Recently I had a call from a coach who wanted advice on the training program he had developed for an 11-year-old girl. I was concerned about the plan on several counts. The first concern was that a number of skills and abilities were left out of the plan. Also, I was concerned that the volume and type of training, as well as the schedule of training, related to an older player and not an 11-year-old girl.

My conversation with the coach revealed that the plan was a copy of a recent schedule and training program for a current world-ranked player. Needless to say, we then talked about growth and development and progressive development in tennis and rewrote the program to make it appropriate for an 11-year-old who seemed both talented and enthusiastic to learn.

When outlining a program, the first thing to consider is making a plan that is appropriate for your player. Coaches know that issues of growth and development should underpin a Developmental Plan, but sometimes they are understandably a little hazy on how to relate this to teaching technique, tactical and mental skills, as well as competition.

In this article we will address the following questions:

- What are the Windows of Opportunity that exist to maximize learning?
- What are the common growth and development stages that affect learning?

Growth and Development

The reality of understanding and applying a sound knowledge of growth and development is important to successfully working with a player. As coaches, it is essential that we understand that at different ages, different things are possible and that there are critical times—Windows of Opportunity—that must be recognized and utilized.

For example, players under 12 or 13 years old lack the ability to generate power because physiologically they lack speed and strength—the components of power. So what is the impact of growth and development on teaching technique? Boys moving through puberty often “lose” coordination, especially when they are growing very fast. The length of their arms and legs increases so rapidly that they temporarily lose the ability to control the increased length of the levers. So how do we help the natural loss of confidence in the player when things that once worked no longer do?
DEAR COACH

With the new year upon us, it is a good time to spend some time planning. Planning is essential to success on many levels. The players you coach certainly need a well-planned training and competitive schedule that includes goals to develop technical, tactical, physical and mental aspects of their games. These plans should be based on principles of periodization that incorporate rest and time away from tennis. In addition, any long-term planning should take into account the “age and stage” of each player you coach. Knowing the “Windows of Opportunity” or what to teach when, based on player readiness is essential to long-term development. In this issue, you will read articles by Anne Pankhurst and Scott Riewald that will provide you with information related to the progressive development of a high performance player that will help you in your efforts to coach your players in a more effective and systematic manner.

Speaking of planning, 2007 will mark the last year that the High-Performance Coaching newsletter will be available in paper form. This decision was not an easy one, but with technology comes change and it is important that we take advantage of technology to broaden our scope to make the newsletter and other resources available to all tennis coaches in the United States. Our website, www.playerdevelopment.usta.com, will now become the centerpiece of our Coaching Education efforts, where you will find the newsletter in electronic form, along with some new and exciting resources like our “Digital Library.”

Launching in February, the USTA Player Development Digital Library will feature video clips from the US Open that you can watch in slow motion and will even provide you the ability to create your own sequence pictures, which you can print out and share with the players you coach. Stay tuned to the website and also the next High-Performance Coaching newsletter for more information about our new plans.

All the best to you both on and off the court,

Paul Lubbers, Ph.D.
Director, Coaching Education, USTA Player Development

USTA High Performance Coaching Program Attendance

The following coaches successfully completed the USTA High Performance Coaching Program conducted at Harvard University, May 16-21, 2006. Congratulations to each Coach for his/her efforts!!

Nelson Alapi
San Diego, CA
Carlos Baez
Trujillo Alto, PR
Jeff Bearup
Duxbury, MA
Mark Beede
Honolulu, HI
Vlatko Bosevski
Amherst, NY
Tim Donovan
Boston, MA
Duane Evans
Charlotte, NC
David Geatz
Minneapolis, MN
Gordon Graham
Arlington, MA
Nancy Grimes
Bedford, NH
Bruce Guilkison
Burnsville, MN
Philip Hayman
Pawtucket, RI
Arun Jetli
Orange, OH
Rhona Kaczmarczyk
Denver, CO
Lance Lee
Philadelphia, PA
Christopher K. Lewit
York Town Heights, NY
Jonas Lundblad
Cedar Park, TX
Francisco Montoya
Manchester, MA
John M. Raker
Harrisonburg, VA
Kim Reid
Arlington, MA
Tyler Thomson
Minneapolis, MN
Gwinyai Zengeni
Norwalk, CT
David Zeutas-Broer
Westborough, MA

USTA High Performance Coaching Program Update

The USTA Coaching Education Department is accepting applications for the High Performance Coaching Program. This educational program is intended specifically for the coach who is working with players striving for excellence in competitive tennis (i.e., sectional and national ranked junior players to collegiate and young professionals). Applications for the 2007 program dates are available by e-mailing us at Coaching@USTA.com or by going to the USTA Player Development website, www.playerdevelopment.usta.com, and downloading the program application.
might never catch up to learn the skills needed to develop into a top player.

