 3.

General recommendations for technical training

Based on that which has been outlined thus far, we can put forward several recommendations on how to conduct modern, technical training sessions:

1. A warm-up before the session is a must.
2. After approximately 20-30 minutes of practice, the coach should include rest breaks of 3-5 minutes.
3. Before the session or following these session breaks, the coach should endeavour to train explosive power, coordination or speed for short periods (5-10 minutes).
4. Technical training should be first performed over a short distance with the coach positioned at the net and the player at the service line. The coach will feed from the basket and rally with the player (both use racquets).
5. In doing this, the coach should not stand in the centre of the court, but in one of the service boxes and relatively close to the net.
6. Similarly, the player should not be positioned in the centre of the service line, but in the diagonally opposite service box to the coach.
7. Initially the feeding should be moderate forcing the player to move a few steps to hit the ball.
8. The player should vary the direction

9. The player should not only be given a direction to hit, but also a target area, which should initially be quite large.
10. It should be ensured that, from the start, the player's whole body is used (slight rotation), in spite of any problems that this may cause. Optimal biomechanics should always be kept in mind.
11. The stroke movements should be short; their length should be adapted to the speed of the ball and the desired depth of the stroke.
12. The forehand and backhand should be practised equally.
13. All movements to and after the shot, the ready position and the hitting position on the court should all exactly correspond to the movements and positions to be later required during a match.
14. With time (according to progress), the feeding should become increasingly varied.
15. The coach should play balls back that are hit within his reach by the player.
16. Even in group lessons, apart from in exceptional circumstances, the player should hit a series of strokes (i.e. not just one shot).
17. Volleys and serves should be integrated as soon as possible.
18. With increasing success, the player should move further back down the court, until he is standing on the baseline.
19. With time, the so-called "one-ball rallies" should be avoided. Rallies between the coach and the player or between players should be increasingly encouraged.
20. The feeding and the task solutions provided by the player should become increasingly varied.

In accordance with these recommendations we can define a progressive method for learning modern tennis technique that has three ongoing principles:

1. The whole stroke should be taught as a unit (with exception of the service); initially with a reduced backswing and a lighter racquet; only with the increasing success of the pupil should these be lengthened or increased.
2. All groundstrokes should be taught at the same time.
3. The strokes should be performed in their complexity from the outset: incorporating movement and body rotation.

Conclusions

Modern technical training should

concentrate on two main aims:

1. Create new, direct relationships between conditioning and technical elements using real game situations.
2. Establish training forms which

resemble match situations, but which can be successfully solved during training. In other words: train all rally variations that are more often than not, unsuccessfully resolved during

matches.

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Communicating With Your Players

By Serena Bates (Great Britain)

You've had years of experience playing and coaching tennis, you know the rules inside out and can correct faults easily, but how good are you at communicating this knowledge to your players? You know what you want to say but do you know how to say it effectively? Below are some questions regularly asked by coaches.

Q.1. Why do players have trouble hearing me even though I think I'm speaking loudly?

A.1. Your words need to be directed at the person you are talking to. Not over their heads or at the ground. If you want to hit a ball down the line you wouldn't aim it crosscourt. You must also open your mouth. A lot of people seem to think the sound will come out of a closed mouth - try hitting a groundstroke without moving your arm - it's not possible. Words won't come out of your mouth if it's not open. If you think that you do open it widely, look in a mirror, you'll be surprised at the smallness of the opening! Tennis players and coaches don't hesitate to exercise the appropriate muscles in their body in order to improve their playing but very few people think about exercising the muscles, which help with speech. The tongue and lips need to be exercised daily. Ideally, voice exercises should be used, but making funny faces by stretching the lips and tongue will suffice. Bad articulation is nearly always caused by lazy muscles.

Q.2. Why do players seem to misinterpret what I am saying?

A.2. Words aren't the only way we communicate. Facial expression is very important. Children often find it difficult to work out from words alone whether we are serious, joking, angry, frustrated etc. They tend to miss the nuances in the voice that alter the meaning. For this reason it is important that people can see your face in order to see if you are smiling or looking angry. Look at your players when you speak to them and look at them when they are speaking to you.

Q.3. Why do players have coaches if they don't want to listen when I try to correct them?

A.3. When you correct players, try not to do it in front of other people. Make sure that the player has the time to listen to you. Don't be tempted to leave it to the end of the session when the player is getting ready to leave. Also make sure that *you* have the time to explain fully, allowing time for any questions. If you have to rush, misunderstandings occur. When introducing new ideas, only introduce one at a time, this will avoid confusion. Remember to find something positive to say - your job is to motivate players - make them feel like a failure and they may not come back. Also make sure that the player needs to be corrected - don't criticize them just because you're having a bad day!

Q.4. I sometimes get tongue tied when I'm speaking. How can it be avoided?

A.4. Don't speak too quickly, which is what happens when your brain is trying to make your mouth physically work faster than it is able to. Slow your thoughts down. Opening your mouth more widely will help to slow your speech down. Pause between each new sentence. This will give the people listening the time to take in what you have said; they may want to laugh at a joke or just have time to think. It gives you the time to take a breath and think about what you are going to say next. If

you have just won a point in tennis, you stop and get your breath back, acknowledge the cheers of the crowd and then compose yourself for the next point. The same technique applies to speech.

Q.5. Why do I have a sore throat at the end of the day?

A.5. This usually happens when we are speaking in large areas. A lot of people are frightened of speaking loudly. The larger the hall or space is, the more breath is needed to support your voice. The louder we speak the more emphasis we must put on the vowel sounds - we must open our mouths to let these musical vowel sounds out. If the space is large we will need more energy in our words just as if you were to hit a tennis ball from one baseline to the other. Make sure that you always finish the word, don't chop it off at the end. The more supple your lips and tongue are, the clearer your speech will be thus avoiding the need to shout. Correct breathing (as outlined below) will help.

