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The Official Coaching and Sport Science Publication of the International Tennis Federation

EDITORIAL

Welcome to issue 69 of the ITF Coaching and Sport Science Review. In this special monographic issue of CSSR, the main topic of focus is physical development in U12 tennis players. This edition features articles from various authors all boasting years of coaching experience related to the athletic development of young tennis players in this important developmental phase.

The ITF Coaches Commission (pictured right) met at the ITF Headquarters in London on Sunday 3 July, with the meeting chaired by Russian Aleksei Selivanenko, who sits on the ITF Board of Directors. The Commission also welcomed new members for the 2016/17 term including: Alfredo de Brix (PAR), Martin Blackman (USA), Dr. Janet Young (AUS), David Sanz (ESP), Hichem Riani (TUN) and Wei Zhang (CHN).

The agenda at the meeting covered a range of strategic discussions including ITF International Coaching Licensing and Certification, continuous professional development for coach education, on-court coaching and the impact of entry-level National Junior tournaments on participation.

Luca Santilli, the ITF Executive Director, Tennis Development presented the new Development strategy with its two core objectives – increase participation in tennis world-wide and develop talented players – through four strategic pillars: Events, Facilities, Coaching and Programmes. The Commission also discussed the preparations for the 2017 ITF Worldwide Coaches Conference by BNP Paribas.

Miguel Crespo, ITF Participation and Coaching Manager, reported on the progress made in coaching since the last meeting, and how the new coaching strategy will be implemented in order to improve coach education in tennis worldwide for the benefit of the ITF member nations.

ITF Coaching have finalised the venues and dates for this year's Regional Coaches Conferences by BNP Paribas. They are:

ITF Southern African Regional Coaches Conference: Sun City, South Africa from 9 to 11 August

ITF/OS Caribbean Regional Coaches Conference: Port of Spain, Trinidad from 6 to 9 September

ITF/OS Central American Regional Coaches Conference: Queretaro, Mexico from 26 to 29 September

ITF West Asian Regional Coaches Conference: Tehran, Iran from 15 to 17 October

2016 Tennis Europe Coaches Conference: Antwerp, Belgium from 20 to 22 October

ITF/OS North African Regional Coaches Conference: Oran, Algeria from 24 to 27 October

ITF/OS Asian Regional Coaches Conference: Guangzhou, China from 29 October to 1 November



ITF South American Regional Coaches Conference: Santa Marta, Colombia from 1 to 4 November.

The ITF will be launching an official conference app for delegates that will keep attendees up-to-date with: daily schedules, speaker biographies and presentation summaries and the opportunity to interact with other conference app users and industry expert speakers through a live activity feed.

The app will be available for free download on iOS, Android or HTML5 only if you have received a welcome email and are attending the following conferences:

ITF Southern African Regional Coaches Conference by BNP Paribas: Sun City, South Africa from 9 to 11 August 2016 “Performance coaching for junior tennis” or ITF South American Regional Coaches Conference by BNP Paribas: Santa Marta, Colombia from 1 to 4 November 2016 “Preparación física en el desarrollo de los jugadores”

Newly published content on Tennis iCoach includes conference presentations from the 2015 ITF Worldwide Coaches Conference and LTA National Coaches Conference from experts including: Francis Roig (ESP), Alex Cuellar (ESP), Kenneth Bastiaens (BEL) and Louis Cayer (CAN) to name a few. Members can also find out more about the growing visually impaired tennis opportunities and view new drills videos that can help improve training and matchplay performance.

You can view all of these presentations and register for Tennis iCoach membership here.

We hope that you enjoy this latest issue of the ITF Coaching and Sport Science Review and the articles prove informative in broadening worldwide coaches' knowledge in the physical development of U12 players.

The role of tennis in developing physical literacy

E. Paul Roetert (USA), Mark Kovacs (USA), Miguel Crespo (ESP) and Dave Miley (GBR)

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ABSTRACT

Tennis may just be the perfect sport along the journey of physical literacy. Few sports can claim all the lifelong benefits that tennis provides. These benefits include physical, psychological, social and emotional aspects that lead us to achieving the competence, confidence and desire to enjoy physical activities for a lifetime. That is exactly what physical literacy is all about. Tennis can be played at almost any age in multiple environments, requires only one partner to play with, has multiple health benefits and certainly provides players with significant enjoyment while competing.

Key words: benefits, health, lifelong, participation

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INTRODUCTION

Physical literacy as defined in SHAPE America's National Standards & Grade-Level Outcomes for K-12 Physical Education (2014) and Mandigo et al. (2012) is "the ability to move with competence and confidence in a wide variety of physical activities in multiple environments that benefit the healthy development of the whole person" (p. 27). Other definitions have been put forth but embracing physical literacy as a desirable outcome clearly allows us to enhance physical education, physical activity and sport programs throughout the world (Roetert & Jefferies, 2014).

Although one of the first uses of the term physical literacy in the United States referred to young army recruits being physically illiterate (National Physical Education Service, 1938), it was revived again as an updated concept fairly recently. More than sixty years later, Great Britain's Margaret Whitehead shared her landmark paper entitled "The Concept of Physical Literacy" (2001) where she stated that physical literacy must encompass more than physical skills; it must include an ability to read the environment and to respond effectively. We can't think of a sport more appropriate than tennis to teach these exact skills. Whitehead (2013) later asserted that not all contexts throughout the years were related to physical activity. Since Whitehead's initial paper, the concept has been discussed, shaped, adopted and implemented with success in number of different countries. Much of this was based on her recommendation to address concerns that:

- Fewer people are continuing with physical activity after leaving school.
- Sedentary leisure pursuits are on the rise.
- Cases of obesity and stress related conditions are increasing.
- In many schools and other physical activity settings there was, and is, a subtle move towards high level performance being the principal focus of the subject.

In our opinion, the sport of tennis is in a unique position to address these concerns. Physical education classes as well as sports activities are offered during and after school hours in most countries. However, when children enter adulthood, an effort to continue physical activity either through sports or leisure pursuits has to consciously be made. Even during the school years, many students engage in video games and other sedentary electronic activities. All this has led to increases in obesity and overall physical inactivity. This is where the sport of tennis has a distinct advantage over many other sports. Although tennis can be played at very high levels of competency, players of all abilities can enjoy the many physical activity benefits throughout a lifetime. As a sport for a lifetime it can be played at all skill levels and provides excellent physical activity both competitively and recreationally. As tennis skill improves, players become more physically literate by understanding the different components of the sport such as reading the environment and responding appropriately. This includes psychological, social and physical benefits.



LONG-TERM ATHLETIC DEVELOPMENT

The concept of physical literacy is very much in line with the goals of the structured pathway of Long-Term Athlete Development (LTAD). The pathway of LTAD allows players to optimize their development at all ages and stages based on their developmental age and the maturational level rather than chronological age.

As stated by Balyi and Hamilton (2003), a specific and well-planned training, competition and recovery regime will ensure optimum development throughout an athlete's career, with success based on training and performing well over the long term rather than winning in the short term. However, as Lloyd et al. (2015a) point out, ensuring that youth of all ages and abilities are provided with a strategic plan for the development of their health and physical fitness is also important to maximize physical activity participation rates, reduce the risk of sport- and activity-related injury, and to ensure long-term health and well-being.

Coaches must therefore provide individualized programs based on the needs of each player to motivate them towards a lifetime of participation. Players should be provided with individualized development programs to motivate them for lifetime engagement in tennis and physical activity in general. Lloyd et al. (2015b) appropriately point out that from an athletic development perspective, it is important to expose youth to a variety of movement patterns to ensure that a child can competently perform a breadth of movement skills in a range of different activities and environments before specializing in specific movement patterns within a single sport. This is in line with Roetert and Couturier MacDonald (2015) who point out that at early ages the activities or curriculum should be focused on fundamental movement skills and combinations that are applied in specific games, sports, and physical activities in later years.

Tennis by itself certainly provides many strength, flexibility, coordination, speed, agility and other health benefits, yet should also be supplemented by other physical activities particularly early on in development. Another reason for this is that a high proportion of youth who specialize early will not successfully reach the highest

level of elite tennis and will therefore require a requisite level of athleticism to support lifelong participation in other sports and physical activities.

Although it is difficult to identify a definitive age at which to start formalized training, most 7 and 8 year olds are ready for some type of structured training as part of fitness recreation, sports practice, or physical education. However, younger children (≤ 7 years of age) should still be encouraged to engage with less formalized structured and unstructured activities to promote kinesthetic development and physical literacy.

Modified equipment

The benefits of learning the sport of tennis with modified equipment have been promoted as allowing children to enjoy the game more based on an early success rate, the ability to compete at an earlier stage and the use of proper biomechanics based on racket size, court size and height of ball bounce. These benefits all form the basis for learning proper motor skills; a key component and building block of helping players become physically literate. Several studies have shown the benefits of using modified equipment when teaching beginner players particularly children. Quezada et al. (2000) studied the influence of pre-tennis on the development of motor patterns of children of 5 years of age. The motor patterns studied were running, throwing, catching, jumping and hitting. Results showed that all children significantly improved in each of the motor patterns studied. The percentage of improvement in the different motor patterns studied varied depending on the subject, and several children improved much more than expected. The overall conclusion was that pre-tennis activities can be used as a means to develop basic motor patterns of children aged 5 years, which will lead to a better adaptation to the following practice of



any sport.

Both Pellet & Lox (1997) and Buszard, Farrow, Reid & Masters (2014) found benefits to learning the game with modified rackets. Pellet & Lox (1997, 1998) examined the effects of three racket lengths (26, 27, and 28 inches) in relation to beginning player skills test. Results indicated that students who used the shorter 26-inch racket attained greater achievement for the forehand groundstroke. Buszard, Farrow, Reid & Masters investigated the influence that varying racquet sizes and ball compressions had on children's ability to play a forehand groundstroke. The study demonstrated the benefits for young children playing with scaled racquets and low-compression balls. Other studies have highlighted the benefits of using low-compression balls and scaled tennis courts in skill acquisition, ball control, velocity and overall success rate (Farrow and Reid, 2010; Buszard, Farrow, Reid & Masters, 2013; Larson and Guggenheimer, 2013; Kachel, Buszard and Reid, 2014). It appears clear that modified tennis courts and equipment accelerates the acquisition of skills required to play tennis helping to provide the foundation for physical literacy in young tennis players. The best way to obtain physical literacy in sports such as tennis is to seek the guidance of a well-qualified coach.

