MANIFESTATION OF BIOMECHANIC PRINCIPLES IN TENNIS SHOTS AND MOVEMENTS

Goals

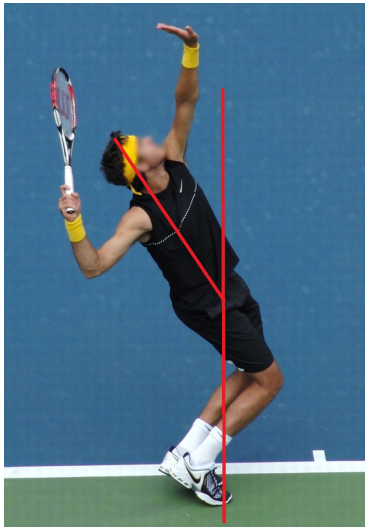
1. Separate efficiency and effectiveness,
2. Identified deviations in the technical implementation,
3. Recognize key positions and movements related to biomechanical principles.

B.I.O.M.E.C vs P.A.S.

Efficiency

Movement of the player.

Coach observe the movement.



Effectivness

Movement of the racket.

Coach see shots effect.

Biomechanical principles

Balance
Inertia
Opposite force
Momentum
Elastic energy
Co-ordination chain

Balance

Factors:

- The height of the body's center of gravity,
- The width of the supporting base,
- The body weight,
- Shoulder and head position.

Player‘s position (PP) after split step (SS)

- Conditioned by gender, age, flexibility, strength, perception, anticipation, situation...
- The optimal height in the position is 0.83 of the body height (BH = 183 cm = height in PP = 153 cm).

Shost in dynamic balance

- Jump shots,
- Shoulder and head position (visual control of the ball),
- Compensatory movements (counterforce).

Serve

- Position in "power position",
- Coordinated movement of the two hands,
- Shoulder and head posture,
- Kick back,
- Compensatory movements (opposite force).

Running shots

- shots in movements to the side, to the back, to the front,
- Perceiving and estimating the flight of the ball,
- The importance of the first three steps,
- Execution of a shot that allows a quick return,
- Strains and injuries.

Approaching & net shotss

- Dynamic or static,
- Shoulder and head position,
- Simple execution of the shot, allowing a quick return,
- Exploiting/overco ming inertia.

Playing a very low balls

- Extremely wide leg position in dynamic or static conditions,
- Shoulder and head position,
- No significant change in TT position during impact.

Inertia

Split step (SS)

- Get your body moving
- SS timing depends on the situation: S1=.300, S2=.334, R1=.331, R2=.293, F=.318, B=333, VF=.242, BV =.280); on the level of play: pro = .272 - .330, B14 = .306 – .424, G14 = .272 – .353-

Unit/shoulders turn

- Continuation of movement after SS,
- Use of large parts of the body (trunk),
- Movement pattern when the ball is near/far.

Movement (forward, back, lateral)

- Next: use inertia to increase power and shot's control,
- Back: counteract inertia with an appropriate movement,
- Laterally: play the shots with as little lateral movement as possible during and after the shot.

Arm extended/bent

- The movement of the skater's hands during the jump (axis),
- There is no clear answer,
- The line of acceleration of the racket on the forehand,
- Relationship with the height of the impact zone.

Opposite force

Start the movement

- Allows a quick start of movement or a change of direction (back line, coming to the net),
- Under time pressure,
- The effect of anticipation,
- It is developed through situational training.

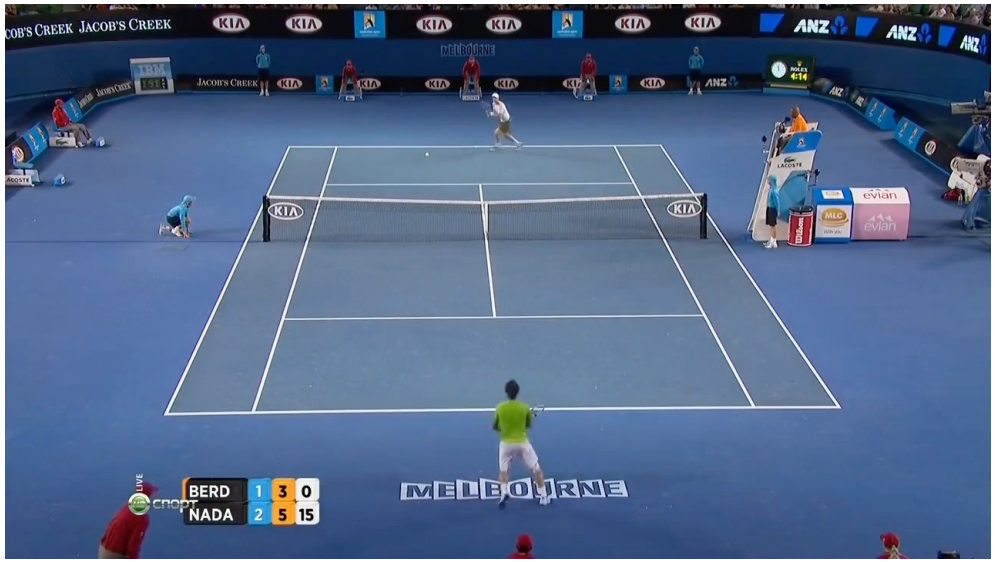
Foot pressure when changing direction

- The player does not increase the range of lateral movement,
- Allows a quick change of direction and optimal coverage of the field,
- The first step is the cross.

