

Intelligent devices for tennis rackets

Ángel Iván Fernández-García and Gema Torres-Luque

University of Jaén, Spain

ABSTRACT

The current technological advance within the field of sport is an undeniable fact, and this includes a speciallist sport such as tennis. In line with these changes, there are different devices in the market today to help players' technical and kinetic analysis. Coaches sometimes cast doubt about these devices' performance and technical characteristics. This article intends to ntroduce the tools that are currently marketed that offer technical and kinetic information about tennis players.

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INTRODUCTION

The use of technology in tennis, just as in other sports, has been booming over the last years. There are more and more powerful and affordable tools available in the market, whose objective is to improve tennis players' performance, and to help to improve training programmes. Perhaps one of the most exponential current advances is the availability of "intelligent courts" for training and competition such as Play-Sight (Play-Sight, USA), which, by means of a camera system, provides data about tactical and kinetic parameters, in real time, with continuous storage, videos, information about type and duration of points, and a long list of other possibilities for the technical team. It is true that this is advanced technology, which mainly due to its price, is not accessible to all coaches.

However, it is interesting to highlight that there are lots of devices in the market, chips or other instruments, that are attached to the racquet and provide a great deal of information in real time about performance, game statistics, etc.; there are free or low cost apps for portable devices that are easy to use, in tablets or smart phones (Quinlan, 2013). They all have the same objective, to provide players and coaches with a number of technical, tactical, physiological, kinetic or statistical parameters, in a timely and direct manner.

Because of this, the amount of data that players and coaches can gather using these tools is amazing. Still, for the scientific and technological contribution to be transmitted to improve performance, it is key for coaches to know how to select the relevant information, depending on their goals; and they should know how to interpret and convey it to the player (Barnett & Clarke, 2005; Barnett et al., 2008; Gillet et al., 2009; Martín, et al., 2014; O'Donoghue, 2001; Pollard et al., 2010; Reid et al., 2010, Over, & O'Donoghue, 2008; 2010; Pestre, 2009), given that just plain data can be meaningless for athletes.

This article intends to introduce the tools which are currently marketed and offer technical and kinetic information about the action of the racket on the ball.

METHODS AND PROCEDURES

A revision of the current market was carried out in order to identify the existing tools that provide technical and kinetic information. The results are framed within 3 options: a) built-in chips in the racket. b) devices that are externally placed on the racket, and, c) devices that are placed on the player's wrist. Once all the devices have been selected, official websites of each product are analysed, in order to get more detailed information about the technical characteristics and possibilities of each tool.

DESCRIPTION OF THE DEVICES

Artengo Personal Coach

Artengo Personal Coach (https://www.decathlon.es/personalcoach-artengo-sensorpara-la-raqueta-id_8247319.html) is an external sensor that is placed on the racket's throat, just at the end of the grip, to which it is attached by two Velcro tapes., There is also a watch which is connected to the sensor by means of waves with which it shares information immediately when the distance between them is less than 20 m. Its main disadvantages with respect to its competitors are: a) the attachment of the sensor to the racket is unstable, reducing reliability of the data, b) because it has a considerable size, and it is placed on the throat of the racket, it modifies the racket's balance and impacts on technical execution of the stroke (see figure 1).



Figure 1. Artengo Personal Coach.

Babolat Play System

Babolat Play System (http://es.babolatplay.com) is made up of several sensors that have been built-in the racket handle without altering its initial weight. This is its main advantage; however at the same time it may be used only on a single racket, an important aspect for those competition players who break strings all the time. In the butt cap there are two buttons and a USB port. The buttons are used for turning the device on and off, and for the Bluetooth connection; the USB port, is used to charge the battery and transfer the information recorded. It offers Bluetooth technology and an application for tablets and smart phones with which you can see the data instantly. Play technology is available in Babolat Pure Drive, Pure Drive Lite and Pure Aero (see figure 2).



