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CHAMPION BASED ON COMPARISON OF A HANDBALL PLAYER AND A TENNIS PLAYER

1. Basic ball handling abilities

1.1. Speed

Speed is the ability to, based on cognitive processes, maximum determination and functionality of muscularity, achieve the highest possible speed of reaction or movement, at the given time. Even though the maximum speeds are rarely achieved in sports, the correct techniques of running and speed-trainings will enhance every kind of speed, necessary in sports.

Some authors believe that an athlete's speed cannot be improved, but instead the reserves for achieving higher speeds, exist already. To improve the maximum speed, a lot of effort is required. It's the running technique which by its own improvement, results in a higher speed. Under the technique of running, we assume the biomechanics of the motion, correct running mechanics, the pace length and frequency, correct position of hips, shoulders and legs.

1.2. Agility

Agility can be defined as the ability to quickly and effectively move the body, in terms of sudden stopping and changing the direction of movement. Some authors quote different definitions of agility, such as Pearson (2001.) – defines agility as the ability to change the direction of movement without losing balance, speed, power or movement control. According to Verstegen and Marcello (2001.) these are the factors that influence agility: speed, power, coordination, joints' mobility, dynamic balance, development of according energy resources, stability of the locomotion system, and biomechanical optimum structure of movement.

When exercising agility, its very important to understand the patterns of movement common for each sport. Then we come up with exercises which enhance these abilities. That includes the given movements executed in sport, dissolutioning the given movement into different sections and the basic movement which emphasizes the skill. Key words, regarding exercising agility, are body awareness and control, preparation for execution of exercise, reaction, change of direction and leg work. An example of these exercises, includes the usage of agility ladders which are used to develop faster leg work with exercises for changing direction.

Mastering agility requires a combination of balance, speed, coordination and power. Balance positions in yoga, are also a good way to improve this ability.

All exercises require good general physical condition. Without the adequate strength of leg muscles, the quality of any movement is quite limited. Executing power-exercises 2-3 times per week is recommended for the development and

maintenance of muscle mass. Agility can be divided into frontal, horizontal, vertical, and lateral.

1.3. Explosiveness

An athlete's success is largely dependant on the speed of his reactions. It's said about this trait also, that it is genetically assumed and that it cannot be affected. That is completely wrong. Exercise brings closer to the perfect performance of a task. The sooner the task is learned, the sooner we're able to concentrate on improving the performance while doing it. The genetics factor is largely of matter, however many biomechanical skills are dependant on explosiveness which can be improved. When discussing explosiveness, we should mention speed, acceleration or agility. One of the definitions of explosiveness is "to quickly react to stimulation". So, explosiveness is tied to speed, time and reaction. Time of reaction, to simpler or complex situations, is ever present in sports. Sometimes it is the judging factor, and can certainly be improved by training. It's important to state that improving explosiveness has the most affect on improvement of speed, acceleration and the time of reaction.

Tennis is classified under acyclic group of sports (gymnastics, wrestling, boxing, ball sports) because each movement is followed by another which is different to the previous one, unlike cyclic sports (running, cycling, rowing) where certain movements are repetitive, and mixed (long jump, high jump) where a cyclic part is present (running) and acyclic (the jump). In tennis, the mixture of components is also present, but to a lesser extent: for example running to meet a short shot (cyclic), and the hit (acyclic).

The type of competition (individual, group): tennis is an individual sport (boxing, fencing) because the match is held between two contestants unlike group sports (football, handball) where opposite teams of players compete. By the amount and kind of contact: different kinds of contact, no contact.

In tennis, there is no contact between the competitors (table tennis, volleyball) unlike sports where contact does occur (water polo, handball) and in some sports the contact is essential to the sport itself (wrestling, boxing, judo).

Tennis is played with a racquet, which means additional equipment is used for the game (table tennis, baseball), unlike sports where no equipment is required but the body is used instead (basketball, handball, and football).

