



# Selection criteria for intelligent devices for tennis

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## ABSTRACT

Today coaches can resort to a great number of devices that contribute to the tennis training process. Still, more often than not, the selection of one device over another creates uncertainty due to the great variety in the market, and to the lack of knowledge about the performance of the different models. Therefore, the target of this study is to provide some detailed technical information about the performance of those devices that provide technical and kinetic data, and to present some criteria for coaches and players to rely on, in order to get the tool that best suits their needs.

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## INTRODUCTION

During the development process of a tennis player, a key element when programming the teaching-learning process consists of the analysis and evaluation of the different areas (Sanz, 2012). Due to scientific advances, the information that coaches have available is much more powerful, with more complete and accurate data, which are presented in an immediate and easily represented fashion.

Thus, the evaluation and analysis of technique and kinetics have been one of the most systematized areas in tennis, more than others such as tactics and psychology. The first reference to the use of technology for tennis player development goes back to the early 20th. century (Beldam & Vaile, 1905; Vaile, 1906; Paret, 1926; Lacoste, 1928). However, it was not until recently that technology started growing exponentially in the market, offering an affordable and economic way of getting data, a process that has taken the place of the “coach’s eye”, a system which presents deficiencies regarding the accuracy of data based on excessive subjectivity (Sanz, 2012).

Another benefit of the use of the new tools is the greater motivation that its application brings about in the teaching-learning process for players and coaches, given that it can give evidence of the technical level in real time, and allow checking of progress by comparing the different training sessions or

matches. Furthermore, these data can be shared by means of the different social platforms (Quinlan, 2013).

This paper aims to analyse the performance of the tools that provide technical and kinetic information of the action of the racket on the ball, and show a criteria for coaches and players to base their decisions on.

## METHODS AND PROCEDURES

These are the devices analyzed: Sony Smart Tennis Sensor, Babolat Pop, Babolat Play (Pure Drive), Zepp Tennis, Zepp Tennis 2 and Artengo Personal Coach. A detailed analysis of the official websites of the devices selected was carried out in order to understand their performances.

## FUNCTIONALITY OF THE DEVICES

A classification of the different devices and their recording capacities for the different items is presented below. In fact, Table 1 shows the capacity to record aspects related to the training volume in the different devices.

	Artengo Personal Coach	Babolat Pop	Babolat Play	Sony Smart Tennis Sensor	Zepp Tennis	Zepp Tennis 2
Capacity to record the total volume of strokes	✓	✓	✓	✓	✓	✓
Capacity to record the total volume of each type of stroke	✓	✓	✓	✓	✓	✓
Capacity to record the training/ match time	x	✓	✓	✓	✓	✓
Frequency of strokes per minute	x	✓	✓	x	x	x
Capacity to record the training/ match active time	x	x	✓	x	✓	✓
Capacity to record the calories burned in each training	x	✓	✓	✓	✓	✓
Capacity to record the number of impacts in each point or series	x	x	x	x	x	x
Capacity to record the average number of impacts in each point or series	x	x	x	x	x	x

NB: When ✓ appears in blue, it will mean that the device is providing the information but not in the official measuring unit.

Table 1. Capacity to record training volume related aspects.

Table 2 shows the capacity of the devices for stroke related aspects.

	Artengo Personal Coach	Babolat Pop	Babolat Play	Sony Smart Tennis Sensor	Zepp Tennis	Zepp Tennis 2
Capacity to discriminate the different types of strokes	✓	✓	✓	✓	✓	✓
Capacity to analyze the points of impact in each stroke	x	x	x	✓	x	✓
Capacity to analyze the point of impact in the same type of stroke	✓	x	✓	✓	✓	✓
Capacity to discriminate between top spin and slice	x	✓	✓	✓	✓	✓
Capacity to discriminate the flat stroke	x	x	✓	x	✓	✓
Capacity to determine the amount of spin in each stroke	x	✓	✓	✓	✓	✓
Capacity to determine the quantity of average and maximum spin in each type of stroke	x	✓	✓	✓	✓	✓

NB: When ✓ appears in blue, it will mean that the device is providing the information but not in the official measuring unit.

Table 2. Capacity to discriminate the different rackets, types of strokes, spin, and to analyze the points of impact.

Table 3 highlights the speed related aspects.