As coaches we should know when the best time is to develop spin, develop a game style or use goal-setting with the player. It is not when we decide, but when the window to learn is open. We should know when (at what ages) we should use play as the teaching tool rather than structured practice. We should know when practice should be led by the player and why.

The Link between Growth and Development and Performance

What is the link between growth and development and the progressive process that develops a high performance player? After all, not every tennis player becomes a high performance player; nor does every talented young player become an expert player. Progressive development is the long-term development of expert athletic performance. It has a pattern, is planned and does not happen by chance. Over the years, different researchers have noted that at different ages and stages in their lives, athletes make faster progress in certain skills and abilities. Furthermore, they rarely make the same progress in all skills at the same time.

For example, skill learning takes place earlier than tactical understanding—typically between the ages of 8 and 12. Researchers also note that the stages of development in different skills have to be moved through in a progressive manner for the expert performer to eventually emerge. They note that the ages at which different abilities develop are similar across most sports and that athletic development is undoubtedly linked to growth and development. Also, they note that the years spent at each stage are similar and that the age and length of expert performance was roughly the same across all sports.

As a result of these findings, a number of different models of athletic development have been drawn up. Recently, the USTA adopted a well-researched model developed in 1985 by Benjamin Bloom. Coaches will be familiar with the original tennis-specific model. It identified the key technical, physical, mental, emotional and tactical skills that were important at each phase of development of the player. The importance of competition was recognized and the types of competition appropriate at each of the three stages were identified.

Since the introduction of that model, we have undertaken more study and research in our quest to help give coaches the best information and ideas and, thereby, give the best opportunities to every player. Along with this edition of the High-Performance Coaching newsletter, you will find a copy of a new version of the USTA progressive development poster. We also have taken the opportunity, through our usual photo sequences, to illustrate the link between the physical development and the technical ability of players at different ages.

The Progressive Development of a High Performance Player

The Introduction and Foundation Phase (ages 5 - 12)

In this phase, young players are introduced to the sport and a solid foundation is laid for their future development. The learning theme for the phase is fun and fundamentals—making the initial experience one that will encourage the player to make progress, have fun and stay in the sport.

The issues of growth and development are obviously very real at this stage and underpin what is possible for the age group. The Windows of Opportunity are identified under the physical, technical, tactical, and mental and emotional sections on the enclosed poster. They are important to know because the specific skills of physical development will affect what is possible technically, and the elements of mental and emotional development will have a strong bearing on what is possible tactically.

But the key issues for this phase move beyond these skills. The phase covers childhood, which means the young player is small in stature, has limited sports experience, is physiologically underdeveloped and certainly has different needs from a teenager or adult. Another important need for the coach to consider is the concept of multiple sport participation.

Court sizes and equipment must “fit” the child. The ball is important too; a normal ball will move through the air too fast and bounce too high for a small child learning the game skills. The length of the racquet must enable the child to control the length...
The Progressive Development of a High Performance Tennis Player

of the lever, so shorter, lighter racquets are vital to rapid learning.

In the introduction part of this first phase, a foam ball is used on a 36-foot court, but as the child grows and moves to the foundation part of the phase, the court size increases to 60-feet and finally to a full-size court. The ball moves from a foam ball to a low-compression ball to a normal ball and the racquet length steadily increases. The ages and abilities of the player in this phase will also be reflected in the scoring system and types of matches played. For young children, a three-set match is too long, but they do need to learn certain competitive skills as well as the foundations of winning and losing, sportsmanship, and respect for others. Specific scoring systems that lay a good foundation are essential, as are team competitions. Teams help young children learn to play as an individual, but with the support of others. This is important in building confidence.

Finally, young players need to be in an environment where they are taught by those who understand their need for fun and enjoyment as well as for learning in relevant ways. Consequently, coaches, teachers and parents who are experienced with young children are more likely to progress the players and keep them in the sport.

Refinement and Transition Phase (ages 10 – 20)

This phase has three characteristics:

- It builds on the skills and abilities from the Windows of Opportunity developed in the Introduction and Foundation phase.
- It develops the key needs of players at this stage in their tennis careers.
- It serves as the launch pad for the World-Class phase of performance that follows it.

The learning theme for the phase is training and competition, since this is the prime time in the player’s development to learn the skills for both. In terms of tennis training, the basic technical skills should be in place by this time. The player is able to develop more pace and improve movement and footwork because of the physical skills learned in the foundation phase and because they are growing stronger and faster.