The Coaches' Role

Duffy and Lara-Bercial (2013) have stated that the education and development of suitably qualified and skilled coaches at all levels

of the participation spectrum is paramount to the fostering of motivated, confident and competent individuals who value and take responsibility for pursuing meaningful physical activity throughout their lives. This can be accomplished through the development of an International Sport Coaching Framework (International Council for Coaching Excellence, Association of Summer Olympic International Federations and Leeds Metropolitan University, 2012) to provide a common, worldwide set of criteria to inform, guide and support the development and qualification of coaches. The practical outcome according to Duffy and Lara-Bercial is to align coach education and development with the needs and wants of participants, but to promote coaching that goes beyond the teaching of any technical skills and towards the fostering of the holistic development of the person and an intrinsic desire and motivation to be and remain involved in sport and physical activity for life. Roetert and Bales (2014) concur in stating that among future challenges in coaching education are:

- Conducting research that further identifies the implications of coaching knowledge and ability on athlete development.
- The need to decide the role of physical literacy in coaching education.
- Developing an age-appropriate body of knowledge to coach educators of all levels.

CONCLUSION

With that in mind, the International Tennis Federation (ITF) has been instrumental in its efforts to introduce and promote tennis worldwide, develop coaching education programs, design a robust competitive structure for all ages and introduce age-appropriate modified equipment for young developing players. These efforts have all been very much in line with the concept of physical literacy.

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[RECOMMENDED ITF TENNIS ICOACH CONTENT \(CLICK BELOW\)](#)

Tennis  **iCoach**

Fundamental motor skills for 10 and 12 & under tennis players

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ABSTRACT

In this article an overview of the main characteristics of motor skill development for 10 and 12 & under tennis players are presented. Several key concepts related to this crucial area will be introduced and defined. A summary table including several guidelines on fundamental motor skill acquisition for the different stages of development is presented.

Key words: FMS, LTPD, agility, balance, coordination

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INTRODUCTION

When reflecting on the fundamental motor skills than need to be introduced to 10 and 12 & under tennis players it is crucial to define and clarify several key concepts some of which are presented below.

Definition of a child

The reference to a child is considered to typically encompass the time from birth to puberty. The onset of puberty varies between individuals, males, and females. While the sporting initiation of children can be classified according to a variety of physiological, cognitive and psychological characteristics, it should be acknowledged that such profiling will be specific to the individual (González & Ochoa, 2003).

Physical literacy and fundamental skills

A crucial area of development with 10 and 12 & under tennis players is the development of physical literacy. This is critical for the overall enjoyment of tennis and sport in general but also for development of top players. The development of overall athleticism and fundamental movement, motor and sport skills is a priority during these stages (Tennis Canada, 2003).

Physical literacy is composed of three fundamental skills:

- **Movement:** running, jumping, throwing, catching, striking an object, wheeling).
- **Motor:** agility, balance, coordination.
- **Sport:** balance, lateral movement, hitting, throwing.

If the fundamental motor skills are not developed between the ages of nine to twelve for boys and eight to eleven for girls respectively, skills cannot be fully recaptured at a later time (although carefully planned and early remedial programmes can contribute to limited success (Balyi, 2001; Rushall, 1998).

Development stages

It is obvious then that to become physically literate, children need to master fundamental movement skills. For almost every skill, the developing child needs to go through a series of developmental stages. For the purpose of this article, we are dealing with children 10 and 12 & Under.

Prepuberty, puberty, and postpuberty are a simple way to describe different development stages. Since each stage is very general and not very specific to athletic populations, different models of the Long-Term Player Development (LTPD) have been utilized to offer a more strategic approach to the athletic development of youth (Ochi & Kovacs, 2016).

Some of the most used models are the following:

Authors	Models (*)
Bloom (1985)	<ol style="list-style-type: none"> 1. Early years: stage of initiation 2. Middle years: stage of development 3. Late years: stage of perfection
Balyi (2001)	<ol style="list-style-type: none"> 1. Fundamental: Overall development of the athlete's physical capacities 2. Training to Train: Learn how to train and the basic skills of a specific sport 3. Training to Compete: High intensity individual and sport-specific training 4. Training to Win: Optimization of performance to peak for competitions 5. Retirement / Retaining: Activities performed after retiring from competition
Côté, Baker, & Abernethy (2007)	<ol style="list-style-type: none"> 1. Sampling years: participating in different sports for fun and enjoyment), 2. Specializing years: starting at about age of 13—focusing on one or two sport activities. 3. Investment years: starting at about age of 16—achieving proficiency in one or two sport activities. 4. Recreational years: participating in several sport activities, not for achieving proficiency but mainly for fun and good health.

Table 1. Most used long term athlete development models. () For a more comprehensive and tennis specific approach see Crespo & Reid (2009).*

It is important to note that, no matter the model used, coaches should be aware of the fact that the most essential component of an effective training programme is the concept of individualization and that any programme should have a holistic approach in order to encompass some of key interdisciplinary perspectives for sport and tennis development (Ford et al., 2011).

Planning

Some coaches feel that 10 and 12 & Under players do not need training plans. This is not true. Even at the initial stages of player development a specific and well-planned practice, training, competition and recovery regime will ensure optimum development throughout a player's career.





Ultimately, sustained success comes from training and performing well over the long-term rather than winning in the short-term. There is no short-cut to success in athletic preparation (Balyi & Hamilton, 2004).

Sensitive phases or trainability windows

Optimal windows of trainability are critical stages during which training produces the greatest benefit to each player's long-term development. Coaches should ensure that players are exposed to the adequate training contents at the right stage (Ochi & Kovacs, 2016). See table 2.

Authors	Models (*)
Flexibility	<ul style="list-style-type: none"> • For both genders: between 6 and 10 years of age
Agility, quickness and speed	<ul style="list-style-type: none"> • Boys: between the ages of 7 and 9 years • Girls: between the ages of 6 and 8 years
Motor skills	<ul style="list-style-type: none"> • Boys: between the ages of 9 and 12 years • Girls: between the ages of 8 and 11 years
Strength	<ul style="list-style-type: none"> • Boys: between 6-18 months after Peak Height Velocity (PHV) • Girls: immediately after PHV
Aerobic capacity	<ul style="list-style-type: none"> • Before players reach PHV

Table 2. Optimal window of trainability according different motor skills.

Individualisation

It is crucial to note that, in the development process of children, they are responsive to particular stimuli that facilitate the development of a specific physical capacity or quality at different points during the biological maturation process. The stimuli that each child is presented with should be specific to that individual.



Initiation and specialisation

Tennis can be considered an early initiation sport (i.e. 3-4 years old). However, in tennis, specialisation is not recommended prior to age ten. If specialisation occurs before age ten, it contributes to one sided (only tennis) preparation, early burn out, drop out and retirement from training and competition (Balyi, 1999).

Tennis Canada (2003) suggests that early specialization in tennis can contribute to one-sided and inadequate overall athletic preparation, lack of development of basic movement and sport skills, overuse injuries, muscle imbalances, early burnout and early retirement from training and competition.

Chronological and biological age

It has been shown that there can be extreme variability in rates and timing of growth and maturation among tennis players. Due to this, it is crucial to be aware of the athlete's status with regard to puberty, so that care and consideration can be given to the progression and intensity of physical workouts. It is important to understand that once puberty begins, the biological age of each individual is more important than chronological age. Most training and competition plans refer to chronological ages, however, these should be used as general (Ochi & Campbell, 2009).

Relative age

According to Pankhurst (2016) relative age is an important concept to be taken into account. It can be defined as the month of the year (academic or sport) in which the child was born. It impacts the abilities of individual children in different ways because a child born at the beginning of a particular year is developmentally many months older than a child born at the end of that same year. It will logically be of greater importance the younger the children are.



Competition

Competitive activities should be at the core of all fundamental motor skills programmes. Coaches should ensure that players remain motivated and challenged by games and exercises that emphasise enjoyment, personal improvement and 100% effort.

Giving 100% while learning from wins and losses will build character in a young tennis player.

Boys and girls together!!

Prepuberty is typically the ages between 8-11 years for girls and 9-12 years for boys. Boys and girls in prepuberty can usually be grouped together for physical activity because they are all at the same stage of development (Ochi & Campbell, 2009). However, research has shown that boys have better performance at motor skills tests than that of girls (Olçucu, 2013). At the end of this stage, there will be some variation between children depending on earlier growth and development.

WHAT TO DO?

Table 3 summarises the fundamental motor skills needed to be included in the training programmes of 10 and 12 & Under tennis players (Tennis Canada, 2003; Tennis South Africa, 2007).

Stage	1	2	3
Approx. age	Boys 0–4/6 Girls 0–4/5 years	Boys 6-9 Girls 6-8/9	Boys 9-12 Girls 8-11
Main goals	<ul style="list-style-type: none"> Promote the love of physical activity while laying the foundation for future enjoyment of sport. Introduced to relatively unstructured, free play in a safe, but challenging environment. 	<ul style="list-style-type: none"> Fundamental movement skills should be practised and mastered before sport-specific skills are introduced. Develop athletes' "physical literacy". 	<ul style="list-style-type: none"> This is the major motor learning stage. Children are developmentally ready to acquire the fundamental movement skills that are the cornerstones of all athletic development.
Main contents	<ul style="list-style-type: none"> Introduce and promote fundamental movement skills like walking, running, skipping, hopping, jumping, catching and throwing. Emphasize agility, balance and coordination Create neural connections in the brain using activities integrating rhythm. 	<ul style="list-style-type: none"> Develop the ABCs (Agility, Balance, Coordination and Speed/Strength), plus rhythmic activities. Further develop fundamental movement skills using a positive and fun approach. Explore the window of optimal trainability for hand and foot speed. 	<ul style="list-style-type: none"> Take fundamental movement skills to a higher level. Basic tennis skills should be mastered. Larger amount of time is spent training rather than competing.
How to do it	<ul style="list-style-type: none"> Activities to include: <ul style="list-style-type: none"> Running (stops, starts, changing direction) Catching with a wide variety of soft objects and balls of different sizes. Throwing games using right and left hand with objects that can fit into child's hand. Jumping games with 1 and 2 foot jumps. 	<ul style="list-style-type: none"> Develop ABC through games and fun exercises. Develop speed with anaerobic alactic (less than 5 sec.) on and off court games. Emphasise aerobic on and off court games. Use player body weight, light medicine and Swiss balls to introduce strength. Introduce the basics of flexibility using fun games. 	<ul style="list-style-type: none"> Coordination: Skipping, throwing, balance drills with boards, multiple tasks. Speed & agility: drills with signals and direction changes. Endurance: Be able to run 15-20 min. Strength: Use similar methods as before and introduce core stability. Flexibility: 5-6 times/week.
Tennis	<ul style="list-style-type: none"> Play and Stay (P&S) tennis with appropriately sized balls, racquets and courts for 4-5 year olds will facilitate eye-hand coordination when striking the ball and promote early success and self-confidence. 	<ul style="list-style-type: none"> Tennis participation is recommended two or three times per week, but participation in other sports three or four times per week is suggested for future excellence. Introduce basic tennis technical and tactical skills. Acquire psychological skills. (Ability to focus, emotional control, positive attitude, commitment and effort.) Introduce decision making. 	<ul style="list-style-type: none"> Develop the basic technical/tactical tennis skills. Introduce ancillary capacities: warm-up and cool down, stretching, hydration and nutrition, recovery and regeneration, mental preparation, taper and peak, integrated pre- competition routines and post-competition recovery.
Other	<ul style="list-style-type: none"> Encourage participation in fun, enjoyable physical activity daily. (e.g. swimming, tricycle and bicycle and skating.) 	<ul style="list-style-type: none"> Participation in a wide range of sports is encouraged. 	<ul style="list-style-type: none"> Participation in other sports is still encouraged.