Q.6. Why, when I have to talk to groups of people do I get out of breath and my mouth becomes dry?

A.6. In order to speak you need to be able to breathe. A long sentence uses more breath than a short one, just as a long rally uses more energy than a short one. Speaking requires intercostal



John Fitzgerald, Australian Davis Cup captain, talking with Rafter and Hewitt.

diaphragmatic breathing with the use of the abdominal press. When people are asked to speak, the first thing most do is to lift their shoulders. This is caused by panic. Avoid lifting your shoulders - your top five ribs don't move so you'll achieve nothing but tension in your neck and consequently in your throat. As you breathe in, your intercostal muscles, which are between the ribs, lift the ribs upwards and outwards allowing your lungs to fill with air. Your diaphragm will push downwards at the same time. As you use this air up, your diaphragm will return to its normal position, as will your ribcage. Breathing in through your nose will avoid the gasping sound some people make when nervous. To stop your mouth becoming dry, try smiling when you are speaking. This relaxes the muscles in the mouth and helps the creation of saliva.

Q.7. Some players seem to be asking the same questions time and again. Why?

A.7. Perhaps you are not listening to the question. It's very easy to think you know what people are going to say and then let your mind wander. In order to hit a ball you need to watch it coming towards you. If you want to respond intelligently to someone you must listen to what they say. Children are often too frightened to question their coach, so when they do ask a question, have the courtesy to listen! It may take them some time to get to the point but try not to interrupt them.

Q.8. I find speaking at formal occasions terrifying but I don't mind talking to groups of players why is this?

A.8. As a coach you spend a great deal of your time in comfortable clothing which is easy to move in. If you are talking to a group of businessmen and want to look smart, take care not to wear clothes that are too tight. Trousers, skirts, shirts and shoes which are slightly tighter than you are used to will restrict your breathing (and the thought of a button coming off will make you frightened to move!) Beware of too much jewellery - earrings, bracelets and necklaces can jangle every time you move.

Only use body movement if you really must. Obviously when you are on a tennis court movement is necessary! If addressing a more formal occasion try to keep still. A speaker who can't stay still is very distracting and the audience will start to watch you rather than listen to you.

If you are standing while you are talking don't lock your knees. Let your feet take your weight. If the knees are locked, the tension in your muscles will inhibit your breathing. Avoid 'ums' and 'ers'. People will start to listen for them rather than listening to what you are saying. If you find it difficult to stop saying it, try thinking 'um' instead!

Q.9. Why is it important for me to get on with the parents?

A.9. If you are to build a successful relationship with your player, you are going to have to get the parents to trust you. To do this, you must talk and listen to them. Remember what the parents say and what they are expecting from you. If you disagree with their aims, speak to them. If you ignore their views and give the impression that you or your tennis academy are more important than the

child, you will not be popular for long. If the parents ask questions, keep your answers short and simple but do not use one-word answers such as 'yes' or 'no', which give the impression that you haven't got the time to bother with them. Make sure you listen to the parents (and the child) if they come to you with a problem. If it is upsetting the family it will affect their performance. You may not be able to help, but you should be able to put them in touch with someone who can.

Q.10. How can using my voice help me to motivate players?

A.10. Always encourage players. Sound excited, even on bad days. Never let players (especially young inexperienced players) go home feeling like a loser. Your aim is to make them feel like a winner. The difference between winners and losers is often just a matter of confidence. If you are misunderstood as a coach, it is ultimately your fault. There are bad teachers but very few bad pupils! Be clear in your own mind what it is you are trying to say.

Practice out loud. Too many people think they can improve their speaking skills by reading about it. You wouldn't recommend to a child that they try to improve their serve simply by reading about it. The only way to gain confidence in speaking is to speak! Don't be afraid of the sound of your own voice and don't try to sound like any one else. Enjoy speaking. Forget about luck, you know what you are talking about, now enjoy it and let your enthusiasm show through.

Developing Early Perception and Getting Ready for Action on the Return of Serve

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Introduction

High-level tennis forces players to deal with very high time and space constraints. On the return of serve for example, when the serve is hit at 200 kph, the time available for action is approximately 500 ms. During that time, the returner has to get organised to defend a space approximately 8 metres wide and play a stroke whose execution frequently spans less than 10 ms (Regan, 1997).

In this situation, it is clear that the

player's reaction time must be reduced to a minimum and that the dynamism of the response must be maximal (i.e. movement time reduced). On the behavioural level, tennis players learn to put into practice a very specific pattern that consists of performing a split-step just before the opponent impacts the ball in order to land the instant after impact (Figure 1). The main advantage of this 'split step/landing' sequence is that movement to the ball is facilitated through the pre-stretch applied to the

extensors of the lower body.

This pattern deserves the undivided attention of players and coaches alike as we can presume that these instants largely determine the outcome of the next shot. A few milliseconds gained during this phase can make the difference between an ace and a winning return. On the other hand, players, in getting ready to hit the ball, can use a variety of strategies to unsettle an opponent's response. Changing the rhythm in the middle of the rally, taking

