

Tactical Movement

Movement and Footwork – 360 perspective

Background – Limitation model

Tennis coaching has been defined in terms of 4 performance factors or processes that appear regularly in coach education material, namely technique, tactics, physical and mental. All of the process are heavily linked and have a limiting effect on one another. This idea promotes a need for a holistic teaching model, that is identifying how all of the factors play a role within what it is that's is being taught.

Technique is a solution to a problem or in tennis terms a tactical intention. Without the intention there is no need for technique. There are many ways to throw a ball but certain methods are better suited to different tasks. To throw a ball for distance one will use the over arm technique but conversely to throw a ball a short distance into a bucket one would use an underarm throwing technique. Similarly a player who wants to rally the ball cross court will employ certain techniques in order to achieve their desired outcome. This outcome success can be measured in terms of ball spin, flight, pace, the effect of the shot on the opponent and the opponents reply and in addition the players ability to recover into the most optimal position post stroke execution. If the desired result is observed one can suggest that the player has executed appropriate and efficient technique. As the tactical intention increases in complexity the technique will have to develop to achieve the desired result.

A coach may consider the racket requirements to produce a shot, in terms of its path and shape to achieve a desired intention but in reality the thoughts must extend further into considering the rest of the processes in order to offer a complete understanding and deliver the highest quality of execution within a performance.

Technical competency will limit the execution of the tactical intention in terms of quality, i.e. to execute a high level of tactical intention the players technique must be capable of doing so. To repeatedly, and continuously execute tactical intentions a players technique must also compromise of effective footwork and movement (to include court coverage and recovery positions). This naturally leads to physical competency in movement and footwork limiting both technical execution and tactical intention. In addition to this biomechanical fluidity through stroke execution will also limit the racket potential and in turn the quality of the tactical outcome.

Physical “contextual” competency will limit technical execution. Contextual refers to the requirement or function of the body to allow the racket to impact the ball in the most effective way. Similarly the footwork and movement requirements through the complete stroke cycle to recovery fall under this umbrella of physical contextual competency and can be taught and learnt alongside the other skills required to play the game of tennis.

The mind governs the complete execution of the game and one can deduce that the understanding of what is required, the brain's ability to coordinate the body and mental focus limit the entire process of stroke production for tactical intention. Choices of movement and footwork could be conscious or unconscious depending on the skill level of the player and similar to developing racket

skills coaches must strive for autonomy in movement and footwork application. The body will adapt appropriately if it knows what is the most suitable movement pattern to employ.

When a player chooses to execute a certain stroke for tactical gain he/she will employ certain racket paths, footwork patterns and movement positions to fully exploit the tactical intention desired. In this article I will consider the analysis from all of these angles with the intention of providing greater understanding of the linkage between the processes and suggest that approaching player development using a holistic 360 teaching model will allow players to learn more effectively and at an accelerated rate.

The first analysis considers the movement from a biomechanical point of view and includes tactical reasoning for the adopted footwork pattern to promote the importance of contextual movement and footwork.

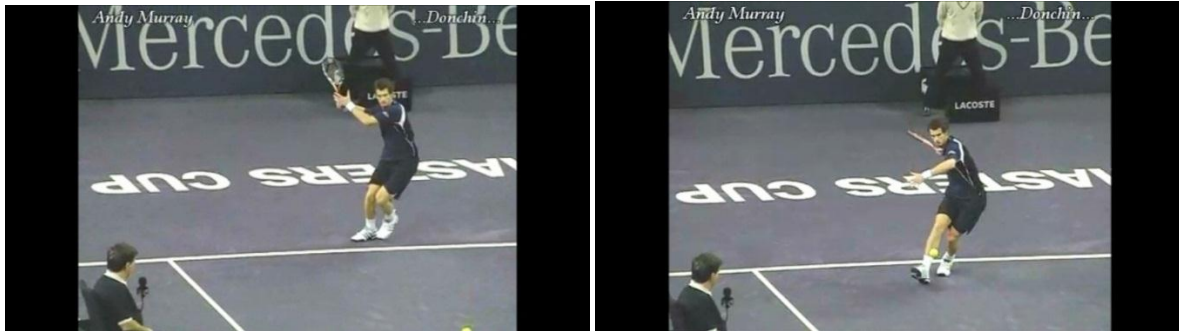
In this sequence of images we see Andy Murray playing a forehand approach (in fact he wins the point with this shot) and it is very interesting what he actually does and why. I choose this sequence as it is commonly executed by many of the top players and demonstrates the ever increasing physical requirements of today's tennis players along with adopted footwork for tactical intention.