By the level of movement standards: standard and non-standard. Tennis is a non-standard discipline because the game is played under constantly changing circumstances (all ball sports), unlike the standard (running, gymnastics, figure skating, weight lifting) where there is a specific routine of movements.

By the more distinguished physical trait (speed bursts, stamina). Tennis is in the group of sports where the sudden bursts of speed is required (short running disciplines, jumps, throws, weight lifting) unlike sports where stamina is required (running middle and long races, cycling).

Methods of comparing score (points, points at a specific time, time, weight, height, length). Tennis is a sport where the score is calculated by points comparison

(volleyball) without a time limit, unlike sports where there is a time limit (handball, football), where the score is calculated using time (running, cycling), weight (weight lifting), height (high jump, high pole jump), and distance (long jump, triple jump).

That way tennis could be qualified as: acyclic (mixed), individual, no contact, utilizes additional equipment, non-standard, speed burst sport, that is played for points, and without a time limit.

When comparing the complexity of different sports by these criteria of classification:

1. Structure of movement – acyclic and mixed sports are more complex than the cyclic kinds of competition – individual ones are more complex compared to the group ones
2. The amount and kind of contact – sports without contact are simpler than those which do feature contact; in other words the more the contact, the more complex it is, by these criteria.
3. Utilization of additional equipment – sports that use additional equipment (racquet, bat) are more complex than those sports which do not utilize equipment instead of the body.
4. The degree of standardization of movements – non standard sports are by this criteria more complex than the standard ones, because the skills are performed under changing circumstances (the tennis ball never flies in completely the same manner), unlike standard ones where regardless of the technical complexity of movements, the quality of their execution is strictly dependant on the athlete himself.
5. The more distinguished physical trait – by this criteria, it is impossible to say that one or the other is more complex, because except for training, both feature the role of genetic capabilities (sufficient amount of fast/slow muscle fiber)
6. Methods of comparing scores – only those sports which are played for points, with and without the time limit, are valid for comparison. The ones without the time limit are more complex than those which do not feature a time limit.

It is ungrateful to compare the difficulty of sports, but judging by this superficial analysis, one may conclude that tennis is classified as a highly complex sport. It is confirmed by the fact that practicing tennis is required since early age, to have any chance of success, and the time needed to practice is at least 10 years or 10.000 hours (the best illustration of how much 10.000 hours really is, that it is one year and 51 days of exercise 24 hours a day – sounds incredible). Only then one could tell whether it all made sense, or not.

Mainly, tennis is an individual sport compared to group sports (football, basketball, volleyball...). The group part of tennis is displayed at competitions such as the Davis cup, Fed cup, etc. But the actual group component of tennis is present only in couples' game. Seeing it is an individual sport, a tennis player has to master the whole technique and tactics for all phases of the game. There is no specialization, which is

featured in group sports (some are better in defense, and some in attack) but instead the individual is only as good as his weakest trait is. There is no help from a teammate, no substitutions. As much effort one puts into the game that much the chances for a good score increase.

2. Two main goals of sports science

A talent is a child with the same pattern – structure, as that of a champion. Sports science can be defined as a pair of maps (f, f^{-1}) between the patterns of talent and champion: (I) Direct, continual training map f , from the pattern of talent to the pattern of champion, and (II) inverse, selective (well known) map f^{-1} from the pattern of champion to the pattern of talent.

So, sports science is directed towards the methods of training (towards the making of a champion) and methods of selection (directed towards seeking out a champion). In sport sciences all champions are represented by a model champion for a specific discipline (for example tennis) and all talents are shown by the talent model for the same discipline (picture 3.1). Statistically, talents and champions have the same structural factor – however it has completely developed in a champion, and only partially. For example Nadal, Roddick, Federer and Djokovic were all talents. But until now only one of them has become a true champion – Roger Federer, the man who apparently defines all tennis statistics. Today, in our opinion the biggest odds to become the future tennis champions belong to Nadal and Djokovic.