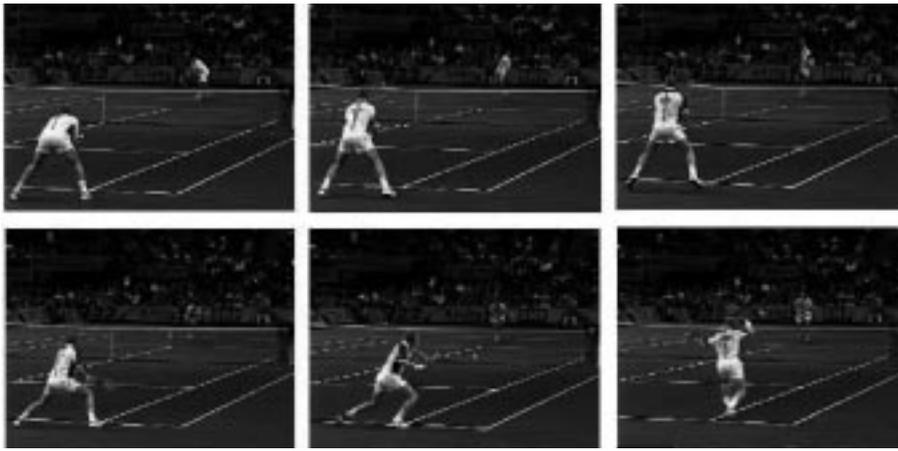


Figure 1. Illustration of the 'split-step/landing' sequence. The player initiates the 'unweighting' prior to the opponent's impact (Photo 2). The opponent has struck the ball and the returner is in suspension (Photo 3). Upon landing, the returner initiates his movement to the ball (Photo 4). The player is getting ready to hit his return (Photo 5). (The photos are derived from the videotape 'The return of serve' produced by the French Tennis Federation (1996).

the ball early or conversely hitting the ball late are ways to force an opponent out of his comfort zone and often represent the best opportunities to wrong foot an opponent.

Methodology and Results

In order to better understand the relationship between both players' actions during the moments that precede and then the moments that follow impact, two studies were conducted. Simply put, the research endeavoured to find answers to some particularly important questions: Do high-level players save time during this phase? Does the taking into account of information on the opponent's preparatory behaviour really allow players to better anticipate (i.e. react sooner to) an opponent's stroke? Is it possible to disturb the 'split-step/ landing' sequence of the opponent by modifying the rhythm of the serve (i.e. slower or faster backswing, higher or lower ball toss, etc.)?

To answer these different questions, an analysis system was developed that recorded:

- the instant of the impact through a microphone located next to the server
- the temporal sequencing (timing) of the different foot positions of the returner in relation to the impact through 'foot switches' placed in the returner's shoes (Figure 2).

A first study, involving two groups of nine, national and regional level players, was realised in a service return situation where serves were hit at an average of 130 kph. Results showed a better synchronization of the 'split-step/landing' sequence in national level players than in regional level players. On the other hand, the study showed no significant differences in terms of

unweighting and landing between national and regional level players. On average, the unweighting phase started 40 ms prior to impact and the landing, which corresponds to the beginning of the return action, occurred 160 ms after impact. This would seem to suggest that information is taken from the opponent to anticipate the direction in which to move.

In the second study, the constraints were increased with services hit at an average of 170 kph and a professional player was tested to determine whether or not certain adaptations were specific to the elite level. A comparison was therefore realised between an elite-level player (world number 12 at the time of the study) and a national as well as a regional level player. The study also intended to establish whether or not elite players were able to adjust when the rhythm of the serve was modified. Players were faced with a server who could use ball tosses of two different heights. The difference between the high and the low ball tosses, which were monitored by video, was approximately 1.50 metres and the time lapse between the toss and the impact increased by 300 ms when players used the higher toss.

An analysis on the first trials showed that the three players were late in the timing of their 'split-step/landing' sequence and needed a few attempts to 'get in sync' with the server. However, the study found that the professional player adjusted faster with only two trials required while the other two players needed three and six respectively. Each player then managed to stabilise the 'split-step/landing' pattern, but once again the professional player demonstrated more consistency in its

timing. With regard to the timing of the unweighting, it was observed to be performed earlier by the national level player than by the professional player (on average -28 ms vs. -5 ms in relation to the impact). Does this then mean that he was anticipating more effectively or that he was able to ready himself earlier? Interestingly, the results show that this was not the case. Rather, the timing of the professional player's landing, which really corresponds to the start of the movement to the ball, was earlier than the national level player (on average 130 ms vs. 160 ms after impact), suggesting that the professional player anticipated shot direction earlier and was able to ready himself quicker.

As far as variation in toss height and therefore serve rhythm was concerned, the study found that the weaker player (regional player) was very much affected by this variation when returning. This player's unweighting was taking place long after the impact on low ball tosses (+25 ms) and before the impact on the higher tosses (-50 ms). This discrepancy could also be observed on the landing which was taking place 190 ms and 142 ms after impact on low and high ball tosses respectively. The higher level players on the other hand, were not particularly affected by these variations, which in turn implies that they were able to time the 'split-step/landing' sequence independent of ball toss height. However, that the serves were systematically varied by the server, resulting in the returners being acutely attentive to the timing of each serve, may have facilitated these players in adapting to this variation in the serve. Less frequent variations might have contributed to unsettle them on certain service returns.

Discussion

The first thing that should be remembered from these two studies is that the best players (especially the



Figure 2. Arnaud Clément is equipped with the device recording his various foot positions.

professional player) were more advanced (in time) and consistent in the execution of the 'split-step/landing' sequence. These findings seem to indicate that returners use 'pre-information' gleaned from the preparatory behaviour of the opponent or at least early information after impact (e.g. Abernethy et al., 2001). The second important point is the adaptability that the best players demonstrate when dealing with ball tosses of different heights. This observation indicates that expertise in tennis is partly related to the ability to adapt to the opponent's timing of shot execution and that, in turn, this ability allows player's to react to the stimuli as quickly as possible.

The results of these two studies raise a number of interesting questions with regard to motor learning. For example, how can coaches help players optimise their 'split-step/landing' sequence in training? To what extent is it possible to facilitate the learning of this sequence?

Why do some very young players discover the significance of this sequence instinctively while others need years of practice? Definitive answers to these questions are still some way off but the researchers at this stage believe, that the ability to react and be ready early can only be developed through practice. That is, only through the early introduction of duel situations with specific constraints (large zones to defend in limited periods of time) can coaches facilitate this type of learning. These situations must not be limited to the tennis court, but should be introduced into all ball sports and children's games where there exists the notion of an opposition.