In this first image Andy is positioned behind the base line, a common position of rally, but he has already initiated his movement by stepping across and forward with his left leg. We can see that there is a heel strike action, associated with walking patterns and used for controlling the body's movement, with the left foot. This implies he has a flexed hip on the left side which in turn has caused the pelvis to hike up on the left side higher than the right. The spine is flexed over to the left and his hitting shoulder is lower than the non-hitting shoulder due to the preparation with the hands. His head is centrally positioned to maintain balance and focus on the incoming ball. Already we can see there are many functional body requirements to execute this stroke. Andy keeps his hands close to him although has set the racket head. This choice of step allows him to cover the correct amount of ground efficiently and set himself up for what he intends to do. It could be suggested that stride patterns need to be adaptable in length and direction as players will need to cover varying distances in varying times throughout the course of a point and adjust their feet when close to the strike zone.

In the left image Andy has impacted the ground with his left foot (right image) demonstrating the requirements of the foot to pronate (Internal rotation of the ankle and dorsiflexion). In preparing the head of the racket Andy has extended his spine slightly into a more upright position. Once again there is a physical requirement for the foot/body to function optimally. The choice of movement

and footwork is also characteristic in Andy preparing his racket with care and accuracy before striking.



Andy is in a tennis specific position here (left image) with his hands creating a heavy shoulder turn that creates an angle between the shoulder line and the pelvic line. Shoulder and pelvic lines are the straight lines created if one were to draw through from one point to the other, i.e. a line drawn, and extended through the left shoulder from the right shoulder. The pelvic line bisects the shoulder line as the shoulders are rotated further than the pelvis. This is known as a separation angle which allows for fast forward rotation and linkage to the ground.

The foot position (right foot) which is in contact with the ground has the ankle rotating with the racket which in turn slows down the pelvis hence creating the angle mentioned before with the shoulder line. Not only is the pelvis rotating it is also shifting forward towards impact. This increases the loading effect in the abdominals from the left pelvis to the right side of the ribcage. A slingshot effect in the body has been created ready for when Andy begins to release the racket towards impact. Andy's left foot is poised to plant on the ground to carry his motion closer to his desired impact zone.

Andy has now got himself over the baseline and into a position that will allow him to be positive with the ball strike (right image). He has moved his right foot in front of his left foot which allows him to get close enough to the ball. He is intending on loading on the right foot which will allow him maintain a good court position, be aggressive with the stroke, generating optimal rotation to the ball and also allow him to be well positioned post shot to recover effectively.



Here Andy has begun to pivot on the left foot that suggests that he is rotating heavily towards the left, towards the ball. The heel strike appears again and the pelvis has come forward creating a greater angle between the shoulder line and the pelvic line. He has set himself to explode off his right foot creating maximum speed from the shoulders into the ball. The choice of this footwork

pattern allows for maximum acceleration from the body/hand whilst maintaining forward momentum.



Andy has moved from a position of rally behind the baseline to being inside the baseline to play this shot. In the time available Andy has effectively positioned himself to play his desired shot and also be ready to continue the rally post execution.

At impact the shoulders have completely caught up with the pelvis with the ankle of the right foot also rotating. This has driven the knee inside his foot. The result is that the spine is in a delayed position flexed over. It is almost like the lower body is considering where it needs to go next and there is a delay for the upper body to finish the stroke. The difference in rotational speed of the pelvis and spine is also an effective way of transferring force from the ground to the impact. The racket head is dropped below his hand which will allow Andy to quickly rotate his hand up through contact creating heavy spin on the ball.



Even after impact as the racket extends forward the spine is still left behind and the shoulders are tilted. The racket head is higher than the ball as a result of fast hand movement prior to impact. Notice also the spiralling motion of the hitting arm throughout the shot. Hitting off the right foot and landing on the right foot allows him to maintain good court position and initiate the recovery back into the court. His spine has now caught up and he can move into the next position. Throughout the whole execution of the stroke Andy keeps his head in a neutral position whilst his body works around it to make the shot.