Table 3. Fundamental motor skills to be included in the training programmes of 10 and 12 & Under tennis players.

CONCLUSIONS

For the young tennis player, an understanding of growth and development needs to be at the forefront of any training and competition programme. It is a long process of development and requires patience, especially as a child is going through the initial stages of their life.

All involved should be aware of the importance of introducing the adequate contents by using the appropriate methods while respecting the individual characteristics of each player.

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[RECOMMENDED ITF TENNIS ICOACH CONTENT \(CLICK BELOW\)](#)

Tennis  **iCoach**

Proposal for the early development of coordination skills in tennis players

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ABSTRACT

Among the different characteristics of the comprehensive development of a tennis player, there is an important one, its multi phase component. Above all, one of the bases of motor development during the maturity process of the player, has to do with coordination skills. It is considered that the development of coordination is an essential element in the developing stages of young tennis players, therefore, it should be part of the content of the programme from the very first stages, if it is expected for players to reach a competitive level. This article offers a number of guidelines and examples to improve and develop these coordination capabilities.

Key words: Coordination capabilities, motor development, nervous system maturation.

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INTRODUCTION

Coordination in tennis represents an indispensable capacity to optimize player performance (Born, 1999). Although it is true that tennis is a multiphase sport (König et al., 2001; Fernandez-Fernandez et al., 2009), technique is considered as one of the most important and determining qualities to reach top performance. This technical component, that has to do with the 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 biomechanic principles applied to tennis will be taken into account (Elliott, 2006), the principle of coordination of partial impulses, 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. In this sense, coordination will allow for 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 the physiological point of view. In fact, we could associate the development of coordination capabilities to being competent in the sport activity, sport competency being the command of a repertoire of relevant responses to situations, that in many cases, are new, and highly uncertain for the player. (Bernstein, 1967) highlighted the importance of understanding how the human system was able to integrate so many different behaviour units. This is what we know as degrees of freedom. So, during learning, there are coordination synergies or structures that provide solutions to the problems, and in fact, they solve motor tasks in different way, each time they occur (Schmith, Wisberg, 2008).

As to the upper structures of the central nervous system, coordination will imply an improvement in the efficiency of information processing and the possibilities of the subject to look for adaptations and solutions to the problems in uncertain situation as tennis practice. (Bourquin et al., 2003) points out that in tennis, a sport of high uncertainty, only players who manage to get the maximum neuromuscular (technical skill) and energetic (physical condition) adaptation, by means of varied and stimulating training, will be successful at the top level. In fact, we know that coordination is determined by the correct functioning of the nervous and locomotor system, that is, the moment we suffer a transient, (stress, fatigue), or permanent (injuries in the nervous system) problem, our coordination may suffer the impact.

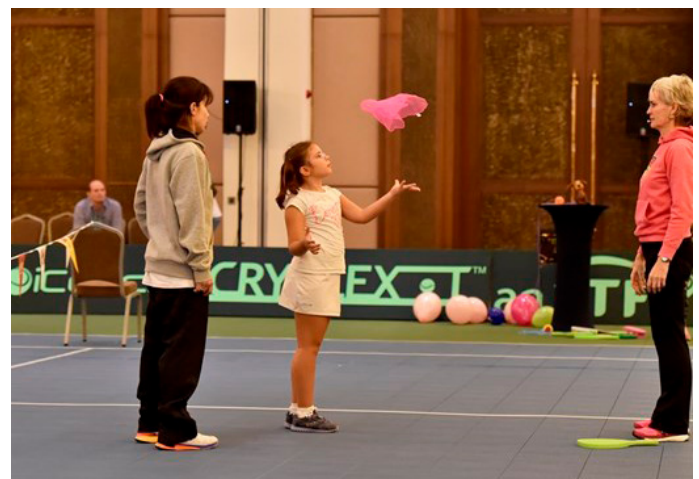
In this sense, coordination could be defined as the ability of the body, or one of its parts, to perform in an orderly, harmonic and efficient sequence, a certain movement or action.

The different classifications of coordination skills present different numbers of capabilities that make up these coordination capabilities. We have adopted the classification of 7 components, in line with (Meinel, Schnabel, 2004).

DEVELOPMENT OF COORDINATION CAPABILITIES

As expressed before, the work of these skills must start at an early age since it is at this time in life when the nervous system is easier to format (Souto, 1997; Piaget, 1993). Actually, coordination evolves parallel to the development of the person, and is conditioned by biological aspects (the structure of the nervous system), and by learning, and by the level of motor experiences the individual is subject to. Thus, the individual acquires the nervous and muscular maturity to be able to control their own bodies (crawling, walking, climbing) from the first years. During this stage, coordination development will be closely linked to the correct structure of the body, as well as the knowledge and control of their own bodies. (Hirtz, 1987) points out that coordination skills should be trained during childhood and adolescence as an “additional technical training”. In most sports, technical training is not enough to learn and incorporate new skills, specific exercises are necessary to facilitate the development of the technique, so, there are studies with theories concerning the coordination requirements for each sport (Neumaier, 1999). In the case of tennis, (Mantis, 1997) states that the skills that most contribute to the development of a good service in young players are body coordination, reaction time and accuracy in the strokes.

Most coordination disturbances happen between birth and the 4th year, that is why it is important to provide a stimulating and caring environment all along this maturation process. Most coordination improvements happen between 4 and 7 years of age, even though they will continue evolving. In fact, condition capabilities, as strength and speed, improve after puberty, thus enhancing coordination skills. The International Tennis Federations (ITF, 2003) provides a very didactic and useful guide with the parameters to be enhanced, depending on the age of the player. (Bourquin et al., 2003) proposes this table (Table 1), which summarizes the development of the subjects and a guideline for coordination work.



Age: 4-6

Children between 4 and 6 years must develop a number of simple motor skills (running, jumping, throwing, hitting, aiming, rolling, etc.), in order to get a good foundation and optimize learning stages and improve their future efficiency.

Age: 7-10

As to children between 7 and 10, the priority is to improve the following skills: reaction, speed, space analysis and coordination under pressure. The latter should be practised with competitive or timed exercises. It is key to keep the quality of the exercise during competition.

Age: Girls, 11-12, Boys, 10-13

Motor learning is optimal at this stage. This is the best age for coordination training. The main characteristic of this stage is that the child improves control and combination, and analysis skills, as well as the reaction speed and rhythm. Therefore, training will focus on its development. At these ages, children can perform "Double task" exercises.

Puberty

Puberty brings about morphological changes and growth varies between 8-10 cm. This fast growth may interfere with coordination, and impact on the fine motor skills in particular. It is important to do simple exercises and consolidate and improve movement execution and techniques that have already been learnt.

Adolescence and later stages

During adolescence, the potential to learn techniques and movements is maintained, particularly in boys. It is during these periods that coaches can observe a general stability in the motor activities of their players.

PRACTICAL PROPOSAL OF EXERCISES TO DEVELOP COORDINATION SKILLS

We propose a number of exercises, by way of example, to work the different coordination skills, and some basic methodological orientation for this work.

Orientation

Exercises with balloons. The player has to try to keep 2-3 balloons in the air. The racket can be added to control the balloons, and the player will be told in which order to hit the balloons, depending on the colours.

Differentiation

Exercises with balls of different sizes, and pressures: bouncing a basketball with one hand and a tennis ball with the other one. Rallies to set zones with balls of different pressures.



Balance

Balance exercises on unstable surfaces, like a Swiss ball, balance platforms... Exercises can become more specific like hitting from these surfaces.

Rhythm

Exercises with a skipping rope, combining different supports. Exercises on the agility ladder. using cones at different distances.

Reaction

Exercises including different starting positions and different stimuli. Throwing and receiving balls with unpredictable bounce effects (z balls).

Combination of movement

Exercises in which the player performs a "double task", that is, two different functions at the same time, for instance, bouncing a ball on the ground with one hand, while going through the agility ladder in a certain sequence, and without losing control of the ball that is bouncing.

Transformation or change

It is an exercise in which the player adapts to the situation, for example, the coach feeds from the basket with different height, speed, depth... and the player must constantly adapt.



CONCLUSIONS

The important role of coordination skill development must be considered when developing players. Beginning from the early stages of tennis player development this will be especially key due to the relationship with the maturation of the nervous system.

In conclusion, both the coach and the physical trainer must lay emphasis on coordination work, in order to optimize the technical movement skills for tennis strokes and sprinting. (Forcades, 2003) also recommend improving all coordination skills, even though it may be necessary to work hard on kinaesthetic differences and reaction capabilities, which seem to be of utmost importance for our sport, a solid foundation of these skills will further aid in the long term athletic development of tennis players.

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[RECOMMENDED ITF TENNIS ICoACH CONTENT \(CLICK BELOW\)](#)

Tennis  **Coach**

Speed development for 10 and under tennis players

Kenneth Bastiaens (BEL)

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ABSTRACT

Children must be cultured in and from a broad base of motor skills in tennis programs. The children's speed abilities cannot be challenged and therefore fully stimulated in a tennis-specific context. At this stage the acquired tennis skills are unstable under pressure. Consequently, we should consider developing the speed abilities for 10 & under tennis players in a non-specific, yet challenging context within a motor skills practice.

Key words: speed, motor skills, U10

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INTRODUCTION

A natural reasoning for us as coaches is that speed training serves the player development with regard to improving performance. From this perspective the theory and discipline for speed training generally adopts a 'top-down high performance' approach. We learn from what we see at the highest level and from what these top players have done to get there.

We should also bear in mind that over 95% of the tennis community consists of recreational players and the circumstances for player development are changing. More and more children turn to tennis at a very young age, whereas the motor readiness of these children strongly runs backwards. Tennis-programs are inadequate in terms of ensuring well-rounded player development.