3. Athletics and tennis

Question: how to have a tennis player run faster. Fast running is a direct consequence of athletic speed and length of pace. The question is how to bring these two elements to their maximums, to achieve the highest level of performance during sprint or simply the fastest running on the court. We can't have the highest speed of pace and the longest pace; what is needed is the maximum speed of pace with the optimum length of pace. Maximum speed of pace represents how quickly one makes a step, or around 10 steps in 20m. The speed of the pace depends on several factors including power and mechanics. To have a higher speed of pace, its required to be capable of doing a correct sequence of steps, as quick as possible with the optimum length. The optimal length of pace enables the athlete to make a correct pattern of pacing during the least possible amount of time. On the other hand, the time spent on the ground is of the biggest help to the pace speed. Its known that most athletes spend almost the same amount of time in mid air. The big difference comes from the amount of time spent on the ground. The goal of all sprinters, and tennis players alike, is to spend the least possible amount of time on the ground. To achieve this they require power to go all the way through a correct cycle. Also, during short sprints on the court, in every leg units absorb the force of extension (eccentric) before they contract (concentrate) to create the initial force.

4. Question: how does a tennis player improve his jumping skill?

Jumping is determined by the strength of the legs. Remember that the muscle strength is a consequence of muscular force and speed of movement. In other words it's the ability to quickly produce muscular force. If you take a look at the force – speed graph, the high values of strength appear in the middle ranges of both speed and force. If an athlete develops higher strength, it improves his ability to create both force and speed. This mixture of speed and strength can be more useful for athletic performance than just the strength. So the strength of a leg is a consequence of both force and speed. In the future of tennis, for players of all levels it will be necessary to possess a certain level of leg-strength to ensure success on any level – the higher the level, more strength is needed.

Main leg-strength exercises. These exercises are necessary to develop the force component. The squat exercises, such as complete squats, front, half, separated squats, develop the jumping musculature to a high level. Only several, or maybe none, great athlete has a weak squat capability. Even with beginners, some form of a squat is adequate, with the help of a weight-ball, to develop the jumping musculature. Even though there is a huge benefit of performing general strength building exercises, such as squats and their variations, an athlete has to keep in mind not to use the squats as the only exercise because these exercises are generally slow, and do not repeat the same requests as other events do.

5. Question: How to prevent possible injuries?

It is of great importance to an athlete to be both physically and mentally prepared for a competition, or even just training. An athlete should be able to identify a case of a minor injury, and to distinguish it from simple fatigue.

This is a list of simple ways using which you can recognize an injury:

1. pain is constant and is not fading away
2. the extended period of tension which disables movement
3. feeling exhausted
4. if a minor injury hasn't healed in time

Very motivated athletes, always try to put out more than their capabilities both during training and when competing. Unfortunately if an athlete doesn't rest enough and when required, muscles can become injured and these injuries can only become worse over time. Such injuries include:

1. Cramps. Muscles become too tight during contraction.
2. contusions (internal bleeding, pain caused by serious bruising).
3. ligaments overstress (over-extension, or torsion)
4. sprains (muscles or tendons were overly extended, or distorted)

For example, when lifting a weight, during exercise, the body reacts to the heavy load by creating micro-cracks in the muscle bonding tissues. This explains the pain which occurs after each weight lifting exercise. It is essential for an athlete to rest after every training session...

6. Superior weapons in tennis

Every effective tennis strike, whether it's a serve, backhand or forehand, is a whip like motion, performed by a complex coordination of all segments of the body, which work to set the racquet in the exact position at the right time and apply the maximum available force at the tennis ball. It's already been stated that the best training of power (strength+speed) for both service and forehand (even single-handed backhand) is javelin throwing. Not just that, but all exercises for strength and speed which the most outstanding javelin throwers practice are perfectly suited for future tennis champions.

The superior service, forehand and backhand, are whip-like motions comprised of an array of extended reflexes in all major joints beginning with legs ending in the hand's strike.

