



Learning movement by awareness

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ABSTRACT

This article reviews a special approach to the learning and teaching of technique. For tennis players, movement awareness and understanding implies full body awareness. Improving your body schema is the foundation for efficient technical learning. As part of body and mind training, repeating good and fundamental technical habits, first at a very slow pace with a progressive increase in speed as skills improve, is surely an approach that is worth considering.

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INTRODUCTION

This article is a testimony inspired by a long conversation I had many years ago with a physiotherapist friend responsible for the rehabilitation of accident victims with motor injuries. He was sharing his views on how he could help these recovering patients experience again the motor actions that had been "lost" following their accident. This led to some deep thinking and, ultimately, to a special approach to the learning of technique. All the experiences that I'd like to share with you are all based on well-known scientific principles. But my intent here is not tell you about things which, in some social circles, would surely make an impression. My commitment to helping my students improve is what drove me to deepen my analysis of organised movement, a true miracle of nature.

We are all on a daily basis confronted with technique and its teaching, from mini-tennis to all other levels of practice. Our education, our experiences (deliberate or not), as a player or a teacher, the continuous search for improving our own teaching methods are such that we develop a "sensitive" attitude toward the notion of "transmitting" technical skills. But before going further, what would be an appropriate definition of the word "technique" for tennis? The following two suggestions come from the Larousse dictionary:

"A set of processes and practical methods specific to an activity"

"A person's practical knowledge and skills for the carrying out of a specific task"

When reading these definitions, supposing we do so with the eyes of a teaching professional, we see two very distinct aspects, namely technique from a global perspective (body of methods), on the one hand, and technique from a person-centred perspective (individual skill), on the other.

Once we figure that out, we're on the right path!

Indeed, both perspectives complement each other: mastery is primarily a level of technical mastery, know-how and ability! In the case of individual technical flaws, this translates on the court as a "messy" spatial and temporal organisation. Technique therefore reflects a person's cognitive organisation. In my last article, I was discussing motor actions whose execution is inevitably supported by a rhythm, motion range and balance specific to each action, in accordance with technical and mechanical fundamentals. I know what you're thinking about this "fundamentals" word, an overused term to describe a blurry notion, not sufficiently clarified and thus often forgotten! I therefore suggest that we take, as an illustration of this fundamentals concept, the example of the search for a contact point in front of the body and two of its direct mechanical consequences, i.e. the maintenance of an optimal

contact point and the follow-through action of the arm over the shoulder.

A picture is worth a thousand words...

What does this picture tell us? I'm not sure for you, but for me it illustrates "perfection": balance of both arms on the same level, head (and eyes) focused on the ball impact which, in turn, allows for optimal core stabilisation during rotation, full extension of the right arm with delayed elastic action of the wrist and forearm, and forward movement of the right shoulder in the natural direction of the shot all serve as the foundation for a contact point in front of the body; all this is executed with no apparent effort, no visible strain!

Looking at Federer's execution of this forehand, one can only see how fluid and effortless this player is. His balance is perfect! The impression that he gives us, during this motor action, is that he is fully aware of the unity of body and mind: he feels the movement!

The awareness of the technical action is inextricably linked to the awareness of the spatial interactions between all body parts, from start to finish of the movement. There is nothing automatic about this movement; quite the opposite: it is the result of pure determination!

The continuous and deliberate search for a contact point in front of the body is only possible if the intention is to organise the body position with minimum effort for optimal performance. Only through a strong and permanent awareness of the mechanics and organic sensations can this action be repeated each time with the same efficiency.

BODY SCHEMA OR FEELING ONE'S BODY

From a very simplistic and holistic perspective, a controlled motor action is an action whereby bones are moved by muscles working in kinetic chains with alternating contraction and relaxation phases, the whole action being controlled by the CNS. The specificity of this action is that, at any moment, it can be stopped, adjusted, reversed or replaced with a different action than the one originally planned. This is why we are in the field of voluntary movement. The action being voluntary, this means that it can be acted upon, controlled; it's no longer something that you do, but something that you "live"!

Living is feeling, feeling is being alive!

During any technical and motor learning, the efficiency of our actions and adaptation skills depend, from early childhood, on our self-image. We act and react according to our self-image! That is why we cannot separate the body from the mind, because both develop together through a subtle mix of nature (innate qualities) and nurture (social, emotional, sentimental,

educational and, of course, psychomotor experiences that we have from an early age, even before we say our first words). Self-image is therefore something we inherit without us being aware of it.