Physical and technical training is especially important in this phase. However, an increased emphasis should be placed on the Window of Opportunity for tactical development. The player is maturing rapidly, both mentally and emotionally, and this is reflected in improved concentration and ability to conceptualize things like goal-setting and anxiety control. Tennis is an open skill sport in which success depends on rapid decision making and a sound tactical understanding. In this phase, players are able to make quality decisions when presented with a range of options. A personal game style makes sense as the player’s personality becomes more evident.

In the foundation phase, competition is team-based and is used to coach simple skills like winning, losing and scoring. In this phase the opportunity and feasibility exists to teach skills such as defense, offense, counter-attacks, etc., because the player has the mental maturity to understand such skills. Therefore, competition is a vital development tool. The ratio of competition to training increases as players move through this phase and the type of competition changes. Rankings become increasingly important as benchmarks of improvement.

At the end of the foundation phase, the ratio of training to competition should be about 1:5, but by the end of the transition phase it will have moved to 1:2. The players will have a periodized schedule for their training, competition and rest. As they move through this phase, the players also are moving through puberty—a stage that represents the greatest changes in their lives in terms of physical growth and emotional and mental development.

Good practice in terms of coaching, training, and competition in this phase is crucial because it has such a huge impact on the player’s future as a tennis player.

There are significant changes in players in this phase. In physical terms there are real biological/physical differences between young players of the same chronological age. Players in this phase can be up to two years above or below their chronological age in physical terms. This poses a challenge for coaches who need to coach players appropriately in groups. A further dilemma for coaches is that a player may appear talented, but simply be bigger and stronger than his or her peers. The differences in chronological and biological age also mean that coaching technical and physical skills becomes increasingly individualized.

In this phase, there also will be marked physical differences between girls and boys. These differences will be reflected in the way each play the game. As the player matures throughout this phase, his or her tennis really improves, so the range of knowledge of the coach will need to be higher to ensure that the coaching skills match the player’s needs.
The Links Between Physical Maturity and Technical Development in the Serve

by Paul Lubbers, Ph.D., Director, Coaching Education, and Anne Pankhurst, B.A. (Hons.), Administrator, Coaching Education

In previous editions of *High-Performance Coaching*, we have presented many photo series of adult professional players. For the first time, and to illustrate the issues of progressive development raised in this newsletter, the four sets of photos show the progressive development of the serve in young female players.

A successful serve depends on a number of key factors that are not always possible for young players to develop until they reach a specific phase. These are the key factors in developing an effective serve:

- an overarm throwing motion
- dynamic balance
- rotation of the hips and shoulder
- the use of all the segments of the kinetic chain
- the generation of racquet head speed

In the sequences of photos from different phases, it is possible to see that the young players are able to incorporate these different factors at different times. The Windows of Opportunity and the physical development issues have been identified for each phase.

<table>
<thead>
<tr>
<th>PHASE</th>
<th>WINDOWS OF OPPORTUNITY</th>
<th>PHYSICAL DEVELOPMENT ISSUES</th>
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<tbody>
<tr>
<td><strong>Introduction and Foundation Phase</strong>&lt;br&gt;5 – 12 years old</td>
<td>Develop&lt;br&gt;• throwing action and grip&lt;br&gt;• stance and dynamic balance&lt;br&gt;• rhythm&lt;br&gt;• basic shape&lt;br&gt;• hip rotation and then shoulder rotation</td>
<td>ability to use dynamic balance to control body at full height&lt;br&gt;unable to use complex coordination at start of phase&lt;br&gt;lack of strength</td>
</tr>
<tr>
<td><strong>Refinement and Transition Phase</strong>&lt;br&gt;10 – 20 years old</td>
<td>Develop&lt;br&gt;• integration of body segments of kinetic chain through the core&lt;br&gt;• ability to use both sides of body—non-racquet arm and back leg&lt;br&gt;• use of increasing upper and lower body strength&lt;br&gt;• use of ground reaction force—shown in increased use of knees and leg drive&lt;br&gt;• ability to control length of lever (racquet arm) through service motion</td>
<td>different rates of growth in different players&lt;br&gt;development of strength and speed leading to ability to generate power&lt;br&gt;temporary loss of coordination with rapid growth in height</td>
</tr>
<tr>
<td><strong>World-Class Performance Phase</strong>&lt;br&gt;15+ years old</td>
<td>Develop and Improve&lt;br&gt;• use of ground reaction force and leg drive&lt;br&gt;• shoulder rotation (further than hip rotation) to increase arm speed&lt;br&gt;• use of power&lt;br&gt;• landing position and preparation for next shot</td>
<td>ability to maximize all physical capacities to produce effective serves</td>
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**World-Class Performance (ages 15+)**

The learning theme for this phase is personal excellence. In any sport, the talented athlete is aiming to achieve expert performance on the world-class stage. In tennis, we know that the timing of this phase for females is around two years earlier than it is for males. Essentially this is the phase when all the work in the previous phases comes to fruition, coupled with the fact that the “playing field” is level—almost every player has completed physical, physiological and emotional growth.