With respect to high-level tennis, a large-scale study based on a systematic analysis of the 'split-step/landing' sequence in professional players should be conducted to extensively examine reaction and response times. Practical applications would include the possible

perceptive learnings that would result in the deciphering of the opponent's game and the temporal sequencing of his stroke production. While a few professional tennis players are able to deconstruct their opponents' games in this way, further study may unveil information that can be applied across tennis players. This information would potentially allow players to better anticipate or at least react quicker and more dynamically to their opponent's strokes.

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Mid Court Game

By Iván Molina (ITF Touring Teams Coach)

Modern tennis demands that a player have a complete and attacking game both from the baseline and from the mid court forward. The player that, by using aggressive groundstrokes or a serve and volley game, places his opponent in trouble yet is unable to finish the point with either his first or second volley, will lose the initiative in the point. In this situation he loses a point that he should have won. The performance of the player suffers, he becomes less effective and loses self-confidence during the match and makes fewer offensive decisions.

When we speak of volleys we can misunderstand their meaning in tactical terms. Many players practice volleys by volleying very close to the net for a set amount of time everyday. However, after having "practiced" and devoted considerable time to this exercise, the player approaches the net only twice during the match - missing the volley both times or playing them from a different position to that which he "practiced". The volleys often lack power and placement and, in return, the opponent can angle or drive a difficult pass.

In this article we are going to analyse the different tactical situations that need to be considered when working on the approach shot of a player. We will also

put forward several practical aspects applicable to our work and highlight several concepts that can add precision to our coaching methods.

Tactical Situations

1 High or waist-high bouncing balls

at the mid court: These balls are very common and should be able to be played as a winner to every part of the court. If the player cannot do this, he has to position himself inside the service line and try to play a winning volley with his next shot to finish the point.

2 Low bouncing, sliced or slightly angled balls at the mid court:

The player should play an approach shot, preferably deep, with topspin or slice. He has to keep moving forward diagonally to volley inside the service line in an effort to cut off the angle. More often than not he will receive a short crosscourt angle or a powerful drive, down the line, in return. The approaching player should subsequently move and react properly to place his shot well.

3 Serve and volley: After the serve, the player typically plays a low volley from close to the service line. Volleying from this position has been imposed on him by his opponent's return. The resultant volley should be

played from low to high with depth, power and placement. By doing this, the player can move in and play a second volley closer to the net and therefore have a considerably greater chance of finishing the point. This tactical pattern is underused by many players and yet it remains a very effective ploy on both slow and fast courts as well as on important points. To employ the serve and volley tactic to the greatest effect the player needs to have a sound technique along with good co-ordination, agility, leg and hand speed, balance, and perception and anticipation skills.

4 Half volley: To become more effective in playing this shot, players should practice it extensively. Due to the power and the effect of modern groundstrokes (including passing shots) the player who approaches the net is having to play the half volley more and more often: especially when serving and volleying, or after following a good groundstroke in, to finish off the point.

Generally this shot is played when the attacking player is approaching the net and "is caught" close to the service line, a little bit behind or in front of it. The half volley's effectiveness in allowing the player to continue to move forward and play an

offensive volley with his next shot depends on its speed, depth and placement.

5 Smash: When we speak of an attacking game we should not forget the **smash**. When the attacking player volleys well and forces his opponent out of position the lob is often used, and as a result, the smash becomes a very important shot in the attacking player's repertoire. Irrespective of where it is played, the smash should more often than not be a winning shot. We should not fail to mention the backhand smash, which although a more difficult shot, can be equally effective with a little more use of the wrist.

The aforementioned points 3 and 4 provide us the best insight into the calibre of a good mid court player. This gives us a better idea of the different tactical and technical situations that we should practice to best assist our players.

Worth noting is that thus far I have focused on the volleys that should be played from low balls or difficult situations, but it would be remiss of me

not to emphasise that volleys are also played at waist height and above. Although in practice it is these types of volleys that are easy to execute, players must be concentrating intensely to ensure that they are played as winners during matches as well. Among these volleys we can include the "drive volley" which has become increasingly popular and is now used by almost all players.

Practice

Drill 1: The player is positioned in the mid court, between the net and the service line, and starts playing a series of volleys with a partner or the coach who is on the baseline. The player repeats one volley after the other towards the centre of the court irrespective of the speed, depth and different angles of his partner's shot. His movements are predominantly lateral and on many occasions he will play a block volley.

Drill 2: Initially, players will play the first few volleys from the service line T. The coach will be on one side of the baseline and play to either side of the player who has to volley and keep

moving in. The rally can continue but the player should try to put away the second volley, directing it to a target placed at an angle or close to the baseline on the side that the coach is not. It is important that the player moves in towards the ball diagonally. Follow the same routine for the other side.

Drill 3: With respect to the half volleys, firstly, I do not think that we practice them enough and secondly, if and when we do so, the drills are very "soft". The following drill is a good one: one player is placed two steps behind the T. The coach is on the baseline and feeds a ball to either side of the player who has to play a half volley towards a target and then move in to play a winning volley as offensively as possible. Targets should be deep, especially for the half volleys.

Technical tips to take into account

Volleys played close to the "T" should generally be played with a longer backswing than those played closer to the net. The turn should be completed with the shoulders and not with the arm. The elbow should be close to the body and the trunk should be slightly inclined forwards.

In order to have more powerful and deep volleys when volleying from the same position or when hitting a low volley closer to the net, it is recommended that the tip of the racquet frame finish in front, as if the player were extending his arm.

On the other hand, when the player is very close to the net and the ball comes very quickly, a simple block can be more than enough to finish the point.

Conclusion

In summary, the most important points that should be gleaned from this article are:

- A good player should have an offensive game both from the baseline and the net.
- The volley should be played more offensively.
- Tactically, winning volleys are played from the first or second volley, seldom are they hit as a third volley.
- In order to have a good net game a sound technique is needed along with good balance, mobility, perception and anticipation.
- The backswing movement of the volley is a short turn of the shoulders that can vary according to the position of the player in the court.
- At the net the player should move diagonally to cut the angles.
- A good technical tip for the volley is to finish the follow through with the tip of the racquet frame in front.