SPEED DEVELOPMENT FOR TENNIS AND ITS APPLICATION TO THE 10 AND UNDER AGE GROUP

Although it is suggested that speed should be practiced off-court for 10 & under players, the necessary basic skills for an outstanding tennis-specific speed performance must be acquired. Speed training for tennis is highlighted from the perspective of the game specific demands and performance determining factors.

With respect to the nature of the game, speed in tennis is much more than running, stopping, sliding, changing direction, hitting hard, high frequency footwork, ... A player's speed performance relies on the ability to adapt and control acquired skills within their personal constraints under time-pressure.

Before considering the type of movement speed, and which movement skills are to be employed, it is important that the players are inspired to make the movement actions as fast as possible in order to exploit their speed potential. In this case, the context is created by the coach along with the set of rules of the game/task.

The coach needs to set (realistic) high standards, a positive and supportive attitude towards the players while simultaneously allowing for the playful nature of children at that age. You could argue that we do not aim for 'Deliberate Practice' for children between the ages of 7 to 12 years, we prefer to call it 'Deliberate Play'.

The game/task design should lead to a mind-set within the children that encourages them to accomplish their actions fast(er). The coach has to adapt the degree of the coordinative complexity based on the ability of the children. Experience shows that despite the skilfulness of the children it is advisable to start-off with speed drills that have a simple organisation like a back and forth relay and a straightforward action and build the speed challenge from there. Such a step-by-step-approach helps coaches to get the children familiar with the situation and necessary skills, to work with larger groups and to achieve the main goal, namely to train speed.

TRAINING SPEED ABILITIES FOR TENNIS

Tennis players are considerably and predominantly dependent on their perceptual skills for speed performance. They must be able to simultaneously track the ball, coordinate their movements, orient

their position and observe the actions of the opponent. In addition, they must realize several successive intended actions based on the perceived information in real time. After many years of tactical and technical training, a player's brain is able to interpret game situations and formulate applicable motion responses.



Although the children have not yet acquired the sport specific skilfulness, that doesn't necessarily mean that the perceptual and brain skills that precede a flawless motor control cannot be trained. From 6/7 years old children can be encouraged to perform (sequences of) general motor skills in a dynamic or even interactive context as fast as possible, allowing them to develop their primordial split-vision and thinking-and-doing capabilities.

Besides the ability to organize various tasks sequentially and/or simultaneously in a dynamic environment, a player must be able to tap into their acquired fast movement abilities. During a rally a player needs to run, hit, shuffle, push-off, twist, turn ... quickly, invoking their basic motor skills. With the right speed training stimuli players can build the necessary fast action blocks for explosive movement actions. As these blocks are acquired through the construction of a fast brain pattern and the development of the necessary physical abilities, training strategies for speed training should focus on evoking a favourable improvement on both levels. To ensure a well-rounded development and for planning & periodization reasons, it is useful to categorize the types of speed training. Multi SkillZ, a specialized motor development method for success in sports for children between the ages of 6 and 12 defines 4 types of speed abilities: 1- (Re) action Speed, 2- Agility, 3- Start, Stop & Running Speed and 4- Speed Coordination. To reach the ultimate speed performance ability in the long run, Multi SkillZ promotes general motor skills being challenged to their fullest extent under time pressure in a dynamic context through various games and (inter) active motor tasks.

LON-TERM SPEED DEVELOPMENT AND SENSITIVE PHASES

Speed training for the world's elite consists of specific on-court drills, set-up with or without side exercises (complex training), flanked by off-court agility, start-, stop-, run- & displacement and striking drills. Furthermore, the players' limits are pushed by physical conditioning methods such as specific complex, power, strength, endurance and flexibility training. This predominant tennis specific and physically orientated approach is not what you are looking for in developing the speed abilities with the 10 and under age group.

The load capacity of children compared with adult players, is in many ways limited, yet unique opportunities do exist for the 10/12 and under age group to help them reach their maximum tennis potential.

To adapt and control the tennis specific skills under the ever-changing challenging situations, players need to utilize their (implicit) motor abilities, in particular when there is a need to react and move quickly. These implicit skills are mainly built up during the first 12 years of our lives through our movement experiences. Alongside the contribution of talent, a great wealth of movement experience allows players to select, control and execute movement actions more effectively.

Achieving the maximum speed potential assumes that the appropriate incentives have been offered throughout the long-term development. Before puberty, the neural system reaches a maturation level of 98% around the age of 6-7 years. The window of opportunity where the development of the predominantly physical abilities, such as stamina, strength and anaerobic power, is particularly effective and starts at the Peak Height Velocity (PHV) during the first phase of puberty. During the 'FUNdamentals' (6-8/9 years) and 'Learning to Train' (8/9 – 11/12 years) phase before PHV, the priority is motor development. Balyi & Hamilton suggest stimulating the ABC's (Agility, Balance, Coordination and Speed) continuously for 12 & under players. Between the ages of 7 to 10, there is a unique period of time, called 'Peak Speed Velocity 1', which accelerates the development of the speed capability. This period corresponds with a number of favourable neuro-physiological changes. The Peak Motor Control Velocity is introduced to the 'FUNdamentals' and the 'Learning to Train' phases, representing the start of the golden period to develop motor control and motor skilfulness. As the physical abilities of the children are underdeveloped before the PHV, the speed incentives should target the improvement of the neural aspects of the speed development through various movements. As Multi SkillZ suggests: 1- (Re) action Speed, 2- Agility, 3- Start, Stop & Running Speed and 4- Speed Coordination.



CONCLUSION

As more and more children turn to tennis at a very young age and the existing tennis-programs are fundamentally inadequate in ensuring a well-rounded player development, there is a need for a high quality motor skills program for Red, Orange and Green programs. The problem is that most of the information available to coaches focuses on top-down tennis and strength & conditioning development models when the motor readiness of children is heavily deteriorating.

To increase the motivation & participation and to accelerate the development of speed abilities, children must be cultured in and from a broad base of motor skills in tennis programs. After all, the physical load capacity of the children is limited and their motor readiness is concentrated primarily in the coordination and skills level.

Bearing in mind that the tennis specific skills are unstable and that there are unique opportunities to positively influence the speed abilities in the 10 & under age group, it is recommended that general speed training forms a fixed value in the training program. As young children prefer play competitively, the speed practice should be fun, include elements of surprise, variety, of playing together and be open skilled ... as the main ingredients. To fulfil the players' speed potential, it makes sense to develop both rapid action movements and fast perceiving-thinking-and-doing strategies for 10 & under tennis players.

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RECOMMENDED ITF TENNIS COACH CONTENT (CLICK BELOW)

Tennis*i*Coach

Developing balance in 10 & under tennis players

Javier Villaplana (ESP)

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ABSTRACT

This article discusses balance, one of the six coordination skills the International Tennis Federation (ITF) mentions in its book Strength and Conditioning for Tennis. First, this capacity is discussed, together with the importance of its development in tennis at an early age. Then, two types of balance fundamentals are described, and some examples, and some research carried out on balance in young tennis players are included. Finally, different balance exercises which can be used with beginner players are presented.

Key words: balance, coordination, infancy, development.

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INTRODUCTION

Balance has been defined differently by different authors. Thus, for (Meinel & Schnabel, 2004), balance is the capacity of keeping the desired position of the body, either in a static position or in movement, always keeping a centre of gravity, a support base and an inertia movement.

In its turn, the USTA (2016) considers that balance is the capacity of a player to control his/ her balance or stability.

For other authors, balance is the capacity to keep a body position in control, during the execution of a task, sitting at a table, walking on a balance bar, or stepping on an edge. In order to work effectively in different backgrounds and tasks, it is basic to have the capacity to keep controlled body positions during static (fixed) and dynamic (in movement) activities Kids Sense Child Development,(2016).

In order to better understand the importance of balance in tennis, it is necessary to make a brief description of the sport, and also to know its biomechanical demands.

Tennis is a sport of opposition, where one of the targets of the players is to move the opponents for them to hit the ball, as uncomfortably as possible, so as to make them fail, or, should the ball bounce in the court, try to keep the advantage of the situation so as to be able to win the point with the next stroke.

From the biomechanical point of view, tennis is a sport with high motor activity, where the racket, through the arm, at the last moment, executes a complex movement that sets several muscles in action, both from the upper, and the lower limbs. One of the targets of training is to activate the muscles in a coordinated fashion, so as to get efficient strokes and movements to be able to hit as accurately as possible.

Correct balance helps the child to practice sport with reasonable success, since it will help them to execute those fluent movements which are necessary for physical performance. If children aged 10 and under can perform body movements appropriately, and in a controlled way during the execution of the different tasks that sport activity demands, they will be able to reduce the energy they use, and therefore, they will be minimizing fatigue.

Besides, when movements are made in good balance, the possibilities of injury decrease, since the child is using the appropriate posture as (and when) it is necessary. Likewise, balance allows a correct body posture for the different tasks, in gross and fine motor functions.

As we have explained, balance will play a key role, hitting in balance helps to direct the ball accurately, and this will help, on the one hand, to create an attacking situation to take the upper hand, and win the point, or on the contrary, try to defend as much as possible, trying to revert the situation, in order to take the lead and, while attacking, try to win the point.

TYPES OF BALANCE

When describing balance, we note that it can be classified into static and dynamic balance. In the case of static balance, (Chu & Rolley, 2001) define it as the skill to keep balance when the centre of gravity is placed on a support basis. As to dynamic balance, these same authors describe it as the skill to stay on our centre of gravity while the body is moving.

In daily life, static balance is the capacity of keeping a stationary position with control (for instance, staying “frozen” or playing to be a “statue”) while dynamic balance is the capacity of keeping balance whilst in movement (for instance, running, jumping, or riding a bike).

For the USTA (2016), all coaches need to know and understand both types of balance and the possible examples that can occur during the game of tennis. So, the player will be in static balance, this being the capacity to control the body while it is stationary, when it is getting ready to serve, while the player will be in dynamic balance, that is the capacity to control the body during movement, when they change the direction after a stroke.

Khasawneh, (2015) studied the relationship between anthropometric measure and its relation with static and dynamic balance in junior tennis players. The experimenters came to the conclusion that the factor that best contributes to static balance is the width of the pelvis, while the circumference of the calf and the width of the ankle were the most significant for the dynamic balance.

RESEARCH ON BALANCE FOR TENNIS IN YOUNG PLAYERS

Andreas, Michelin, Elisa, Rinaldi & Burini, (2010) examined the differences between sexes in primary school children in static balance and its relation to anthropometric measures, and came to the conclusion that static balance relatively depends on body weight and longitudinal measures.

While researching on the effect of balance training on young players, research by Malliou et al. (2010) concluded that fatigue generated by tennis practice during a long time has a negative effect on balance, so they suggest including a specific balance training programme during the tennis training sessions. For these authors, it is key that players keep their balance capacity during a long time, especially in long matches.