The Window of Opportunity is now to capitalize on and train every capacity so that players can utilize their abilities to the maximum with the objective of winning. A real difference in this phase is that each and every player is now working to an individualized training, competition and rest schedule. The ratio of competition to training of 1:1 reflects the fact that the objective of all previous training was to play and succeed on the world-class stage.

Top players often have a team of people to help them reach and maintain their full potential—coach, physical trainer and sports science support. In technical terms, the players have sound, but flexible technique, especially in relation to their game style and the different surfaces on which they will play. Physically, all components of strength, speed, endurance, power and flexibility are trained to maintain peak performance and reduce injury. Mentally and emotionally, the player has the tools to play at peak level, to win and lose and have the ability to move on.

Practice is very specific to the individual. After all, the player is now an independent adult seeking to achieve goals for which he or she has trained for a number of years. In addition, the relationship with the coach will probably have developed into a more mature relationship.

The progressive development of a world-class player is a systematic process in which the pathways for training and competition can be clearly identified. The increasing maturity of each player is obviously a critical feature. It also is necessary to understand how growth and development contributes to the key phases of development toward world-class performance. The progressive development poster is only a summation of all the skills, abilities and factors needed by players as they develop, but it gives all of us as coaches a clear framework from which to work with every player.
This edition of the High-Performance Coaching newsletter focuses on the progressive development of a high performance player. As tennis coaches, it is natural to think about how this information pertains to on-court training and developing a game style, but strength and conditioning should be approached in much the same way. It is pretty obvious that players in the world-class performance phase possess physical attributes that younger players do not have. But there also are physical and physiological differences between players in the introduction/foundation phase and those in the refinement/transition phase.

In this article, we want to take a look at a series of exercises that can be used to develop lower body strength in a tennis player. As we present these exercises, you will see how the demands of each match the physical attributes of the players in that phase. One exercise per phase will be described in this newsletter. However, additional exercise descriptions are available on the USTA Player Development website (www.playerdevelopment.usta.com) under Strength and Conditioning. Online, you will find that in addition to offering more exercises for each phase, we also take you through a second physical training progression designed to improve coordination and on-court movement. Please note that the information presented here and online is not meant to be “all inclusive.” Rather, the intent is to provide some direction as to how strength and conditioning plans can be developed to complement the physical, mental and emotional development of the player.

Development of Strength

Introduction Phase

In the introduction phase, it is essential to lay the foundation for athleticism. The physical skills to emphasize and develop in this phase are the ABCs—agility, balance and coordination. Muscular control underlies all the ABCs, and players should strive to develop and improve motor control and coordination. As much as possible, “exercises” should be incorporated into games, since this will keep things fun and enjoyable. A sample game that will build motor control and can be included in this phase is Tennis Dodgeball.

In Tennis Dodgeball, you should divide the group of players into two teams. One team will form a large circle 20-25 feet across. The other group should stand in the center of the circle. The group around the outside will have 1-2 playground balls that they will roll/bounce into the circle trying to hit the players from the other team. It is the job of the players on the inside of the circle to avoid being hit. The players on the outer ring should roll or bounce the ball (not throw it) with both hands in a motion like they are hitting a forehand or backhand and in such a way that the ball would hit a player below the waist. When a player is hit, he or she will join the outer circle. This continues until there are no players left in the center, at which point the teams switch positions and play again.

Foundation Phase

Players in the foundation phase are still in childhood in terms of growth and development, but they should start incorporating some basic strength and conditioning exercises into their training. In this phase, the principle objective should be injury prevention, particularly preventing overuse injuries that have become so common in tennis. In particular, we want to focus on developing strength and stability throughout the core of the body and the muscles of the upper back that support the shoulder blades. An example of the type of exercise that could be included in this phase is the Inverted Hamstring exercise.

The Inverted Hamstring exercise builds core strength while also developing balance and coordination.