The spinal position is of interest as it stays in a laterally flexed position during the stroke. This is for a number of reasons. Firstly it allows the lower body to rotate and to aid in the abdominal loading pattern and transfer force effectively from the ground. Secondly, Andy has set himself up to play a stroke off his right foot and the intention is to recover back into the centre of the court either following the ball into the net or backing up behind the baseline. The spine being left behind is

characteristic with the shifting the centre of mass and is visible in walking patterns. The function of the body through technical execution and footwork/movement is a clear limit of technique and also has direct tactical relationship. The tactical intention results in the body performing chosen movement and footwork patterns to allow the racket to affect the ball appropriately to achieve the desired result and allow a recovery position that will maintain dominance or stability in the point.

Final Remarks to the above sequence analysis.

The above sequence is of interest from all angles. Andy has chosen a footwork pattern that is relevant tactically. He was able to cover ground quickly and efficiently in the first instance and then use a right, right footwork pattern to execute the shot. This meant that he was well positioned post execution to recover effectively. Had Andy adopted a different approach he may not have had the tactical opportunities open to him or executed the shot as well as he did (since it was a winner) and lost the dominance in the point. .

As mentioned, technique is only of use if there is a tactical intention and that the physical requirements of the most appropriate technique must also be considered. In addition how a player approaches the ball and recovers from the stroke are of utmost importance as a player will need to put the learning into a competitive environment.

When analysing, teaching and training players, consideration of all 4 processes in a holistic teaching model is necessary to provide maximum learning opportunity to players. The contextual physical requirements of tennis are often over looked but it has the power to enhance player's technical competency and support the overall tactical intention

In teaching in this manner players will understand what it is they are learning and understand when and how to apply certain techniques from both a racket and footwork/movement perspective. We have looked at this method from a professional perspective but consider a simple tactic of "over and in". Players must know how to position themselves to play a shot and where to recover for the next shot in the rally. Similarly footwork patterns and stances are taught to young players and should be progressed along with the techniques. The tactic of over and in can be extended to rallying on the move or covering more court or simply the quality of trading. Within this progression techniques will have to adapt along with footwork patterns and movement positions as players will be increasingly challenged to manage time and space. As we have seen in the analysis of Andy's shot there is clear need for a functional body and exercises can be used to promote tennis related body function. This will aid in technical development which will allow players to explore the game further.

Footwork and movement also have their own technical, tactical, physical and mental attributes as we have seen and should also be worked on alongside the development of racket technique.

Tactical Movement

The limitation model of the four performance factors states that technique is a functional entity that is a means to execute a tactical intention. Furthermore, extrapolating the model it is seen that technique is a function of physical, contextual competency which relies on efficient movement and footwork execution and application.

Players select certain movement patterns and footwork patterns that best suit the situation and the tactical intention. We have seen this in the previous analysis of a stroke played by Andy Murray. Footwork and movement can be considered in a wider context and educate the player in the application to the game.

Movement and footwork are key attributes to allow a player to execute tactics efficiently and be able to play the game at the highest possible level. As the quality of the game the player is exposed to increases the time and space that a player has to manage becomes of great importance and increased challenge. Players have less time to get into position to play and depending on the tactical intention (shot selection); a player's recovery position will optimise their ability to execute, continuously through the point, the highest quality of shot. Players must ensure that they have the tactical, technical, physical and mental means to manage their space and time and exploit the space and time of the opposition.

Player's will find themselves in various situations and the choice of footwork pattern will directly impact the outcome of the stroke. Not only do players need to understand tactics but also associate and practice footwork and movement patterns that are most desirable. In the mist of all this is the ability to cover court, as once again as the level's increase, time decreases and players must find the most efficient ways of getting into position, footwork to execute and time and space needed to recover. Tactical decisions will impact all of these elements and it is necessary to have these tools to best deal with the latest situation.

Federer is considered to be one of the best movers on a tennis court and so it makes sense to look at the great man in context. I have selected two points from the Dubai ATP Final 2012 against British hero Andy Murray (unfortunately Andy loses out in both points).