Additionally, a study by Sales et al. (2014) examined the relationship between balance and age, and found that balance is related to growth, since adults have more balance than adolescents. They also found that the height and the weight have significant impact on balance on children. However, they have no impact on balance in adolescents.

Besides, according to Sannicandro et al. (2014) balance training exercises have proven to be appropriate to reduce the asymmetry of strength in the lower limbs of young tennis players. They have concluded that all balance training programmes, as well as all tasks or games performed on unstable surfaces, will benefit the

performance of tennis players.

PRACTICAL APPLICATIONS

Below are some different exercises to work static and dynamic balance with 10 & under tennis players. These exercises can be done on a tennis court, or on a multi-sport court. Sometimes, some basic material, which all coaches have available, may be required:

Static exercises:

- **Exercise 1:** Two players holding their rackets, will stand back to back with one leg raised. Players will rotate their core 90° to pass the ball to the other player. The exercise can be done rotating right or left as many times as the coach decides.



- **Exercise 2:** On-court exercise. The player will be on the service line with their racket in hand and feet in a closed position, but just leaning on the leg in which they have their weight placed. Should a right handed player play a forehand, they will lean on their left leg. The coach will be at their side, just throwing a ball top down for the player to make a complete stroke trying to be in a balanced situation. Should there be more players on court, the coach will ask one player to make the stroke hitting the ball, and the rest will mirror the exercise. This exercise can be used, both for the forehand, as well as the backhand drive.



- **Exercise 3:** On-court exercise. The player will be on the service line with their racket in hand and feet in a closed position, but this



time standing on an unstable platform. The coach will be at their side, dropping a ball down for the player to make a complete stroke whilst trying to be in a balanced state. Should there be more players on court, the coach will ask one player to make the stroke hitting the ball, and the rest will mirror the exercise. This exercise can be used, both for the forehand as well as the backhand drive. And, for hitting in closed as well as open positions.

Dynamic exercises:

- **Exercise 1:** Each player will need two throw down lines, like the ones used to mark the court (or any other material the players can stand on). The players, who will place their feet on each throw down line, will have to travel always on top of these elements, but since they will have only two throw down lines, they will have to use their hands to move the throw down line and to be able to advance.



- **Exercise 2:** The coach will place as many rings as they decide, and in the position that they consider convenient. Players will have to jump from one leg to the other, using only one leg. This exercise can be performed with either leg, going forward or backwards. The difficulty can also be increased if players are made to carry a ball on their racket.



- **Exercise 3:** Two player exercise - The coach will place 6 rings per player, one in front of the other one, so that each one will have a line of rings. There will be one ball per pair, for players to pass the ball from one to the other. The player who throws the ball will do so while jumping on one leg from one ring to the other. In order to add variation, it can be done with the right leg and then with the left leg. Or, both, the player who receives and the player who throws, can be standing on one leg.



CONCLUSIONS

Balance is important in tennis and it has to be worked periodically, mainly, during developmental ages, so that the tennis player is able to act effectively in changing environments and tasks, such as the ones that occur during the game of tennis.

According to (Groppe, 2003), beginner tennis players must understand that controlling the body is key for the right execution of the stroke. The way players move to make a stroke, the way they start moving forward, and how hard they hit the ball will impact on balance and on the control of the stroke in question.

So, we face a fundamental aspect that beginner tennis players have to master and in order to do so, coaches must plan different activities, games and exercises for the tennis lesson, to facilitate the acquisition of this capacity in a natural and fun way.

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RECOMMENDED ITF TENNIS ICOACH CONTENT (CLICK BELOW)

Tennis  **iCoach**

Differences in young tennis players' agility depending on their playing level

Bernardino J. Sánchez (ESP), Guillermo F. López (ESP) and Aina Pagán (ESP)

ITF Coaching and Sport Science Review 2016; 69 (24): 19 -20

ABSTRACT

This research aims to evaluate young tennis players' agility and to analyze the differences depending on their playing level. 24 male tennis players, aged between 8 and 10 years old were involved in this research and completed three different agility tests (the 5x10m test, the spider test and the hexagon test). The findings revealed that more advanced players reached significantly higher scores in each agility test.

Key words: Physical conditioning, agility, playing level.

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INTRODUCTION

The speed of tennis strokes has increased, particularly over the last few years, so, players have to move quickly in different directions to be able to reach the ball and to hit it in the best possible conditions (Domínguez, 2011; Sánchez-Alcaraz, 2013).

Thus, agility is a very important component in those sports that demand a direction change (Jones, Bampouras, & Marrín, 2009), defined as "a rapid movement of the whole body changing direction as a response to a stimulus" (Sheppard, & Young, 2006). Different findings from different research show that 60-80% of the motion/movement during a tennis match is lateral, between 10-30% is linear and forward, and between 8-10% is linear and backwards (Pieper, Exler & Weber, 2007). Besides, tennis players change direction an average of 4 times per point (Roetert, Ellenbecker & Chu, 2003), but it is possible to change from just one movement to more than 15 changes of direction during a point (Kovacs, 2009).

So, initial acceleration and deceleration or stopping phase, and the capacity to make multi-directional explosive movements will be vital components for tennis players, and will determine their performance (Kovacs, 2007; Sánchez-Alcaraz, 2015).

Therefore, this research tries to know the values of young tennis players' agility and to analyse the differences, depending on their playing level.

METHOD

Sample

24 male tennis players aged between 8 and 10 years, 11 of which were supported by their national tennis federation (average age = $8.97 \pm .83$ years/ weekly training = 6 hours) and 13 were not (average age = $9.17 \pm .68$ years/ weekly training = 3 hours).

Instruments

5x10 test: For this test, the player will stand behind the starting line, in a high starting position, and towards a line which will be 5 metres away. Given the signal, the player will have to run as fast as possible towards the next line, he has to step on it with one foot. They will

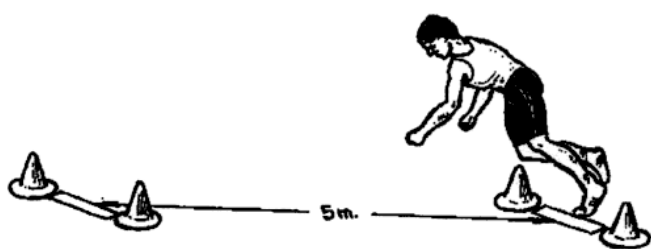


Image 1: 5x10 test (Martínez, 2008).

immediately change direction to go back to the starting line, which they will have to step on. They will have to do this 5 times, completing a total of 50 mts. (Galiano, 1992). The stopwatch will stop when the player crosses the starting line and will register the time that they took for the test.

Hexagon test: For this test, the player will be at the centre of a 60 cm side hexagon. Given the signal, they will jump forward over the line and return to the centre of the hexagon. Looking in the same direction, they will repeat the action on each side of the hexagon clockwise. The stopwatch will stop when they have finished three complete turns, and their feet are at the centre of the hexagon again. The time that will be registered, will be the better of their two attempts.

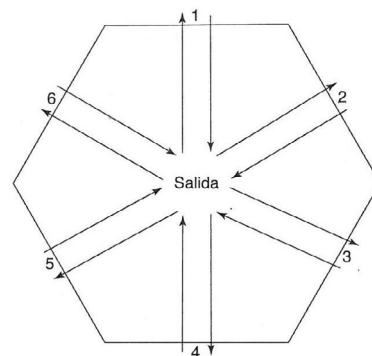


Image 2: Hexagon test (Roetert & Ellenbecker, 2008).

Spider test: Having positioned the tennis balls in the corners and centre of the longest side of an 8.23 x 5.49m rectangle, the player will start from the centre of one of the sides, and will take each ball returning to the starting point "J" and will leave them as the next image indicates. When all balls are taken, the watch will stop and the time for the test will be registered.

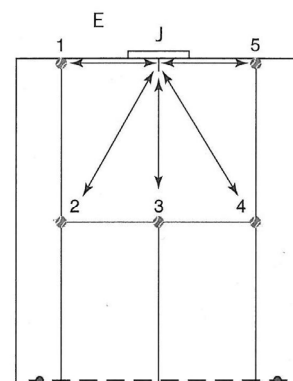


Image 3: Hexagon test (Roetert and Ellenbecker, 2008).

Procedure

For this procedure used for the execution of the tests, the researchers had to go to the clubs. After obtaining the consent of the families and clubs, the players completed the different physical tests voluntarily and anonymously. One researcher was present on-court during the test and no players withdrew. Finally, the statistical analysis of the data was made using an SPSS 21.0. IT package. Descriptive statistics were made after each test and the different variables of the groups were compared by means of Mann-Whitney U tests for independent tests.

RESULTS

Table 1 shows the descriptive statistics for all participants, for each agility test, (5x10m, hexagon and spider test), getting media values between 20 and 30 seconds, in all three tests.

	Minimum	Maximum	M	TD
5x10m test	18,17	33.19	23.93	3.73
Hexagon test	14.19	40.17	20.67	8.01
Spider test	23.67	40.83	29.18	3.28

NB: M = Media; TD = Typical deviation.

Table 1. Descriptive statistics per each agility test

Table 2 shows the relative results of the different agility tests in tennis players depending on their level of playing. As can be noticed, those players with higher playing levels, achieved significantly higher scores in agility tests.

	Expert		Beginners		Sig.
	M	DT	M	DT	
5x10m test	21.15	2.39	24.41	3.72	.004**
Hexagon test	17.45	3.91	21.23	8.33	.048*
Spider test	26.40	1.85	29.66	3.24	.001**

NB: M = Media; TD = Typical Deviation; * $p < .05$; ** $p < .01$.

Table 2. Agility difference between federation and non-federation players.

COMMENTS

To comply with the first objective, the agility level of tennis players was evaluated. In this aspect, tennis players scored worse in the 5x10, spider and hexagon tests when compared to the research made by Sánchez, Yagüe, Fernández and Petisco (2014), Le Deuff (2003), and Reid, Quinn and Crespo (2010), respectively, although these studies utilised 12U athletes.

On the other hand, depending on their playing level, more advanced players scored significantly better in each agility test, this coincides with other tennis research that compared beginner and experienced players. More advanced players displayed a greater level of declarative, procedural and tactical knowledge (García, Moreno, Moreno, Iglesias, & Del Villar, 2008) apart from a greater accuracy when hitting strokes (Vergauwen, Madou, & Behets, 2004).

CONCLUSIONS

Better level players achieved better agility scores in each test. Therefore, the findings from this research can be useful for coaches and trainers for the conditioning, coaching and evaluation of their tennis players.