The Inverted Hamstring exercise addresses many of the physical demands that are important in this phase. It will help develop body awareness and control, core strength and stability, and balance. Start the Inverted Hamstring exercise at the doubles sideline, facing out from the court. Stand on the left leg and bend at the waist until a slight stretch is felt in the hamstrings of the left leg. Keep the left knee bent slightly. Engage the core to keep the back flat and avoid twisting. When done properly, there should be a straight line between the shoulders, hips and the right ankle. Hold this position for 5-10 seconds. Return to the starting position, but step back slightly when you put the right foot down. Repeat while standing on the right leg and gradually walk backward across the court to the other doubles sideline.

Refinement Phase

Developing muscular endurance and dynamic balance are the keys here, and as we design a resistance training program, the focus will be on using low resistance and performing a large number of repetitions for a given exercise. Remember, players in this phase are typically entering puberty. Consequently, they do not yet
have the hormones and other building blocks in place that will allow them to really see large muscular gains, although they will see some strength gains. The exercises in this phase should include some traditional exercises you would see in a weight room (like bench press or lat pull downs), but should also go beyond that to include multi-joint exercises that develop complex coordination. It is also important during this phase to start teaching the techniques used for more advanced exercises, such as Olympic lifts. However, little or no weight should be used as the techniques are learned. An example of the type of exercise that should be introduced in this phase is the **Star Drill**.

The Star Drill is similar to a one-leg squat, except that balance is challenged to a greater degree. Start the exercise by balancing on the left leg. Imagine you are standing in the middle of a compass facing north. Slowly drop into a one-leg squat while lightly tracing a line on the floor with your right heel in the direction of North. Extend the right foot as far forward as you can, making sure you do not bend forward at the waist and keep the upper body upright. Return to the starting position and repeat the motion, except this time you will trace a line pointing NE. Complete additional repetitions tracing a line with your heel to the E, SE and S directions on the imaginary compass. Go through that entire exercise 3-5 times and repeat standing on the right leg. When this becomes too easy, do the same exercise standing on a foam pad. As you gain better strength and balance you will be able to go deeper and deeper into the squat.

**Transition Phase**

With a base level of strength established in the refinement phase, players normally move through and past puberty in the transition phase. Now the focus can shift to increasing strength and power. Keeping in mind the idea of progressive development, players should be exposed to the exercises designed to build strength and power gradually. Just because a girl or boy reaches age 12 or 15, respectively, does not mean either should suddenly jump into a full-blown plyometric or Olympic lifting program. Things still should progress gradually, recognizing that the true benefits come in the world-class performance phase. With that said, an example of an exercise to include in the transition phase is the **Medicine Ball Squat/Chest Throw**.

The Medicine Ball Squat/Chest Throw is a moderate-intensity exercise that will develop lower body power and use of the kinetic chain. Starting in a standing position, hold a 3-5 kg medicine ball (depending on player size and strength) at chest level. Drop into a front squat position and immediately explode upward, performing a chest throw that launches the ball straight up in the air. Land in a balanced position with the weight on the balls of the feet and the knees and hips slightly flexed. Let the ball bounce once and, as the ball is caught, immediately drop into a squat position and repeat the movement. Perform 1-2 sets of 10-12 repetitions of the exercise.

**World-Class Performance Phase**

Power development, which incorporates both strength and speed, is the focus of this phase. It is here that a player will truly reap the benefits of having engaged in a well-structured, age-appropriate training plan for his or her development. To build explosiveness and power, the player now focuses on low-rep, high-intensity exercises with a great deal of rest. These exercises also require a good deal of skill and are not recommended for any player unfamiliar with strength training, regardless of his or her age. One example of an exercise to include in the world-class phase is the **Hang Clean**.

The Hang Clean is a modification of an Olympic lift and helps develop full body coordination and power. Start this exercise by grasping a loaded barbell with an overhand grip, slightly wider than shoulder width apart. Bend the knees and hips slightly so the barbell rests on the middle of your thighs. Driving with the legs, explosively extend the knees, hips and back as you jump upward to accelerate the bar. Shrug the shoulders and keep the weight close to the body. As the weight moves upward, drop under the bar to “catch” it across your shoulders. You should catch the weight in a front squat position and your upper arms should be parallel to the floor with the elbows pointing forward in order to help control the weight. Finish the movement by executing the front squat. Bend the knees slightly as you return the bar to the starting position.
USTA High Performance Coaching Program Dates

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<td>May 8-13, 2007</td>
<td>Minneapolis, MN</td>
<td>February 23, 2007</td>
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<tr>
<td>August 14-20, 2007</td>
<td>USTA Training Center, Carson, CA</td>
<td>May 15, 2007</td>
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</table>

Applications for the above program dates are available by contacting 305-365-USTA or e-mailing us at Coaching@USTA.com. We encourage all interested coaches to apply as soon as possible.