Todd Martin is a specialist in playing from the mid court.



Mini-Tennis



Appropriate Competition for Mini Tennis

By Mark Tennant (Full time tutor LTA Coaching Department, Great Britain)

The LTA national Mini Tennis programme launched during 2001 has focused the minds of those coaching young children. There is now a greater awareness of the need to understand what young children like to do, the way they need to do it, how often and why.

Competition is a key part of a comprehensive Mini Tennis programme. However, we tend to associate competition amongst players aged eight and under with anxiety, tears and general unhappiness! The majority of disciplinary problems in Ratings tournaments occur in Under 10's events. It therefore becomes clear that the competition we offer is often not suited to the physical, technical and emotional abilities of young children. In order for children and parents to see competition as a positive opportunity rather than as a threat and something that is not often enjoyed, the demands placed on children must be appropriate to age, maturity and standard. This way more children are likely to benefit from and enjoy competition.

Challenge or competition?

The physical development of the child is a key area of emphasis in Mini Tennis. As the need for physical

activity is on-going and as children may not be able to rally or serve (in the first level of Mini Tennis), their needs from competition are different from those who can play matches. It is very difficult, for example, to explain to a young child that they played very well, but that they lost because their opponent was a better player. Furthermore some children do not know whether they have won or lost, and some do not care about the result! Competition should therefore evolve in line with the development of the child.

The continuum from challenge to competition

This continuum is designed to allow young children to adapt to competition as their game, maturity and ability develop.

Stage 1: Challenge - for total beginners, usually excluded from competition due to their inability to rally.

Requirements: ability of child to perform basic tasks (throwing a beanbag for distance), measure performance (measure by pigeon steps), record basic results.

Desired outcome: for the child to want to practice in

Challenge		Competition		
1	2	3	4	5
Child very new to tennis and cannot rally; priority is general physical development.	Child beginning to hit balls with a racquet, but unable to build a rally.	Child beginning to build basic rallies, possibly using an overarm serve.	Child beginning to rally with some consistency: developing overarm serve and groundstrokes.	Child rallying consistently, using serve, groundstrokes and volleys.
Challenges: How far can I jump/throw? How many cones can I skip?	Challenges: As previous but adding some racket and ball challenges.	Challenges, but starting to introduce basic rallies; learning to call the ball out; learning to score; team events.	Match play: learning tiebreak and rules; team events, learning to umpire matches.	1v1, 2v2, and team events, umpiring matches.



order to improve; to develop the understanding that improvement is the result of practice, which is the responsibility of the player rather than the coach.

Stage 2: Advanced challenge - for children who are familiar with the concept of a challenge, who can hit a ball with a racquet, but who lack the consistency to rally.

Requirements: ability of the child to perform a more advanced task (i.e. hitting a number of consecutive underarm serves into a service box), to count how many balls went in, to record results.

Desired outcome: for the child to want to practice to get better scores next week; to develop the understanding that improvement is the result of practice.

Stage 3: Learning the rules - similar but slightly more advanced than Stage 2. Once children are able to rally with some consistency, they will need to learn when to call the ball out, and when to continue the rally because the ball is in. This then leads to learning how to score a simple game.

Requirements: learning in and out; how to score; which side to serve from.

Desired outcome: understanding of basic rules; enjoyment of match play.

Stage 4: Early match play – development of basic rallies, using groundstrokes. Points started with a basic overarm serve.

Requirements: simple scoring, progressing to tiebreaks.

Desired outcome: understanding of basic rules; confidence to start umpiring own matches; enjoyment of match play.

Stage 5: Match play – consistent rallying, using overarm serves and groundstrokes. After this stage, children may be ready to progress to the second (orange) level of Mini Tennis.

Requirements: scoring using tiebreaks, ability to apply basic tactics.

Desired outcome: understanding of rules; confidence to start umpiring own matches; enjoyment of match play using individual and team formats.

Competition as part of a Mini Tennis programme

A sizeable competitive element to a Mini Tennis programme is very important as a means of allowing young children the opportunity to develop their game, to learn how to compete and to play matches. Events at this level should be:

- Varied -
 - formal tournaments which may be played as part of inter-club league, town, district or county league, should be played using a tie-break format. Players should be given the opportunity to play singles and doubles events.
 - quick, informal and fun events, at the end of a lesson or during a fun day and could be for either individuals or teams.
- Enjoyable -
 - young children should not be scared and threatened by the prospect of competition.
 - de-emphasising winning and losing, but emphasising progress and effort.
 - using different scoring systems and formats.
- Regular -
 - competition causes players to think tactically, and to develop technically and mentally.
 - regular competition should be offered to all ability levels.
- Local -
 - All clubs should offer some competition at the first (red), (second) orange and third (green) levels of Mini Tennis. At the red level, this should take the form of challenges and competition.
 - It is unfair and impractical to expect children and their parents to travel long distances for competition at this level.
- Short -
 - Events should recognise the concentration span and physical capacity of young children by making events at the red level a maximum of two hours.

We make real efforts to tailor our coaching to the needs of young children. We should do the same with competition.

Note: The author refers interested readers on to the LTA Mini Tennis Handbook for further information and ideas on Mini Tennis competition.

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Player Development Philosophy

By Peter D. McCraw (High Performance Development Coach, IMG-Bollettieri Tennis Academy)

As a coach, how often have you been asked to outline your teaching philosophy on stroke production or teaching strategy and tactics? How about your long-term plan for developing an athlete's real potential? At the National level, the same questions can be asked of the Federations with regard to their 'Player Development Philosophies'.

