



# Variability during training sessions to develop coordination skills in the development of tennis players.

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## ABSTRACT

This article discusses a transversal methodology to develop the different coordination skills as applied to tennis. We consider this work to be relevant because of its cognitive implication for the performance of different coordination skills. The tennis player on-court, is constantly performing a series of technical activities that require different coordination skills, but he is also in a continuous process of decision making, which is constantly “contaminated” by uncertainty. It is an unquestionable reality that the specificity of the tasks involved in the training process is a key variable to its success. The specificity in the tasks is determined by the knowledge of the coach about fundamental learning and its timely sequence along the coaching process.

**Key words:** Coordination skills, Variability in training, Coaching and methodology.

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## INTRODUCTION

Tennis is an open skill sport: the skills are subject to the different stimuli of the environment. The learning process should be based on learning in an environment that provides all the possible stimuli to face the multiple game situations that tennis demands. The player must develop his capacity to adapt to the environment and to the stimuli that tennis training involves, and, to do so in a very short time. In this regard, coordination is an indispensable capacity to optimize a tennis player's performance (Born, 1999). Although it is true that tennis is a multiphase sport, (Koning et al, 2001), technique is considered the most important determining quality to reach top performance. This technical component, that has to do with correct execution from the mechanical point of view, needs adjustment of the different body segments in space and time, to be able to hit the ball. This way, for the correct technical execution of the movement, one of the basic biomechanical principles applied to tennis will be taken into account (Elliot, B., 2006): the principle of coordination of partial movement, that entails correct and timely participation of the body segments to perform a certain movement. This implies moving towards the ball, adjusting before hitting, hitting the ball and recovering after impact. Therefore, coordination will contribute to the

necessary adjustments in the development of the other conditioning capabilities (strength, endurance, speed and flexibility) to be able to perform the technical movements as efficiently as possible, both from the mechanical and from the physiological point of view.

### Variability in training and its application to tennis coaching

Variability is present in all biological systems, and was initially characterised as the changes that happen in motor performance during many repetitions of a task (Glass & Mackey, 1988). Variability is a differentiating characteristic of a person's behaviour. It must not be considered harmful for performance; it is now suggested that variability in motor execution may be beneficial for the organization and performance of the movement, and can even be a signal of endurance to the conditioning elements to that execution. From this point of view, variability can be a parameter to consider, in relation to the stability of the movement pattern. Great variability can suggest unstable movement patterns, but, if this variability is used in favour of the possibilities of action, it could result in a more efficient performance (Menayo et al., 2010). A great part of the research confirms the benefits of variability when training to increase sport performance

(Schölnhorn et al., 2001; Rein & Simon, 2003; Jaitner & Pfeifer, 2003; Schönherr & Schölnhorn, 2003; Beckman & Schölnhorn, 2003; Wagner et al., 2003; Jaitner et al., 2003).

Consequently, the benefits of variability in training can be defined as the adaptation of the athlete to the variability of the intrinsic dynamics of the task by means of the application of variable loads controlled by the coach (Davids, Bennet & Newell 2006).



**Foto 1. Stroke in an unstable condition.**

Therefore, in tennis, coaching by variability, will provide the player an initial instability in his behaviour, but, gradually, and as long as we adapt the loads to the learning/coaching levels of the player, he will adapt and improve his response to unstable situations in such a way that the movements and actions trained will become more stable and permanent in time (Moreno et al., 2003; Davids et al., 2006).

However, as Davids et al. (2003), pointed out: to achieve stability in behaviour, variability in practice must be intermittent. This contextual interference in practice consists of exposing the tennis player to the practice of several types of strokes and/or movements, actions in different game situations in a random way. Thus, research states that this practice prepares the tennis player for his movements to be more resistant to instability since we are exposing him to continuous changes in his tasks.

#### Guidelines to design coordination exercises through variability during training

From the point of view of the dynamic systems, the tennis player is taken as a complex system with a capacity to adapt and is in continuous interaction with his environment (Kelso, 1995). In this context, any variation will create changes in the system and will make the tennis player adjust to the conditions of his environment. Consequently, the tennis player becomes an active information processor of the skills that must be learnt to respond to each situation.