This first image is post Federer serve and we can see how he has landed inside the baseline with his hip line directed towards the return impact. Andy is in a tough spot returning this serve so Federer chooses to maintain his position rather than back up behind the baseline to take up a rally position, anticipating a weaker and shorter reply. Tactically Federer will look to move up the court with his next shot and take control of the point. Should the return of been more neutralising Federer may have backed himself up behind the base line to assume a more neutral position.



In this second image Federer has shifted his hip line 90 degrees clockwise using three “shuffle” steps. These steps are not common side steps as his feet barely come together and he almost bounces around the ball to create the space to execute the forehand. Andy has backed up post return to try and buy some time for the oncoming Federer attack.



This next image is Federer’s split step position. Notice that the approach didn’t push Andy out of the court laterally but kept him suitably pinned behind the baseline. Federer has reached this position using two running steps which is a quite a lot of court for just two steps and notice that he has followed the balls line as he moves in. His base of support is very wide and his weight is shifted in the intended direction of movement. This will allow him to move way inside of the service box to play the volley.



At contact for the first volley it can be seen that he is way inside the service box with weight held on his left foot. The right foot is sweeping behind, (cross behind pattern), which allows him the space to play the volley back the way the ball came whilst also transitioning through the volley closing in on the net. Andy is still in a position behind the baseline.



Federer's first volley is pretty central and the cross behind step he used executing the volley has allowed him to be in a strong net position. Andy has no angles and maybe the lob would have been a better option, in hindsight. However, Andy is up the court a bit more and Federer is not in total control of the point at this moment. His stance is again wide and as Andy plays his shot Federer has shifted his weight to the backhand side. This is a requirement when volleying that the first step is often the foot nearest the ball. This allows much more court to be covered with the next step should the need arise, (which it does).



Federer steps right across his body in this image attempting to create angle and regain dominance of the point.



Federer takes up a new court position on the same side of the court as the ball, a common recovery position to volleying. This is to close down the angles Andy has and also allows coverage of the line. Andy being Andy plays a superb angle across Federer. This is a great choice of shot since the ball is travelling away from Federer after the bounce making it a really tough shot to play.



Federer initiates a turn as he sees the ball move across him and adopts running mechanics to find a solution to Andy's reply. Running steps allow maximum court coverage and enables Federer to keep up with the ball. With the ball travelling away from him he has to rely on hand speed to make this next shot as the body is pointed in the same direction as the leaving ball.



Federer hits this shot off his right foot using his hand speed as the dominant source of transferring power to the ball. He finishes this shot on his left foot which has continued in the running pattern away from the intended direction of the ball. Minimum rotation of the upper body means that Federer is facing away from the play and he uses back peddling steps to continue his recovery



The choice of playing the shot cross court means Federer will take up a recovery position on the opposite side of the ball. Due to the angle he has created there is no need to recover to close to the centre of the court.

In this sequence it is evident that Federer (and Andy in fact) has been able to adopt a variety of footwork patterns, recovery position's and movement to maintain, better or re gain dominance within the duration of the point. Tactical intention requires efficient movement and choice of footwork to best execute and deal with varying situation. Both players have taken up positions to

better their chances. The coverage of the court plays a role in taking additional time away from the opponent, reducing tactical opportunities and being able to stay in the point under pressure.

To conclude this point sequence it is evident that footwork and movement must also complement the tactical and technical intention. In addition to this the choice of shot played and positions the players take up is cognitive understanding of the court and how the game evolves. The physical contextual competency is a tool that allows Federer to do what he did and manage his space and time in ever changing situations.

Point 2

In this sequence we will see great court coverage and also some choice footwork steps are executed with immense athleticism that all contribute to the overall tactical outcome of the point.



Federer has returned Andy's serve down the line and he has recovered to a position left of centre opposite to the side of the ball. This is the new centre of the court due to the line of the ball. Since the ball is off centre it creates angle opportunities across the court and Federer has given him the best chance to maintain quality play by taking up this position.



Andy plays back down the line forcing Federer to move a greater distance off his rally ball. Federer makes a weight shift simultaneously with his split step and performs a running step with the left foot crossing over. This is different to a cross over step since his hips have turned 90 degrees in the direction of motion. He must cover this ground quickly enough to meet the ball without having to back up and lose his neutral rallying position.