Make no mistake – these are not easy questions to answer, nor should they be. Coming to terms with what you really believe is the best course of action to develop a player's full potential is a complex task. A task that requires science, knowledge, experience and a tremendous amount of trial and error. However, the reward of developing a clear philosophy has lasting effects long after your player's tennis careers have passed.

In this article I have outlined how we have tried to answer these questions at the Academy and show how our philosophy helps us implement a world-class training programme.

Why is an Overall Philosophy Important?

Picture this... You are the program director for a facility with over 60 courts, you have 200 players from 20 different cultures training full-time ranging in age from 8 to 18 years. Your coaching teams consist of over 25 pros from 12 countries, all working with varying degrees of knowledge, experience and personal coaching styles. How would you implement a world-class training programme at this facility and develop professional players?

How do you control the quality of instruction on all of your courts? How can you ensure your elite group is not over-trained and the intermediates under-trained? How do you ensure that a player in the top group is taught the same thing on the forehand as a player in another? How do you create an environment where any of the coaching team can take another group and continue the development process?

The answer is philosophy. Taking the time to clearly define what your training philosophy is and how to implement it, gives you the ability to monitor and refine your approach to questions like these. Sharing philosophies among fellow coaches and looking for ways to continually improve is a journey worth taking.

What are the stages and the elements

in the development process? How do you take players at all ability levels through them? For any coach, these questions are of paramount importance. Your answers should form the foundation from which all decisions, beliefs and principals emanate. Your philosophy should permeate every aspect of teaching, coaching and athletic development. Unless a working coach has answered these questions, he himself will be unaware of how and why his methods are impacting his students.

At IMG Academies we have four distinct philosophies that lay the foundation for each other.

Bollettieri Philosophies

1. Long-Term Athlete Development Philosophy
2. Coaching & Training Philosophy
3. Teaching Philosophy
4. Coaches Personal Style

Why so many?

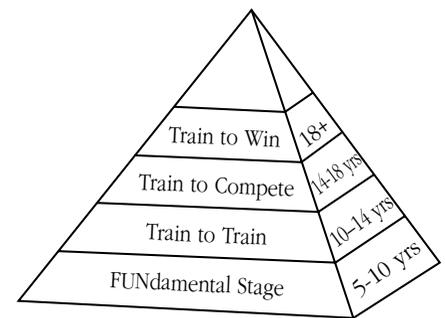
Training and educating children goes far beyond how many forehands and backhands they hit each day. It must encompass every aspect of their lives and provide each student with the opportunity to learn new skills and apply each lesson in their lives long after they leave your care. In short you need to be an educator first, coach second, and teacher third.

Level 1 - Long-Term Athlete Development Philosophy

Our long-term philosophy encompasses a ten-year window. Research indicates that developing elite athletes is a ten year, or ten-thousand hour process. For the athletes, coaches and parents this translates to slightly more than three hours of deliberate daily practice for ten years.

This time span requires us to have a plan for each stage of development, a plan that can cope with early growth spurts or late maturation socially in a player. As each stage of development builds upon the other, careful monitoring ensures our players don't become over-coached and under-developed. A situation where a player reaches the 16 or 18/s age division without a clearly defined style of play and significant technical, tactical, mental or physical limitations. At this stage it is difficult to make up for lost time and rectify the existing skill limitations.

The Four Stage Model of Long-Term Athlete Development:



We use a broad developmental template, which identifies four stages within a ten-year window. This provides me with a tangible reference point from which I can measure my player's development. All in all, the template provides me with a road map of my player's long-term development.

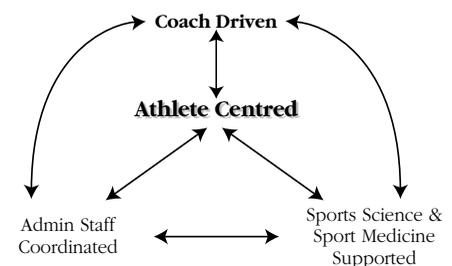
Level 2 - Coaching & Training Philosophy

Our training methodology identifies and integrates the physical, technical, tactical, psychological, nutritional and environmental aspects of athletic training and performance. It also incorporates the principles of growth and development.

It is athlete centered and coach driven, ensuring that athletic training is both tennis-specific and tailored to each student's needs. It is supported and assisted by sport science, sport medicine expertise and administrative staff.

Athlete centered means that each student undergoes regular evaluation of all aspects of their performance, training and development. We work hard to maintain a clear focus on the optimal short and long-term preparation needs of each student.

We conduct physical evaluations and testing each semester to monitor endurance, strength, power, speed and flexibility. Students with muscular imbalances are prescribed remedial programmes and monitored regularly.



Skeletal alignment of the ankle, knee, hip, vertebrae and shoulders are monitored through the critical times of growth and development, with special attention being paid to injury prevention conditioning of the shoulder complex. Where necessary, we also perform blood and sport vision testing for those students that demonstrate a need for these services.

All technical, tactical and ancillary capacities are developed and complemented with tennis-specific physical and mental preparation. These factors are fully integrated and sequenced by the periodized annual training and performance plans we develop for each group. All in all, we place the single biggest emphasis on the process (training and performing to one's actual best capacity) rather than the outcome (winning). After all, life goes on well after they play their last professional or college match.

Level 3 - Bollettieri Teaching Philosophy

We have found there is no better way to instil confidence in a student and credibility among the staff than by adopting a uniform system for drilling, stroke production and the tactics that we teach. Given the structure of the programme and size of the facility, it becomes impossible for Nick to oversee the daily development of each student.

Our solution lies in the development of a common coaching and teaching language – designed to ensure that every student receives the same fundamental instruction. This creates a process some call synergy - I call it three-way confidence. Confidence from the coach by believing in the knowledge they have, confidence from the student in the instruction they are receiving and confidence in the system by knowing that the collective effort of each days programme has impacted the lives and



Figure 1



Figure 2



Figure 3

games of as many students as possible.