	Artengo Personal Coach	Babolat Pop	Babolat Play	Sony Smart Tennis Sensor	Zepp Tennis	Zepp Tennis 2
Capacity to determine the speed of the ball in each stroke	x	x	x	✓	✓	✓
Capacity to determine the average and maximum speed of the ball in each type of stroke	x*	✓	✓	✓	✓	✓
Capacity to determine the speed of each swing	x	x	x	✓	✓	x
Capacity to determine the average and maximum swing in each type of stroke	x	x	x	✓	x	x
Capacity to determine the quantity of effect in each stroke	x	x	x	✓	x	✓
Capacity to determine the quantity of average and maximum spin in each type of stroke	x	✓	✓	✓	✓	✓

NB: When ✓ appears in blue, it will mean that the device is providing the information but not in the official measuring unit. x\* just provides the serve max. speed. ✓ just provides the speed of each stroke in service.

Table 3. Capacity to analyze the speed of the ball and swing and spin.

Table 4 shows the statistics of the game related variables.

	Artengo Personal Coach	Babolat Pop	Babolat Play	Sony Smart Tennis Sensor	Zepp Tennis	Zepp Tennis 2
Capacity to record game statistics (percentage of 1 <sup>st</sup> and 2 <sup>nd</sup> services and points won with serves, winners, unforced errors, etc.)	x	x	x	x	x	✓
Capacity to introduce specific data of each session-match (type of surface, weather, perception of the performance of the player, etc.)	x	✓	✓	✓	x	x
Capacity to compare different training sessions or matches intra-subject.	x	✓	✓	✓	✓	✓
Capacity to compare inter-subject performance	x	✓	✓	✓	✓	✓
Capacity to differentiate between training and match play	x	✓	✓	x	x	✓
Capacity to record the results of the match	x	✓	✓	x	x	✓
Capacity to add comments to the training session or match	x	x	x	✓	x	x

Table 4. Capacity to record game statistic aspects and to make intra- and inter-subject comparisons.

Table 5 shows the possibility to create videos and to get data.

	Artengo Personal Coach	Babolat Pop	Babolat Play	Sony Smart Tennis Sensor	Zepp Tennis	Zepp Tennis 2
Capacity to record videos	x	x	x	✓	✓	✓
Capacity to visualize the videos in slow motion	x	x	x	✓	✓	✓
Capacity to visualize data of the execution in real time	x	x	x	✓	✓	✓
Capacity to reproduce execution in 3D	x	x	x	x	✓	✓
Capacity to make videos with the most relevant executions (longest points, strokes at highest speed and strokes plus slice)	x	x	x	x	x	✓
Capacity to make videos of each stroke	x	x	x	✓	x	✓

NB: ✓ just provides the speed of each stroke in service.

Table 5. Capacity to record videos of the execution and to provide instant data.

### CRITERIA FOR THE SELECTION OF A DEVICE

Here are some reasons for coaches and players on which to base their decisions when selecting the most appropriate device for their needs:

#### From the point of view of the coach

- Number of students: in the case of school coaches who work with a great number of students, it would be ideal to look for a device that can be used with a variety of racket brands and models. Coaches working individually, or with small groups can choose a more restricted model.
- Information level required according to the level of the students, and the knowledge of the coach (competition versus amateur): coaches must value the type and quantity of information they can interpret and they need, in order to improve the level of the students they work with. The higher the level and technical knowledge of the students, the higher the information requirements will be. Possible

examples could be spin related data, the training load or the performance comparison between the different training sessions or matches.



- Recordings: if the “video” option is preferred, with specific data on the execution in real time, Sony Smart Tennis Sensor and the two Zepp models, will be best options since they are the only ones that offer this possibility.
- Competition statistics data: for coaches who need game statistics as well as technical and kinetic data, the only device offering this possibility is Zepp 2 sensor.
- Type of population: one of the greatest constraints for teaching tennis at an early age is that devices cannot be adapted to smaller rackets, so junior and pre-tennis rackets are excluded. From the point of view of the player for individual use

#### From the point of view of the player for individual use

- Frequency with which the player breaks the strings: if a player breaks the strings on a regular basis, or alternates different rackets, it will be necessary to choose a sensor that can be changed to another racket, while an amateur player will be able to choose an internal device.
- To share data and performance in the social media: if players want to compare their results with those of others, using the same tool, they can buy any device, except the Artengo Personal Coach.
- If the player practices with a coach or not: in case a player has a coach, he/she should first ask the coach for advice, to make sure which the most convenient tool is, depending on their characteristics. Just as explained above, the higher the level and the technical knowledge of the player, the higher the information requirements will be.

## CONCLUSION

The use of intelligent devices in tennis, is no doubt, a considerable help to the training process, but it is important to bear in mind that they are there to contribute and help, and never to take the place of the coach. The selection of one device over another will largely depend on the parameters you want to control, i.e. whether they are more targeted towards the knowledge of the stroke dynamics, to having immediate ‘videos’ or feedback, to getting competition statistics, etc. No doubt, the tables presented will help to allow for a better selection based on concrete interests.

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