Federer gets his right foot behind the ball and pushes off this leg whilst turning in the air to make the shot. This allows him to play cross court which reduces his recovery distance as we will see in the next image. Notice that his landing is in line with the inside tram line, quite a considerable hop. His shoulders are fully rotated and his hip line is perpendicular to the direction of the ball. This allows Federer to execute a tactically smart shot whilst maintaining his ability to recover quickly and efficiently. Here the tactical intention is coupled with choice and footwork and post shot recovery position. Although Andy moved Federer he was able to effectively stay neutral in the point. The court coverage in the first instance is energy efficient and allows this choice of footwork which again compliments a tactically sound intention. Due to the efficient court coverage and high quality of footwork execution Federer is able to play in rally as opposed to resorting to defence. Federer's coverage in neutral makes it very difficult for opposition to open up offensive opportunities.



As we expect, understanding some court geometry, Federer recovers to the opposite side of the ball making his whole execution of the previous shot from tactical through to physical effective and efficient.



Andy again plays line and Federer adopts two footwork patterns to create an opportunity to hit his favoured forehand. The first step is a "dynamic" cross over where his right foot crosses in front of his left foot although not as a step but more of a "ping" with both feet airborne until landing. He then performs a similar step with the right leg crossing behind to allow him to orientate his body around the ball and create sufficient space for the forehand.



The sweeping right leg ensures that Federer can shift his weight onto the left leg for the forehand. In order to create more space needed to find a greater inside out angle Federer jumps off his left foot. In the second image Federer lands the hop way outside the court, again a great example of athletic, physical competence, court coverage and footwork technique to execute a tactical intention. With greater angle and hitting cross court Federer's recovery position is well within reach before Andy will send his reply. Knowing this Federer can make the choice to use his forehand instead of his less favourite backhand. This is trademark Federer.



Due to the increased angle Federer created with the previous shot his recovery position is again on the opposite side of the ball and also nowhere near the centre of the court. Also he maintains his distance from the baseline since the point is still neutral although Federer has covered more than the full width.



Andy's reply is exactly what Federer has worked to maintain neutral for. His intention now is to move up the court and command dominance of the point. He uses a left foot hop/pivot to move his body through the ball and into the court. This sets himself up in motion to approach the net. Andy has backed up from the baseline to try to deal with the oncoming attack.



Federer again covers the court well, in fact in two additional steps. He has followed the ball and performs his split step on the same side of the court as the ball. This image demonstrates Federer's ability to move with great athleticism. His base is incredibly wide and with a single additional step he can make his first volley inside the service box. Andy is way out of position now and even though Andy gets a racket on the ball he cannot make it over the net.

Summary

The intention of this piece was to demonstrate that footwork and movement play an extremely important role in the game of tennis. Footwork and movement in their own right have a tactical relationship with the game. In addition, not only do we have a technical component in stroke production we have the same in footwork execution. This means that when developing players or working with high level players the tactical intentions must also contain a footwork and movement component. Consider what footwork pattern will most effectively allow the player to execute the technique that will achieve the tactic. Consider the player's ability to cover the court effectively and also consider the position of recovery that is optimal to maintain the tactical intention. In the same way the racket skills are assessed and progressed footwork and movement skills can also be developed. The inclusion and attention to this component will increase the player's execution of the game.

Just like a coach may break down the forehand technique to progress it the same approach can be adopted to footwork and movement development. Can players hop laterally and control their mass in order to execute the right/right hop and turn? Do players have sufficient running capability to cover the court well? Can players manipulate their bodies to execute movement and footwork patterns to aid in their technical execution?

In order for players to explore their true potential attention must be paid to footwork and movement in tactical contexts. Coupled with biomechanical, functional body fluidity as seen in the Andy Murray stroke, player's technical competency and thus tactical execution can be elevated.

Throughout this exercise there are body, movement and footwork patterns that are emerging and exercises, stretches, movements, drills and games can be designed to promote development which in turn will impact the tactical and technical response. Overall, players will engage with the work as they can understand the wider context and impact and also through practice these movements/footwork patterns will be cemented into the autonomous brain.

Mental + Physical + Technical + Tactical = Holistic teaching model + Accelerated Development