As an example of our teaching philosophy, we instruct all our students to achieve the lock-in position on the forehand. Andre Agassi demonstrates this position in the three photos above.

Figure 1 - If the ball is within the contact zone of a player with a semi-western forehand grip, the angle of the arm and racquet will be 90-90-90. The butt-cap of the racquet will point at the ball – thus creating a position of butt-end leverage, or the lock-in position.

Figures 2 & 3 - For balls outside of the contact zone on the forehand, the lock-in position will have the angle between the wrist and racquet at 90 (right angle). The butt-cap of the racquet will point at the ball just prior to contact, however, the angles of the arm will vary according to the height of the ball and size of the player.

Level 4 - Personal Coaching Style

The final level in our philosophy pyramid is represented by each coach's personal style. Given the diverse range of age, skill level and cultures our students represent, it is each coach's personal style that brings the whole system together. When it's all said and done, the process of athlete development is based on building a

relationship with each student. Knowledge is one thing, conveying the message is another. Giving each coach the freedom to develop their own style is paramount to building a relationship of trust, respect and belief in both the student and coach. Without it, the development process is reduced to theoretical principles and unrealistic objectives.

In an attempt to cultivate coach's style, we encourage them to formulate their own answers to questions such as:

1. What's your philosophy on life?
2. What's your philosophy on coaching?
3. What's your philosophy on sport and on tennis?
4. Why do you coach and what are your goals as a coach?

Again, the answers to these questions do not come easily. However, the process is not only rewarding personally, but the pay-off also results in long lasting benefits to the programme and each student they work with.

Ultimately time spent clarifying your long-term development philosophy, along with your coaching and teaching philosophy will go a long way towards producing elite and professional players. In addition, it will provide each student with the necessary life skills to pursue their dreams and goals long after they leave the sporting arena.

Variable Availability

By Helmut Hauer, Ph.D. (Technical Director of Austrian Tennis Federation)

One of the most important questions in tennis training is how to achieve optimum technique in a short time. Optimum technique has the highest functional and tactical quality, caters for an individual's movement idiosyncracies and is efficient so as to not be potentially injurious. While it is the responsibility of the coach to teach technique that reflects these criteria, ultimately it will be the physical and sensorimotor abilities of the individual player that will determine the technique to be fostered. For, when the

technique and the player do not match, the result may still be one of good stroke quality, but certainly not the best!

What is the optimum way of hitting the ball with a certain technique?

This cannot be established without the decisive contribution of the player in developing his very special, individual technique. Based on this conviction, we have to develop technique through processes that are supported by science, yet sufficiently flexible to provide for individual style.

In the following paragraphs I want to explain briefly some methodical principles that should help players find their optimum stroke techniques. The key to achieving this is "variable availability".

What does "Variable Availability" mean?

Variable availability is one of the stroke functions that are decisive for the quality of a stroke. We all know the parameters of stroke quality: consistency, depth,

accuracy of placement, and the speed and spin of the ball but what is not so well known is the fact that two functions are crucial for its provision: the **situational application** of the stroke technique (i.e. the application of a special technique only in appropriate situations) and its **variable availability**.

Examples: When a player hits a topspin drive with a flat trajectory from a position well behind the baseline, that technique is not the right one for that situation. That is, his situational application of technique is poor and a better choice would have been to play a high topspin with a rising trajectory. Similar situations occur when players return poor, high bouncing second serves with high topspin shots with rising trajectories, or when players try to hit short-angled cross-court shots as fast drives or slices! Readers however, should be relatively familiar with this concept and as a result variable availability shall now be dealt with in a greater detail.

Top players differ from less successful ones by the fact that the latter do not have their techniques variably available. They cannot adjust their techniques to various conditions and situations. It follows that one, cannot therefore, honestly speak of a really good forehand topspin unless that player is able to hit it under stress (i.e. movement, tactical, ...) and from various positions in all desired directions with optimum speed and spin. Obviously such technique is not easily achieved and requires voluminous training of high intensity and quality.

The Training of the Variable Availability of Stroke Techniques

We have to be clear about the fact that different tasks necessitate at least slight changes in the intended technique. Does this mean that for every possible movement, even if they differ only slightly from a similar one, we have to store a separate space-time programme to be able to produce it most effectively? In dealing with this question, I feel it pertinent to first outline some principles, which in my view, are important for every coach aspiring to succeed.

Principle 1

All executed strokes are different due to variation in factors such as the technical and tactical situation, the opponent's ball, the player himself, the performance-related stress and the external conditions. This necessitates that the standard/basic programme of the intended technique needs to be changed a little or a lot depending on the "normality" of the situation (i.e. how closely it resembles that in which the

standard programme could be used). However, in spite of these adjustments, we can still define the stroke as a certain technique as long as the technical checkpoints (end of backswing, beginning of the direct hitting movement, point of impact, and end of the follow through) are apparent.

Principle 2

Our brains cannot store differentiated programmes for all possible situations. During the sensorimotor learning process, the player stores a motor pattern for each technique, the "basic space-time programme". This programme defines what the technique looks like and in what way it operates (fast, slow, accelerated). It is adapted slightly or significantly according to situational demands and a player's characteristics (physical, mental, ...). Irrespective of the magnitude of the deviation from the basic programme, the characteristic checkpoints of the specific technique should be clearly present; otherwise the player has used a wrong or different technique.

In the photos below we see a forehand topspin-drive at an all-important checkpoint, the beginning of the direct hitting movement. Although we notice variation in body as well as racket head position, the technique is clearly definable as a "topspin drive".

Principle 3

The human body has considerable ability to adapt, which helps players adjust their basic space-time programmes to special situational demands. I refer to this ability as "adaptation potential". The coach's task is to teach the player the basic programme and then introduce him to situations that demand he access his adaptation potential to arrive at his own solutions and best develop the variable availability of his techniques. Throughout this process, the coach assists by providing feedback and only intervenes to correct sub-optimal movement when the player does not arrive at the right solution himself.