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RECOMMENDED ITF TENNIS ICOACH CONTENT (CLICK BELOW)

Tennis  iCoach

Endurance development for 10-12 & under tennis players

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ABSTRACT

Within classical definition endurance is understood as the ability to perform hard or long-lasting physical activities involving large muscle groups, without the fast increase in fatigue and changes in inner environment of the organism. This definition also includes the strain tolerance and the ability of recovery (Astrand 1987, Kozłowski & Nazar 1999). This definition suits well into such sports like long-distance running, swimming, Nordic skiing, and so mostly “cyclic” sports. For these sports endurance is a factor limiting performance and there is almost a linear correlation between level of endurance and sport performance.

Key words: endurance, speed, coordination

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INTRODUCTION

From a physiological perspective, tennis is an interval and speed-explosive power oriented sport. Despite matches lasting sometimes 2-3 hours, players do not typically run more than a few kilometres in total. The energy source mostly utilised is predominantly (70%) anaerobic alactic sources of energy. The anaerobic lactic and oxygen sources are utilised approximately 30% during performance. It has been stated within literature that anaerobic and aerobic conditioning are necessary for enhancing tennis performance (Kovacs, Roetert, and Ellenbecker, 2016), however, the question is how much it should be developed, especially in relation with speed.

In studies by (Weber 1987, Unierzyski 1995, 1993) it was detailed that tennis players should develop “general” endurance to a sufficient level but certainly it is not a factor limiting performance such as coordination, speed and agility or tactical-technical and mental skills. Fundamentally, this means that every healthy player is able to develop and train their endurance capabilities to a desired level. Because tennis specific endurance is trainable it is not necessary to include more traditional forms of endurance training like long distance runs to talent identification testing protocols. Research has illustrated that despite comparable levels of basic endurance, individual players react physiologically completely differently to the same tennis-specific stimulus, suggesting that sport-specific endurance plays a considerable metabolic role in some individuals (Ferrauti et al., 1999; Quinn, Reid and Crespo, 2003). Of course this does not mean that coaches should not work on endurance with players. The question is how and when is best to develop it.

ENDURANCE DEVELOPMENT FOR YOUNG TENNIS PLAYERS

Research has shown that young tennis players aged 7-12 years old had superior physical exercise capacity scores (higher oxygen uptake and physical work capacity values) relative to body mass when compared to the non-competitors (Bloomfield et al., 1984). It has also shown that specific endurance training can improve the aerobic performance of a children aged between 9-11 (Krahenbuhl et al., 1985). However, with their ongoing locomotor development, rather than emphasising prolonged repetitive exercises (continuous runs), the presentation an aerobic stimulus should be started globally in the form of games. The child possesses functional and metabolic elements, which better accommodate this. In this way, the training principle of variety should take precedence over specificity in developing aerobic endurance among children.

Traditionally it is said that young athletes need to develop an “aerobic base”. It is generally accepted that the sensitive phases for developing aerobic endurance lasts between the ages of 8-12. This can be interpreted as young children being able to naturally improve when taking part in any long lasting activities where the training load is moderate.

Therefore children within this age category do not tolerate longer lasting loads of high intensity there is no need to force them to



participate in high intensity training, typical track and field endurance training or “cardio” drills. Especially anaerobic lactic type of drills must be avoided. Exercises focused on speed and coordination with maximal intensity are recommended but they should not last more than 6-8 seconds with breaks 4-5 time longer than the drill.

The time for training with high intensity developing anaerobic and speed-endurance will come after the pubertal growth spurt, so usually at ages 15-16.

So, more specifically, at the age of 11-12, just before puberty a gifted tennis player has to finish the stage of the so called versatile all round basic training and may begin the next stage (phase) of semi-specialised training. Before puberty starts and after it is started, lots of abilities and skills can be learned or forgotten. It is obvious for experienced coaches that children are not small adults and they should organise the training process in a different way (Unierzyski, 1994b).

It should be remembered that the age of 12 is the best period for optimal development of the two most important motor abilities in tennis: agility and speed. Between the ages of 12-13 young athletes still have to have a develop versatile athletic skills and, during the same period, have to gain experience, improve their level of motor abilities, mental skills and improve major tennis-specific abilities (Unierzyski 1994a; Grosser & Schönborn, 2002). For a sufficient and versatile development period the training ought to be directed more into all factors limiting performance in tennis.

Young beginner tennis players can participate in prolonged low-moderate intensity activities up to twice a week. The activity could last up to 20-30 minutes (non-inclusive of warm-up and cool-down), while low-moderate intensity suggests that the activity should raise players’ heart rates to ≈60-65% of their maximum. It is therefore advisable for coaches to intersperse activities with short rest periods, especially when that activity is a different sport (Crespo & Reid, 2009).

ENDURANCE DEVELOPMENT FOR 10 & UNDER PLAYERS

There are few better ways to develop basic, aerobic endurance than participating in activities akin to playing ball games, swimming, roller skating, Nordic skiing etc. Generally off-court activities should be predominant.

Also, regular tennis training (despite its specific character) helps to build the endurance. But it must be remembered that tennis drills with high intensity should not last too long (6-8 seconds) – and should be much below the anaerobic threshold level.

It is possible to apply extensive aerobic type intervals lasting around 20 seconds with moderate load reaching no more than 60-70% of maximal capabilities. A good example of such on-court activities are technical drills focused on rhythm lasting 20 seconds with pulse usually around 130- 140 b.p.m., but followed by 60 second breaks (1/3 ratio).

Other activities to develop the aerobic endurance of children are (González & Ochoa, 2003):

- Practising other sports: soccer, basketball, frisbee, swimming, cycling, walking/jogging etc.
- Using circuit training.
- Example game: The players run in any direction around the court and run to the coach when they indicate a certain number.
- Example game: The players run in groups and are required to create different monuments upon the coach's signal.
- Example game: The players run for one minute without seeing the time. The winner is the player who runs closest to one minute. The time can be gradually increased.
- Example game: Running to music of different rhythms for a set amount of time.

As per anaerobic lactic endurance, it has been shown that when compared to adults, children have a significantly lower ability to work anaerobically and perform strenuous exercise for periods between 10 and 60 seconds (Armstrong & Welsman, 1997). This is linked to lower intra-muscular glycogen concentrations and a slower rate of glycogen utilisation in children. Training to develop anaerobic endurance capacities should therefore be introduced at older ages.

Regarding the anaerobic alactic activities, it is important to remember that the anaerobic power generated by an 8 year old can be up to 70% of that generated by an 11 year old, suggesting that this is a trainable quality (Hegedus et al., 1993). Readers are directed to chapter 9 for examples of speed activities that may be utilised when working with children. Similarly, participation in games that place demands on reaction speed to different stimuli (visual, auditory, kinaesthetic) are well suited and beneficial to children. Here, as all beginner players typically direct their actions to the ball, such reaction speed activities should involve similar perceptual demands (i.e. with the ball).

So, coaches should encourage players to develop their aerobic capacity and movement economy through a variety of enjoyable



activities that involve intermittent short bursts of activity. Games of a continuous nature where the beginner's heart rate remains elevated can induce an aerobic training effect. Indeed, the playing conditions of soccer, touch rugby, water polo... can all be adjusted by the coach to provide an appropriate aerobic stimulus, depending on the size of the playing area and/or the number of players (Crespo & Reid, 2009).

SUMMARY- RECOMMENDATIONS

- Children at these ages should not tolerate longer lasting loads of high intensity
- Avoid high intensity, long lasting anaerobic lactic activities suitable for advanced players
- Endurance naturally “increases” when children take part in any long lasting activities with moderate loads
- Less skill specific activities and regular training are important to develop aerobic endurance
- Specific endurance training can improve the aerobic performance of children aged between 9-11. However, rather than only prescribing continuous runs, the use of games is recommended.
- Exercises focused on speed and coordination with maximal intensity are recommended but they should not last more than 6-8 seconds with breaks 4-5 time longer than the drill.

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[RECOMMENDED ITF TENNIS COACH CONTENT \(CLICK BELOW\)](#)

Tennis  **iCoach**

Strength and power development for tennis players ages 10-12 and under

Christoph Biaggi (SUI)

ITF Coaching and Sport Science Review 2016; 69 (24): 24 -26

ABSTRACT

While the “Game-Based-Approach” – summarising a whole training philosophy in three words – is a well-established approach in tennis training, the “Child-Based-Approach” has yet to gain importance among coaches of tennis players aged 10-12 and under in strength/power training and beyond.

Key words: strength, power, child-based approach

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INTRODUCTION

When working with children in this age group, the training approach is crucial and needs to be aligned with the psychological and physical development of children aged 10-12 and under. The quality of training is mainly driven by personal will. To “trigger” this will in order to achieve optimal training progress, requires the coach to consider the following methodological/didactical aspects in the training:

- Switching between exercise and play or exercise while playing.
- Ensure that the hope to succeed is greater than the fear to fail.
- Provoke/activate cross-linking of learning processes by using different receptive channels.
- Combine goal-oriented learning and fun.
- Use the concept of “Lachen-Lernen-Leisten” (Laughing-Learning-Accomplishing).
- Do group training.
- Always link physical exercises with coordinative elements.

For more information on methodological aspects in training refer to the Swiss national sports education program (Youth&Sport – Kids, 2010-2014).

In adults, it is difficult to define which exercises, intensities, number of repetitions etc. are best to achieve maximum progress in strength training due to inter-individual differences. In children aged 10-16 years, those differences are known to be even more profound. Chronological peers may therefore show biological age differences of several years. In addition, the biological age can change in a short period of time due to growth (hormonal changes, levers, passive/active structures).

The nature of the psychological and physical development of children does not allow for general recommendations on strength training parameters for the age group of 10-12 years and under. Nevertheless, strength training should be guided by the Child-Based-Approach, which requires a continuous assessment and critical eye on the physical development of the child combined with the didactical/methodological approaches the child is particularly susceptible to.

THE ESSENTIALS OF STRENGTH TRAINING

The human body is predictable. Whenever the body is challenged or even overstressed its reaction is to adapt in order to be prepared and protected for a next challenge. Strength training starts at birth when gravity is experienced for the first time, followed by the numerous attempts to get up and walk and probably culminates in the perfect squat position of the two to three year old child when lifting toys off the floor. The strength of the body has to keep up with growth. Even in old age, the body is able to make strength adaptation yet the extent of those adaptations is age-related.

Purposeful training results in strength gains that go beyond the normal, growth-related increase – also in pre-pubescent children (Pfeiffer et al., 1986). The positive effects this has for the tennis player will be discussed below. The body of both children and adults will lose the strength gains acquired as soon as purposeful training stops.

That said, the answer to the question whether strength training is beneficial for children aged 10-12 and under is positive. However, the key question is how strength training is done and which methods are used, including the effects that can be achieved.