It is then, a complex dynamic in which the tennis player is self-organized to progressively get the appropriate movement patterns to solve the motor problems he faces.

Contextual interference in training, i.e., exposing the tennis player to several types of strokes in different situations at random, prepares his movements to be more resistant to instability, by being exposed to continuous task changes that become more stable and permanent (Moreno et al., 2003). Strategies in analytical or global training (learning by parts according to Schmidt & Lee, 2005) must be applied as specific training loads depending on the errors detected in technical movements.

When designing variable training based exercises, we propose a number of guidelines for the development or coordination skills (Adapted from Moreno & Beneroso, 2005):

- To create exercises for the game conditions and coaching of the tennis player.
- To use elements that generate instability in the strokes and movements (elastic bands, bosu balance trainer,...) (Foto 1).
- To use elements that disturb the execution (balls of different weights and sizes, rackets with less strings. ) (Foto 2).
- After doing the exercises using these elements, they must be removed to evaluate their impact and they must be introduced to them again in case the movement of the tennis player returns to its previous status.
- To avoid coordination exercises that entail an important load for the player or when the player is subject to high loads of work (for ex. load or impact micro cycles).
- To consider the adapting skills of the tennis player to adjust training/ learning loads to his/her characteristics.
- The key is not to repeat the same solution over again but to develop the capacity in the players to find different appropriate solutions.

#### Working coordination with developing players

As Busch & Strauss (2005) pointed out, coordination is one of the most important elements to determine individual differences in sport achievement. Because of its characteristics, tennis is a complex sport from the motor point of view, since there are over 20 different strokes with different types of execution, intensity and tactical objectives and these strokes are coordinated with specific movements that have a great impact on execution. An appropriate development of coordination capabilities is key for optimal stroke performance and movement in tennis (Filipic, 2005).

In spite of the importance given to the different conditioning capabilities (endurance, strength, speed) that the tennis player has to train during this developing stage, we must also consider the fundamental role of the development of coordination skills and work on them from the early stages, as they will be particularly important for the maturity of the nervous system.

We consider that both the coach and the trainer must stress coordination work in order to optimize the technical movement for the stroke and sprint (Forcades, 2006). We also recommend working all the coordination skills even though we may delve into the kinaesthetic and reaction capability differences which seem to be of utmost importance in tennis (see Table 1).



Foto 2. Coordination materials.

CONCLUSIONS

Finally, we suggest working variability in training from the dynamic system perspective, as a methodology for the development of coordination. It is reasonable to think that if we train different capabilities in a situation that is similar to the one the tennis player will face in front of an opponent on court, the possibility of transfer and versatility to solve problems will be much better (Fernández et al., 2012).

So, we consider that both, the coach and the trainer must lay emphasis on the coordination work in order to optimize the technical movement for the stroke and sprint (Forcades, 2006). We also recommend working all the coordination skills even though we may delve into the kinaesthetic and reaction capability differences, which seem to be the most important in our sport.

Lastly, we consider that the development of coordination is an essential element for young developing tennis players. Therefore, it should be included in the content of the programme from the first stages if we expect our players to play at a competitive level.

COORDINATION CAPABILITIES	EXERCISES	
	GENERAL	COURT
ORIENTATION	To control two lobs in the air without touching the ground.	The coach feeds balls of different colours and, the player has to send them to different areas of the court, depending on their colour.
DIFERENTIATION	To bounce a tennis ball with one hand and a basketball with the other one.	To rally with a regular ball and a mini tennis ball.
BALANCE	To kneel and stay on a Swiss ball.	To hit a forehand tied to an elastic rope at the waist (balance indicator).
RHYTHM	To jump the rope at a different rhythm.	To rally with two balls.
REACTION	To start from different positions paying attention (like in tennis) to visual, acoustic and kinaesthetic stimuli.	When the player hears "Go!" he opens his eyes and plays the ball the coach has fed.
COUPLING	To bounce two basketballs at the same time to a different pace.	To hit forehands with a weighted wrist on his free hand.
CHANGE	To gather Z balls fed by the coach to a corner.	To play on a clay court with holes, broken lines, etc.

Table 1. Suggested coordination work for developing players (Forcades, 2006).

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