Gradually, through the simultaneous action of nervous system maturation, challenging sensory and motor experiences and the support of our caring family and friends, we become aware of our body. It can therefore be said that the child acquires a sense of psychomotor balance and that this "learning" goes on throughout the different experiences in life, until adulthood. This is how body schema, awareness of our own body, develops, whether our eyes are open or closed, whether we are in the dark, in the water, on the sand, seated, lying, alone or with other people, in front of a mirror, whether we stand still or not, whether we prefer to use our right eye/ hand/foot/leg or our left one (or both); in other words, it develops in all the situations that we no longer pay attention to until we are actually confronted with a specific situation or a new psychomotor requirement such as "hitting the ball in front of the body".

OVERCOMING THE FALL

This is an interesting notion that we cannot dissociate from the concept of balance, also very interesting.

As long as we are physically able and in good health, physical balance is a natural quality. However, we forget that, as a child, we used to crawl and that learning to walk bipedally, although part our natural development, was not an easy thing! Balance is a STRENGTH that prevents us from falling. Balance disruption is therefore synonymous with falling and loss of control. Losing your physical balance has an impact on your psychological balance. Can you imagine the psychological consequences that repeated falls would have on you? How would you feel? What image would you have of yourself? Fear of falling is extremely common, it's in our genes. If you think about it, in highly technical sports, one of the biggest challenges is to avoid falling. Falling is the beginning of failure and I'm quite certain that skaters, skiers, dancers, cyclists, boxers, football players, gymnasts, hikers, golfers, and even tennis players, would agree with me! Let's reflect on this for a moment and visualise each sport by incorporating this concept of falling. Do you see what I'm getting at?

I think we've managed to identify something that we no longer pay attention to in our daily lives. And in our daily lives, our role as sports educators is to enable our male and female players to learn and understand HOW TO overcome the "technical fall", as the expression of a non-controlled and forced movement.

A little earlier, we discussed body schema and the awareness of our body. Have you noticed that our arms, legs, head, and trunk have a certain mass? Have you noticed that depending on their spatial position and movement, their mass (with or without the addition of a device to be controlled) changes due to the shift of their centre of gravity? What is the action of gravity upon a body on Earth according to Newton's law? That's right: the free fall of that body! All the permanent changes to our body schema, during a technical motion, are detected by a neurological system made of extremely sensitive kinaesthetic, proprio- and exteroceptive sensors.

Let's not forget that the main technical goal that we have set is to "hit the ball in front of the body" through repetitive, voluntary and controlled movements. For us to be able to achieve this goal over and over again, considering that body schema itself is never, during our entire life, the same twice in a given situation, all nervous sensors work together for a precise "modelling" of the action to be performed, thus creating the illusion of a motion that can be repeated in the same way indefinitely.

What is the best "anti-fall" technique that you should teach?

If you look closely at today's male and female champions, you notice that all of them look for a level of technical and mechanical efficiency that allows them to achieve the most efficient production of energy (moving the ball forward) with minimum effort. This pursuit of body and mind unity invariably results in fundamental segment and joint "via points". Although every player has their own style (their technique is easily recognisable), the constant search for balanced movements executed with the correct rhythm and range of motion is what is commonly called "the right action at the right time".

In our profession, we often hear people say that there are no rules; implying that there is no universal method, that everything is good. I agree that there are no rules, but you need to know them! There are no rules, but the ones that we all know are the so-called "technical fundamentals". And these fundamentals are the exact illustration of what balance should look like from a mechanical point of view.

Here is our challenge: teaching technical skills that are smooth, non-restrictive, biomechanically efficient and non-traumatic; skills that can be felt and understood by the player. Not an easy task... but these fundamentals exist; you only need to draw on the best players' stroke mechanics!

In this article, my intention is not to describe and classify the basic technical skills that are common to tennis champions. It is rather to share with you my thoughts about the idea we have of what teaching of correct, fine, adapted, controlled, progressive and repeatable technical actions should be in all situations of... imbalance!



SHADOWING

This brings me back to this notion of body schema and the continuous struggle to overcome imbalance. Among the solutions available to us is a wide range of teaching tools designed to help players understand their body in relation to the technical actions that we ask of them. Shadowing is one of those tools. We'll describe shadowing as an action without any physical contact with the ball. Though not physical, the contact is nonetheless mental through visualisation such that the mental feeling becomes a physical sensation. In this case, let me continue...