Defining strength and power training

In Switzerland, training that is done between 30-70% of maximal strength is referred to as power training (Schnellkrafttraining), including the special case of plyometric training. Training that is above 70% of maximal strength is defined as strength training. Refer to (Weineck 2009) for a discussion of all forms of strength training and definitions.

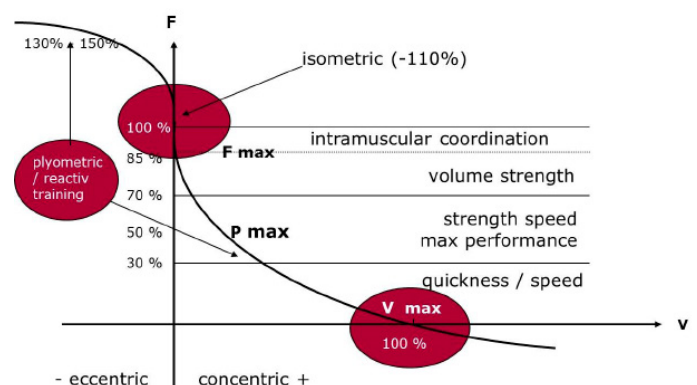


Figure 1. An overview of the different forms of strength training (Egger, 1998)

The body of a child between 10 and 12 years

The physical development of children in the age group of 10-12 years is characterised by an optimisation of the body's proportions and relatively large strength gains with little increase in height and weight. In addition, the development of the equilibrium organ is completed, which is why complex exercises, not only in strength/power are possible and should also be applied in training (Weineck, 2009).

Talking about strength training, the following differences of a child's body compared to the body of an adult should be taken into consideration:

- The muscle tissue of the child is richer in water, but tonicity is less.
- The long bone shows more plasticity and less elasticity, particularly in children under 10 years of age.
- Muscle fibre is thinner and more elastic.
- Due to increased water retention capacity and greater thickness and elasticity, cartilage is less susceptible to injuries resulting from overstress.

Strength Training	Power Training
Adaptations of the central nervous system leading to less co-activation of antagonists resulting in increased strength	
Improved stability (entire body as well as joints)	
	Strengthening of the bones – the long bones are fragile, particularly in children under 10 years of age, and can be strengthened by power training
Positive impact on self-confidence and mental strength (I succeed because I am physically strong)	
Hypertrophy	
Strength & Power Training	
Improved recruitment, synchronisation, and firing rate of muscle fibres	
Improved capacity in terms of strength/power/speed. Combined with coordination training, the development of this capacity can even be enhanced.	
Improved quality of movements specific to the discipline (to tennis)	

Table 1. A table to show the effects of strength and power training.

What can be achieved with strength/power training in children 10-12 years old?

The area of strength/power training in children aged 10-12 years has received little attention in research, particularly in Europe. More evidence is needed to better understand the benefits of strength/power training in this age group (BISp et al. 2010). Despite this gap, studies suggest the positive effects of strength/power training in children, depending on the methodological approach used (Fröhlich et al. 2009). The table below summarises some of the effects that can be expected from strength and power training respectively (Fröhlich et al. 2009). It has to be assumed that both, strength and power training, in part produce the same effects, although to varying extent.

In addition to the physical adaptations listed in the table above, the capacity to perform, to a sufficient standard, complex strength exercises, for example clean and jerk or snatch, may result in a more efficient approach to strength training later in a career.

The current level of knowledge suggests that strength/power training before puberty results in even greater relative strength gains than

during adolescence. In comparison with most other disciplines, the risk of injury is lower in strength training. This risk can further be reduced if the training program is continuously adapted to changes in the growth and development of the athlete.

How important is strength and power development in tennis?

Having argued for the implementation of the child-based approach to strength and power training for children aged 10-12 and under, this section looks at strength training from the tennis-specific perspective.

Contrasting the tennis game in the category U10/U12 to the one in the category U14/U16, the latter is characterised by stronger strokes, faster balls and more spin which results from changing relationships of the levers and strength. As a result, the speed of the game is higher, stop and go's fiercer which together provoke a higher physical stress. Therefore, the main reason for strategic and well planned strength training with tennis players aged 10-12 and under is the "changing game" when they enter the category U14/U16. Entry into this category happens at a time when the body is experiencing profound changes, often accompanied by moments of increased vulnerability to injury. A strong body is expected to better cope with the changed characteristics of the game as well as with extreme positions where body and joints have to be stabilized at the end range of motion. Strength training in children 10-12 year old has another health-related benefit as it counteracts tennis-related one-sidedness by also building those muscles that are not actively involved in tennis playing. Other tennis related positive aspects of strength training are the following:

- Strength training stabilises the body. A stable position positively influences the quality of the stroke.
- A stable core supports balance in motion which again has a positive influence on stroke execution, particularly in difficult positions.
- A child-based approach to strength training also includes whole-body exercises which foster body awareness and coordination.
- Strength and power training have a positive effect on speed.

Finally, an important aspect not yet discussed is the endurance of explosiveness/strength speed (Paganini, 2005) – the ultimate goal of every top player. Endurance of explosiveness and strength speed are composed of different forms of strength. Both can only be developed step-wise and following a proper build-up training program (Weineck, 2009). This long-term development is optimally facilitated by an early start in strength training.

Tennis-specific strength/power training is not recommended for children aged 10-12 years and under. Certain types of power training are similar to movements, sequences and temporal patterns in tennis and could therefore be regarded as tennis-specific. However, a purposeful tennis-specific orientation of training sessions should be avoided.





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PRACTICAL APPLICATIONS

The list below provides selected examples of activities/games following the Child-Based-Approach.

- Climbing.
- Wrestling games.
- Push-pull games.
- Balance and stabilise (Proprioception).
- Rope skipping (challenging exercises).
- Barbell technique.

CONCLUSION

Strength/power training for tennis players aged 10-12 years and under has many positive effects. The most important effects being:

- A well-protected body ready to cope with the stress and challenges characteristic of the U14 tennis game.
- A greater physical performance.
- A decreased risk of overstress and injury.
- An improved body image and self-confidence.

Strength/power training for this age group has to follow the Child-Based-Approach, which requires knowledge of the different developmental stages of a child's body and mind and the methodological/didactical skills for effective implementation.

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Childhood and its relationship with tennis as a sport

Claudio Leiva (ARG)

ITF Coaching and Sport Science Review 2016; 69 (24): 27 - 28

ABSTRACT

This article discusses the role of childhood and its relationship with tennis. It reflects on the importance of feelings, and links this stage of development with action and production in childhood. It also discusses sport and its role in infancy. Sport is considered a multifunctional activity that impacts on different aspects in human and social life, which have been analysed from different points of view, and have always belonged to the cultural environment. Then, with the passing of time, the scientific environment became involved and provided criteria for analysis.

Key words: development, psychomotricity, motor skills

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INTRODUCTION

Childhood is a stage within human development where possibilities of incorporating different learnings, habits, skills, beliefs, traditions, values and behaviours will enable children to start their own journeys.

Childhood has not always been a limitation of existential recognition, there was a historic time when this historic conception cropped up.

“Anthropological studies carried out in different societies have shown the complexity and variety of the relations between growth process and development and the socially delimited stages of life. This way we can state that age limits are not natural, they are the product of classification processes through which each social group sets divisions of the social world, creating groups like childhood, adolescence, adulthood and others” (Bordieu, 1983).

As Fortes (1938), the anthropologist pointed out, it is not the biological maturity, but the relations that the individual builds in a domestic group and in the society as a whole, that mark and express- through what is called “rituals of transition” - the changes within the life cycle.

Besides, a look towards eastern history shows that our own ideas about childhood, (considered as a period of hope, innocence, malleability) are not more than three or four hundred years old, and they cropped up in relation to the bourgeois nuclear family and the modern school system (Aries, 1981), along a conflictive process which left other forms of socialization aside. This makes us see that the different ways of considering and living the experience of childhood are related to the plurality of cultural ideas that human groups have created, and also to the social class inequalities that societies go through.

This look at how the concept of infancy and childhood were created gives us the opportunity to have a richer and more timely outlook. Timely because we have the opportunity to “deal the cards” again.

Infancy is in front of us, as if it were a great “mirror”, which returns positive and negative images of our own childhood.

We must be ready to offer our best without neglecting anything on the way. Childhood deserves an adulthood to take care of it.

Spakowsky (2005) provides a more relevant outlook: “In order to reflect on the sense and meaning of the concept of infancy or infancies in the educational environment, it is necessary to start a path along reflection and ask ourselves: What is a boy/ girl?, what is infancy? or what are infancies? (p. 66).

We cannot answer these questions without referring to specifications like: What do we understand by social representation? We will start with this definition: Social representation is the process and the product of a mental activity by which an individual or a group reconstruct the reality and give it a specific meaning. In this sense, the social representation of infancy consists of the opinion, belief, information, vision of the child, each of us transfers and transports

to all educational situations we go through. These opinions and beliefs are not just our ideas, they are also our experiences and the filter of the perception.

FEELINGS AND LINKS

It is evident that adults experience different feelings when in front of a child. Emotions like astonishment, concern, enjoyment, curiosity, prejudice, impotence, mistreatment, anger, complacency, uncertainty and other “conditions” make adults think constantly “why” children act with that challenging freshness and with that spontaneous and attractive attitude.

At the same time, we, as adults, have the great opportunity of observing what kind of “link” has been built with them.

Different child specific professional disciplines have tried to understand what and how growth, evolution and development occur.

Psychomotricity is one of these. In spite of the few professionals, the little time spent and the lack of knowledge about their targets, observations and solutions have been provided for certain difficulties that make children uncomfortable and suffer in the environment where they live.

The actions of children that psychomotricity is involved with, are related to the body and its different manifestations.

Psychomotricity considers behaviour from a structure which is integrated in three areas, emotional, intellectual and motor. Psychomotricity states that in all behaviours, the subject (the child in this case) expresses himself by means of the constant interrelation of the three areas stated above. This way, he gets away from the classic, and (unfortunately) still in force, dualism of “the mind on one side and the body on another side”.



CHILDHOOD ACTIONS AND ATTITUDES

To walk, run, jump, take a position to pay attention, and to try to stay still, to move an object, to take a posture in order to make certain movements, to express oneself with gestures (not just your face), to coordinate hand or feet movements, to take objects in the air, at a certain height, to write, to move about in big or small spaces, to choose and develop segments of the body to the right of left, to kick a ball, to measure time to realize how fast or slow they do something, the rhythm when walking, reading, dancing, speaking, the fluency or tension in his gestures, in his copybook, and other actions make us think of the relationship between previous experiences of the child and the learnings he must incorporate in relation to his body, and family, social, school and sport demands he will have to face.