Babolat Pop

Babolat Pop (http://es.babolatplay.com/pop), from same brand as the above, is a sensor that is placed on a specially designed wrist-band, which the player must wear on his dominant hand. Just like Babolat Play, it transfers the information through a USB port or via Bluetooth, and there is an app for tablets and smart phones. Its main advantage is that because it is outside the racket structure, it does not alter its weight or balance, and it can be used with all racket models and brands. At the same time, this might pose as a disadvantage, since it may reduce the reliability of its measurements, and it may not be comfortable for the player (Figure 3).



Figure 3. Babolat Pop.

Sony Smart Tennis Sensor

It is a small device that is placed on the butt of the racket and consists of something that is inserted (Figure 4). This device has an internal sensor, and just like the others above: it has Bluetooth technology; a USB port, to charge and to transfer the information; and, a specific application, as well. These characteristics are an asset when compared to Babolat Play system, as it can be attached to the structure of the racket, and therefore can be used with a variety of brands; however, not too often, since it increases the weight. This can slightly alter the sensations of the tennis player, and therefore affect their performance, although not so much as the Artengo Personal Coach, because of the position of the sensor. (https://www.sony.es/electronics/dispositivos-inteligentes/ssetn1w)



Figure 4. Sony Smart Tennis Sensor.

Zepp Tennis

Zepp Tennis and Zepp Tennis 2 (http://www.zepp.com/en-us/ tennis/), are two devices of a different brand, which have the same specifications as those detailed for the Sony Smart Tennis Sensor. That is, they are external devices, have a USB port and Bluetooth functionality, and can be used in different racket models. Therefore, they have the same advantages and disadvantages mentioned before (Figure 5).



Figure 5. Zepp Tennis & Zepp Tennis 2.

CHARACTERISTICS OF THE DEVICES

Table 1 below illustrates, in a simple way, the technical and working characteristics of the different devices selected.

	Artengo Personal Coach	Babolat Pop	Babolat Play	Sony Smart Tennis Sensor	Zepp Tennis	Zepp Tenis 2
It can only be used on a single nacket	-	-	1		-	4
It can only be used on Wilson, Prince, Yonex and Head neckets	-	-	-	*	-	-
This tool can be used in all kinds of brands	1	1	*	*	1	1
This tool discriminates data depending on the specific type of racket.	*	*	1	*	*	*
The tool discriminates between right and left handed players	2	1	1	*	*	*
The tool does not alter the racket weight	*	*	1	×		
It can be used with junior rackets	*	*	*	×		
The tool has Bluetooth technology	*	1	1	1	1	1
Duration of the battery without Bluetooth technology	6 hours	2	6 hours	3 hours	4 hours	8 hours
Duration of the battery using Bluetooth technology	*	2	- 2	1.5 hours	1	1
Capacity of the memory in hours or strokes	so hours	t0 hours	s50 hours	12,000 strokes	3,500 strokes	1
Charging time	3 hours	1	- 2	2 hours	2.5 hours	1.5 hours
Possibility to view date immediately	1	1	1	1	1	1
Weight	20 gr	10 gr	o gr	8 gr	7-7 81	6.25 gr
Size	1	-	-	31,3 X 17,6 mm	28 x 11 mm	25,4 X 12,3 mm
Compatible with iOS and Android	*	1	1	1	1	*
Price (approximately, November 2017)	2	€80	6350	€200	-	€110

Table 1. Tool, application use and function related aspects of intelligent devices. NB. ? indicates that the information does not inlcude tehcnical and performance charcteristics.

CONCLUSION

After the final revision of scientific literature, and product websites, the conclusion is that the use of the technology is very positive, it gives a great deal of information in real time that will provide more quality, efficiency and motivation to the training programme. These tools must always be used as a complement to provide added value to the coaches' task, but they will never become a suitable substitute. Thus, coaches must be updated as to developments in, and invest in the new technologies, if they want to improve their performance, and that of their athletes.

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