Why is shadowing of any interest to us? It's quite simple to understand really. The use of shadowing makes it possible for body schema to truly "connect" to the action to be learnt via all the nervous sensors we talked about earlier. The trick, if I may use this word, is to perform the technical action at a very slow pace. This slow pace allows the CNS to register (encode) each piece of information very precisely and in a controlled way. Any change in balance control, whether caused by trunk or hip

rotation, shoulder elevation, arm extension, head tilting, or knee bending, implies a postural and kinetic adjustment that, if performed at a slow pace, amplifies the sensation of heaviness in the various segments involved. This increased sensation of heaviness forces the body to counteract muscle tension in order to overcome gravity. Let's illustrate this with an example: on a table is a one-and-a-half-litre bottle (of water!). I grab it and move it to another table at an unconscious pace.

A rather common daily task. I now repeat the same action using a container filled to the brim with the same quantity of water. This time, because I don't want to spill the water, I perform the action at a very slow pace with increased visual concentration and a totally different muscular control. The one and a half litre of water feels heavier in the second scenario. This can be explained by the physical laws of kinetic energy, which are way too complicated for me! In any case, what matters is that the technical action was truly felt, due to the increased heaviness sensation. The CNS learns through slow and heavy-feeling movements, allowing the tennis player to become aware of their body schema, and learns from the inside, the outside becoming then less important. Isn't it the impression that we have when we see Roger focus on the ball the way he does?

The advantage of this teaching method is that it develops kinaesthetic, proprioceptive and exteroceptive sensitivity: slow movements, combined with the sensation of heaviness, enhance sensitivity. This method is also interesting because it allows coaches to instantly correct the positioning of any segment, something which is not possible with the use of slow-motion video.

With the alternating use of "real" play and "shadowing", we notice real learning transfer through very powerful feedback. What does a golfer do before a drive or a putt if not shadow swings?

To continue with this idea of feelings that can be transferred to tennis, we can also mention Tai chi. This practice, known for its slow and measured movements, should not be seen as a collection of oriental postures, but rather as another powerful tool to develop body schema. One of the many principles of tai chi is to perfectly isolate the different muscle groups through contractions and relaxations during each posture. By learning to slowly isolate agonist and antagonist muscles using the vertebral axis as the origin of the movement, you're able to harmoniously activate all planes and axes in a combined and synchronised fashion (figure below). Similarly to what happens for shadowing, refocusing can only happen through a "sensitive understanding" of the movement.

Figure 1. Anatomical Planes.

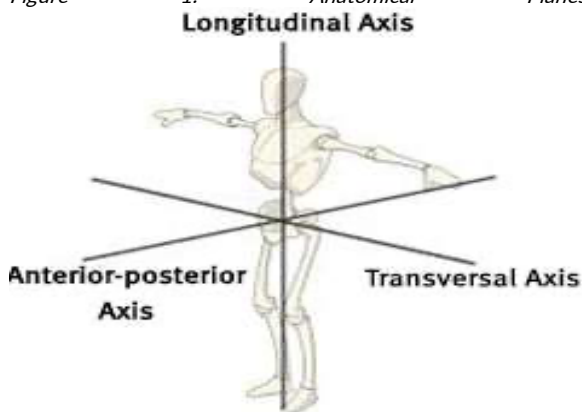
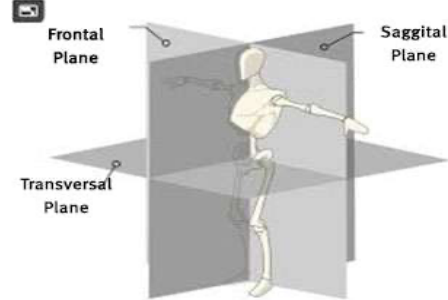


Figure 2. Anatomical Axes.



Through slow execution and the resulting awareness of gravity, tai chi offers a variety of mechanical via points similar to tennis. Finally, we cannot conclude this article on movement awareness without mentioning the importance of psychomotor activities performed with the use of a mirror. The mirror used can be real and, in this case, the player sees and perceives themselves as "their own spectator"; their image is reversed, but that does not change the fact that they're looking at an image of themselves. The player has both an external (they see their image) and internal (the feel) perception of themselves. From a psychological and neurological perspective, it is quite fascinating! If the "mirror" used is the coach or a partner, the goal is then to become the perfect reflection of the other. As with shadowing, this activity should be performed using the "slow and heavy" principle. In this mirror game, the teacher's responsibility is to ensure the technical execution is smooth and in line with the fundamentals.

CONCLUSION

As a tennis player, movement awareness and understanding implies full body awareness. Improving your body schema by listening to your feelings is the foundation for efficient technical learning. As part of body and mind training, repeating good and fundamental technical habits, first at a very slow pace by alternating shadow swings and actions with the ball with a progressive increase in speed as skills improve, is surely an approach that is worth considering! In conclusion, I recommend that you take a look at what happens technically when a player is asked to vary their hand pressure on the grip...

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