These actions are not genetic expressions. They are produced and learned, they are the "fruit of experiences lived" and the stimuli received during the different stages of upbringing.

PRODUCTION

Movement, praxias, gestures, posture, laterality of use, expression, general dynamic coordination, visual-motor coordination, temporal and space organization, object management and manipulation, tonic structure and rhythm, (first non verbal mother- baby communication), language, the gaze, the tension- distension regulation for the different parts of the body, the capacity to wait, the capacity to listen and the capacity to take the floor and communicate with the others.

IMPORTANT CONCEPTS RELATED TO SPORT AND ITS ROLE IN CHILDHOOD

To define what sport is and which are the features that enable its structural characterization, is a task that has been undertaken by several authors, and from different perspectives and areas of knowledge: physiology, biomechanics, education, history, sociology, anthropology.

In relation to childhood and how it interacts with sport practice, it is important to develop five concepts: motor development, motor learning, motor skills, motor behaviour and sport initiation.

– Motor development: Is a process that implies a relationship between the maturity of the child and the stimulus received from the natural and cultural environment. The first component, depends on internal factors, this implies changes in the function which is expressed in the different organs and systems, preparing to meet the function for which they are determined, and the second, depends on external factors that will allow the integration of different learning experiences that will help the child to incorporate significant body experiences.

– Motor learning: The concern for the mechanically effective movement gives a secondary place to the expression of the movement and motor learning acquirement, most of the time, the form of a mechanization that transforms the body into an outsider for the very person. This alienation is particularly serious since it separates the person from the body, the logical consequence of dual thinking. To state, a priori, that man is a duality, this philosophy which has pervaded our life and our educational system, has come, in fact, to a body- intellect duality. Motor learning enacts the child's capacity to record a situation, interpret it, analyse options and provide a motor response as efficiently as possible. This response is supported by the subject with all their previous experiences and the interior mechanism and mental representation. Motor realization evokes a collection of feelings and experiences that make it possible to think and modify actions in order to progress. Motor learning is a constant transformation and change process that provides the child with plasticity and corporal ease.

– Motor skill: Is capacity acquired by means of learning to produce pre- established results with maximum efficiency and minimum energy expenditure. Motor skills are closely related

to coordination capacities which, together with conditional capacities, make up motor capacities.

– Motor behaviour: Is the manifestation of the person from his motor possibilities using the articulation of three aspects of human behaviour areas, as a support: the emotional, intellectual and motor aspects. This articulation fosters the idea that individuals express themselves from a functional globality in all behaviours.

– Sport initiation: Is a process in which contact with sport begins. Those actions that promote slow learning and consider the child's previous experiences, their maturity, age and way of learning begin. Children learn to manipulate general and specific objects, they learn some rules and start trying movements that apply to each practice. Sport initiation is not to be considered as the beginning of a specific practice with all the technical, tactical and physical resources. On the contrary, it must start from the bodily structure of the child, and progressively, include and understand general aspects. Sport initiation provides the child the possibilities to learn some sport characteristics without realizing. It is the preparation for a later stage in which sport will be integrated according to his age, in a more relevant way.

CONCLUSION

These concepts here developed contribute with something very important which must not be neglected in sport practice with kids. *"Sport environments demand great responsibility and commitment, both from the point of view of pedagogical resources and the education of the teachers. To move forward with these proposals should make us think how important teaching actions with and towards children are, and how they impact on their full individual development."*

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Tennis  **iCoach**

Circuit training for 10 and under tennis

Richard Gonzalez (URU)

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ABSTRACT

Coaching or presenting a task in a circuit or station formats for U10 players consists of a session of some 8-12 stations which can be completed roughly three times. The circuit may aim at the development and stimulus of both condition capabilities (strength, speed, endurance, flexibility), as well as coordination capabilities. This format assures variability in the game session.

Key words: circuit-training, u10, conditional capabilities, coordination capabilities

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INTRODUCTION

Didactic objective:

“In order to develop any tennis stroke and the different movements it implies, it is necessary to build a physical support made up of what we call Conditional Capabilities (the foundations) which are based on the metabolic and mechanical potential of the game. Then, the Coordination Capabilities which help the child to the correct development of motor execution (control and regulation) for correct execution” (Fernandez, Villanueva and Sanz, 2012).

1. The presentation of each task in each station must take into account the ludic concept...for the child it must be a playful and a discovery experience.
2. Improving and developing different capabilities.
3. Tasks based on cooperation and opposition games (sprints, jumps, balance, receiving and throwing skills, combinations of both).
4. The development of general and specific coordination capabilities.
5. The compensated development of all muscle groups on the basis of transporting games, on four legs, climbing, stimulating muscle synergy.
6. Start the reaction speed.
7. Gesture speed with and without a racket. Before the child is 10 years old, gesture speed is closely connected to nervous maturity, and intra and inter coordination capability.
8. To stimulate the frequency of support. Between 7 and 9 years, there is an increase in frequency maturation.
9. To develop and maintain flexibility levels.
10. To consider, in each station, the different levels of motor skills in the group (differentiation and optimal challenge for each participant).
11. Pay attention to decision making and discovery.

General characteristics and advice

- Number of stations: 8 to 12 distributed around the tennis court.
- Duration of the games: 15 to 30 minutes per station.
- Pauses: The time between the stations will be measured, depending on the intensity of the exercises.
- Series: 3 to 4.
- Pause between series: 2 to 3 minutes.
- Duration of the session: 15 to 20 minutes.
- Types of exercises or games: Varied, depending on the target.
- Sessions per week: 1 to 2.


PRACTICAL APPLICATIONS


Circuit model

Station 1
Objective
Coordination capability “kinetic differentiation”.
Material / Equipment
Balls of different sizes and weights. Rings or markers.
Description
Three rings or markers are placed at different distances from the child (the rings or areas are marked with a number or colour). The child is given a ball and before they receive it are told where they have to throw it (varying distances). The balls they receive will vary too. This is a general game. If it were specific, when the child has a good command of the racket, they will play deep volleys or drop-volleys.



Station 2
Objective
Balance, proprioception, throwing and receiving in an unstable position.
Material / Equipment
Create an unstable zone (Bosu ball, an old flat ball, a cone (turtle), a ball).
Description
Each player, standing on one foot on the unstable zone and in a balanced position, will rally with and without a bounce to a partner. Variations: count the passes made, or compete against another team during 10 minutes.


Station 3
Objective
Agility and reaction.
Material / Equipment
2 tennis balls, one mat.
Description
Each player, standing on one foot on the unstable zone and in a balanced position, will rally with and without a bounce to a partner. Variations: count the passes made, or compete against another team during 10 minutes.



Station 4
Objective
Agility and skill.
Material / Equipment
Fences (high and low), marks, cones.
Description
A round with different obstacles is set, the player must then change direction, jump, pass under the fence, etc. It is possible to fix a starting line, measuring the time until the end, and participants compete for the shortest time.


Station 5
Objective
Stimulate strength.
Material / Equipment
One mat per pair.
Description
In the service box, starting from the side line to the service line, run races in pairs, a boy or a girl will take the other one from one line to the other, and when they arrive, they change, the winner will be the couple that arrives first.


Station 6
Objective
Balance and proprioception.
Material / Equipment
On an unstable surface.
Description
Control the ball with the racket, without letting it fall, in 10 seconds, how many bounces (changing the support foot).

Station 7
Objective
Stimulate strength.
Material / Equipment
1 cone per child.
Description
Each player, on four legs, must go from the baseline to the service line (carrying the cone with one hand and then with the other one, alternating until they reach the target).

Station 8
Objective
Reaction and agility.
Material / Equipment
Turtles.
Description
Turtles are distributed in the service box (some facing up and some facing down). One player must put them facing down and the other one facing up in 10 seconds, the one that turns more turtles over is the winner.


Station 9
Objective
Sprints with resistance.
Material / Equipment
Elastic bands.
Description
In pairs, the players run with a rubber band around their waists, from the baseline to the net, when they reach the net, they change roles and return to the baseline, the first to arrive is the winner.


Station 10
Objective
Stimulate flexibility.
Material / Equipment
Ball.
Description
Playing in pairs, (keep balance with their partner stretching), pass the ball overhead and then between the legs.

Station 11
Objective
Speed and reaction.
Material / Equipment
Cones and balls.
Description
The players start in an athletic position. There are two cones in front of each player (numbered 1 and 2) two or three meters away behind their backs. There is the same distance between players and with one ball on the ground. When the teacher calls, the child will go to the cone they are told, and will return to the athletic position, it is also possible to indicate the ball and they must bring it to their initial position cone.


Station 12
Objective
Development and stimulation of movement frequency.
Material / Equipment
Foam balls, newspapers, balloons.
Description
The player hits a balloon, increasing execution frequency and speed (hitting many times and as hard as possible).


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Authors: International Tennis Federation. 2016.

The ITF's new Olympic book, My Life, My Medal, launched by the ITF today in anticipation of Rio 2016, contains the memories of 118 players who have won medals in the Olympics and Paralympics, from those men and women who were part of tennis's return to the Games at Seoul 1988 to the current athletes who excelled at London 2012. We hear the thoughts of some of the game's biggest stars of the last 30 years, including Andre Agassi (USA), Boris Becker (GER), Lindsay Davenport (USA), Novak Djokovic (SRB), Roger Federer (SUI), Stefanie Graf (GER), Justine Henin (BEL), Andy Murray (GBR), Rafael Nadal (ESP), Arantxa Sanchez Vicario (ESP), Monica Seles (USA), and Serena and Venus Williams (USA).

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An online version of My Life, My Medal, can be viewed [here](#).



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General guidelines for submitting articles to ITF coaching & sport science review

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Articles should be word-processed preferably using Microsoft Word, but other Microsoft compatible formats are accepted. The length of the article should be no more than 1,500 words, with a maximum of 4 photographs to be attached. Manuscripts should be typed, double spaced with wide margins for A4-size paper. All pages should be numbered. Papers should usually follow the conventional form: abstract, introduction, main part (methods and procedures, results, discussion / review of the literature, proposals-drills-exercises), conclusions and references. Diagrams should be done using Microsoft Power Point or any other Microsoft compatible software. Tables, figures and photos should be relevant to the paper and should have self explanatory captions. They should be inserted in the text. Papers should include between 5 and 15 references that should be included (author/s, year) where they occur in the text. At the end of the paper the whole reference should be listed alphabetically under the heading 'References' using the APA citation norms. Please refer to <http://www.apastyle.org/> for guidelines and tutorials. Headings should be typed in bold and upper case. Acknowledgement should be made of any research grant source. Up to four keywords should also be given and the corresponding author contact details.

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