What are the main characteristics about Andy Roddick's first serve? The former world's #1, and currently ATP ranked 5th, Andy Roddick, holds the world record of the fastest serve: 153mph (246km/h) served at the Queen's Club, UK 2004. When he first met Patrick McEnroe, his Davis Cup coach, he told him: "Whatever you do, do not talk about my serve. If I start thinking about it, I'm in trouble." Why? Because its all reflexes, to be more exact the reflex of extension. If you think about something which is done by reflex, you simply mess up. Therefore it's the most important that a top class player fully develops his technique, based on reflexes. This will ensure the most optimum relation racquet/head speed, and enhance their performance and effect. However, trainers and sport scientists should analyze the most adequate movements, to be able to teach about the model of techniques. For example professor Bruce Elliot, from the University of West Australia, has, using video and 3D analysis of Roddick's and other successful tennis players' serve, concluded that the input of certain movements varies from player to player but has spotted the significant importance of the shoulder's interaction and wrist flexing during the swing.

7. The tennis champion of the future

How to describe the future tennis champion? The tennis champion of the future is hypothetically "the younger brother of Roger Federer" who knows how to, and is capable of doing everything Federer is. Additionally, he is mentally stronger and physically faster. As a consequence of this addition, he will be quite more efficient in the future tennis, which will be significantly faster tennis game play, compared to today's, because of racquet and players' improvement.

Superior tennis weapons of the future champion will show their general efficiency in all situations:

1. powerful serve, with speeds exceeding 300km/h, directed at the "T point" or the opponent's weaker side; second serve achieving the same speed as the first.
2. a powerful return based on the predictions of the opponent's move, and a quick response.

3. a powerful penetrating forehand, speed exceeding 240km/h, single-handed backhand of speed exceeding 200km/h, and two-handed backhand of speeds around 220km/h directed from any position of the body and any part of the court.
4. as an addition, a direct serving point (ace), additionally adheres to the overall aggressive (powerful) attitude.

The ability to make quick and correct decisions is crucial: for service and return, and also for the most appropriate strike in any situation. It's based on the correct prediction of the ball's trajectory, and the opponent's next move. Shortly, such ability is called "mental speed", which is learned and perfected over the years.

Apart from these superior weapons of tennis, the most obvious trait of the future champion is strong concentration, maintained throughout the entire match. The mentioned ability, the "mental strength" which is developed through so called visualization practices.

In general, high efficiency means: "when the opportunity arrives, point ends, game, set or match". Outstanding ability to learn assumes the change of technique and tactics, in the most adequate way, having the current situation in the court, in mind (for example, if the opponent is placing shots exclusively from the main line, the most efficient tactic would be to score by approaching the net).

Ten main traits of the future tennis champion: talent, commitment (to everyday training/competition), the desire to practice, compete and win, self awareness, confidence, planned approach (clearly set goals), the ability to adapt quickly, to a new situation at the court, the body-mind balance, competitiveness (like Federer, Nadal, Henan), and tenacity.

Three most visible physical traits of the future tennis champion are: speed, agility (ability to quickly change direction, during sprinting and jumping), and athletic skill.

The optimum height and body posture, of the future tennis champion, will be around 1.85m-1.87m like Federer, Nadal, Roddick and Djokovic, while the optimal body weight is around 80kg, like Federer and Djokovic. The optimal age of the male champion is 22-27 years of age, (+/- 2). If we wished to create a model of a hypothetical champion, based on current players, such model would be a combination of Federer, with Roddick's powerful serve, and the powerful forehand of Monfils.

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SUMMARY

Similarity between handball goalkeeper and tennis player is that training starts rather early, and the process of creation lasts for about 10 years. Essentially, similarity lies in individual training. The highest similarity occurs in a competition where the highest prospects of success are governed by individual performances. Accordingly, sports science is directed towards training methods. In sports sciences all champions are presented according to a champion model for a particular discipline, whereas all talents are presented according to the talent model for that discipline. Statistically speaking, champions and talents all have the same structural factor, but it is gradually developed in a champion and that it is still is not developed in a talent.

Key words: sports habit, tennis, handball keeper.