Principle 4

The player achieves the necessary



The beginning of the direct hitting movement in a topspin forehand.

adaptations to the basic time-space programme through trial and error. The number of trials varies, and largely depends on the difficulty of the task and the adaptation potential (talent) of the player. This means that the coach should only confront his players with technical tasks that can be solved through the adaptation of pre-existing time-space programmes. This, in turn, brings about an increase in the quality of these programmes. The more a player practices, the more automated he will become at adapting to more difficult technical challenges/tasks.

Example: In executing a topspin shot, the player knows and has stored in his basic programme the need to bend his knees. To what extent he has to bend them is principally determined by the trajectory of the opponent's ball, which in turn dictates the height of racquet-ball impact. The subsequent fine-tuning of the basic programme to these specific situational demands is achieved by the "inner biomechanist", that invisible, ingenious engineer in our brain. The better "he" works the more competently he will develop the variable availability of the various techniques and body movements.

Principle 5

Appropriate task selection is important to provide for improvements in the variable availability of a player's techniques and thus his entire technical skill level. The individual adaptation of basic time-space programmes to perform increasingly difficult tasks is the goal of technical training and as a result the coach's prescription of appropriately difficult drills is extremely important. That is, tasks that are too difficult may lead to a breakdown of the basic programmes, while tasks that are too easy will not stimulate the player's adaptation potential and, therefore, hinder technical progress.

Principle 6

The coach has to know how to vary drills to provoke adaptation of basic programmes. In encouraging his player to execute strokes with depth, placement

and varying degrees of speed and spin, the coach can alter his feeding such that the player has to run faster and farther, has to start earlier or later with his hitting movement, has to impact the ball higher or lower, and so on.

Principle 7

More often than not "adaptation potential" has to be extensively challenged for a very high level of variable availability to be acquired. We call this "**training at the limit**", whereby players have to go to the limit of the pre-existing technical/time-space programmes to maximise their improvement.

Conclusion

When we talk about technical training and variable availability we have to be aware of the fact that without storing basic technique (time-space programmes) the player would never know what to vary!

Nowadays many coaches are very enthusiastic about teaching tennis devoid of straightjacket type instruction. I too,

am believer in making tennis fun, but I am similarly convinced that it is possible to combine learning with fun and advice with freedom. For this to be achieved when endeavouring to improve technique I recommend the following:

First step: Provide pupils with an example how a certain technique looks by demonstrating the desired stroke. Then let them try to do it in a similar way. If they find useful or good solutions by themselves, start immediately with step three.

Second step: If, after some time (i.e. \leq a few hours) the coach and the player realise that the potential for discovery is limited, the coach should show the player how to develop the basic programme. Using a tightly structured method, it takes one - three hours to teach the basic programme of a certain technique (i.e. volley or serve).

Third step: When the players have acquired a *rough* basic programme, coaches should start feeding the ball in various ways in order to develop variable availability and individual style. Remember that even if a player's

individual style is not your favourite one, evaluate it objectively and recognise that if all stroke qualities are used effectively, the individual style cannot be that bad!

Arrange lesson content in interesting, challenging and entertaining ways (i.e. play little games, one against one, against teams or against the coach). Even if this method does not immediately work perfectly, coaches should persist with it, and little by little, players are likely to begin to adapt their basic programmes to the given tasks. Only when a player shows that he has lost his basic programmes, should coaches regress to step 2 and repeat it.

I can assure everybody that the above method works well. It has proved successful in Austria, both in the commercial, and in the competitive field. After all, this method is nothing new. The eternal pedagogical controversy between "leading" and "letting grow" was satisfactorily resolved long ago through the adoption of the compromise, "leading **and** letting grow."

Recommended Books and Videos

Books

Tennis Training. By Alex Ferrauti, Peter Maier and Karl Weber. Year: 2002. Pages: 291. Language: German. Level: Advanced. This book provides comprehensive, state of the art theoretical and practical information for tennis training. Contents include: Technical training, Tactical training, Psychological training, Fitness Training, Periodization and planning the tennis training, etc. For more information contact: verlag@meyer-meyer-sports.com.

Competitive Tennis for Young Players. By Manfred Grosser and Richard Schonborn. Year: 2002. Pages: 141. Language: English. Level: All levels. This book details an approach for developing the talented young tennis player into an adult champion. Contents comprise of: Premature failure: drop out and burn out, Biological performance ability and load capacity during childhood and adolescence, Long term performance development in tennis, Problems with talented players, and Reality and ideal

paths in tennis. For more information contact: verlag@meyer-meyer-sports.com.

Sports Medicine Applied to Tennis (Medicina Deportiva Aplicada al Tenis) By Dr. Javier Maquirriain. Year: 2002. Language: Spanish. Level: Advanced. This is the first book written in Spanish entirely dedicated to tennis medicine. Chapters include: Biomechanics of tennis strokes, Characteristics and rehabilitation of shoulder, elbow, Achilles tendon, lower body and knee injuries, Clinical, nutritional, pharmacological and psychological issues related to the tennis player, and Scientific principles in tennis training. For more information contact: jmaquirriain@yahoo.com.

Videos

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1. The speakers at the Tennis Europe Coaches Symposium in Algarve, Portugal.
2. Attendees watching an on-court presentation during the 11th ITF/OS Asian Coaches Workshop in Beijing, China.
3. ITF expert, Doug MacCurdy, in action in Beijing.
4. Players working hard during an on-court presentation at the 2nd ITF Central American and Caribbean Coaches Workshop in Florida, USA.
5. Participants at the 11th ITF/OS Asian Coaches Workshop in Dubai, UAE.
6. Workshop attendees absorbing information in Dubai.
7. Speakers at the 3rd ITF Southern and East African Coaches Workshop in Pretoria, South Africa with some players from the ITF Regional Training Centre.



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