Fast movement back at overhead smash

- A natural reaction,
- A step forward after a preparatory jump allows a quick backward movement,
- For the development it is necessary to create a situation.

Fast movement forward



- Natural reaction,
- A step backward on the PP allows for rapid forward movement,
- For development it is necessary to create a suitable situation,
- Athletic coaches!

Foot pressure during shot preparation

- Appropriate timing of pressure on groundstrokes, smash, volley,
- In serve, pressure depends on movement (with or without step),
- The pressure (load) is the basis for the initiation of CC.

Opposite movement – serve, volley

- A compensatory movement that increases the velocity of impact and maintains the body's equilibrium position (alignment).

Opposite movement – smash in jump

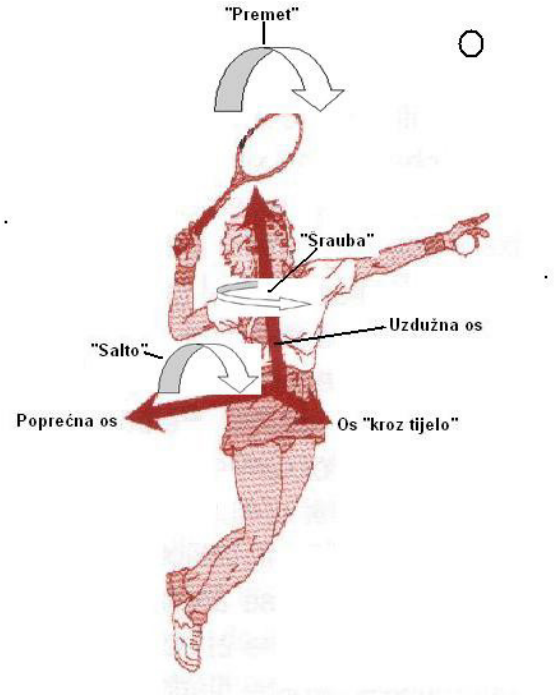
- Natural reaction,
- Balancing movement that increases the speed of the shot and maintains the equilibrium position of the body during the jump, allowing movement towards the net.

Momentum

Body weight transfer

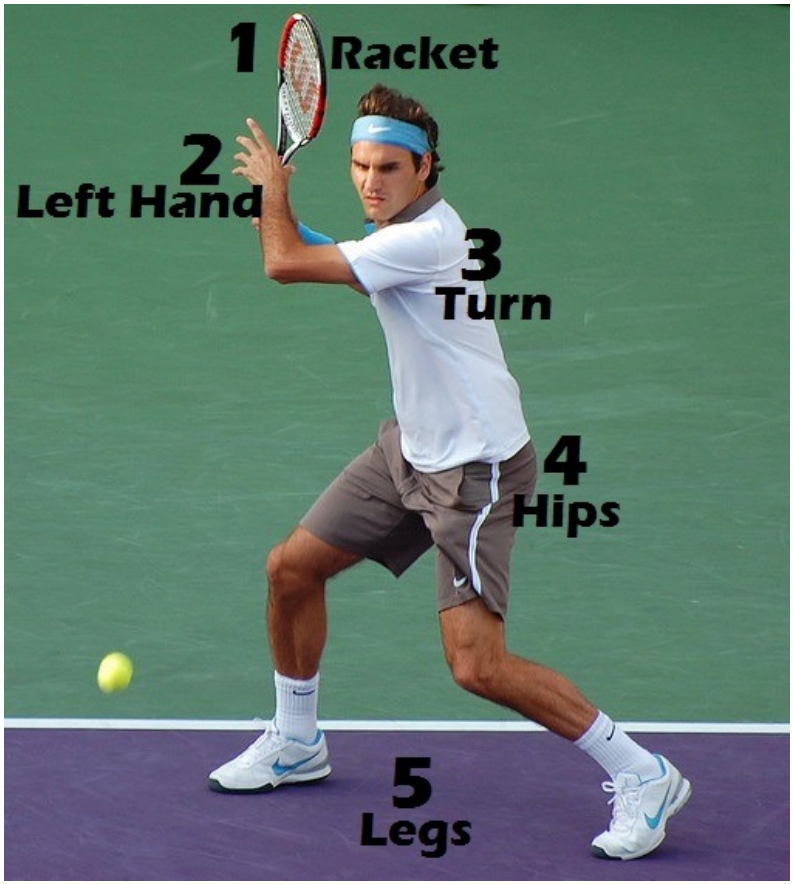
- The effect of grip,
- Dependent on the position of the blow,
- The range of linear and circular motion is constantly changing,
- Do not forget the vertical movement.

Acceleration directions in serve



- Twist: speed, lateral rotation,
- Shoulder over shoulder: ball flight, forward rotation, ball weight
- Somersault: speed.
- Analogy: spin, slice serve,
- Concentration on large parts of the body.

Elastic energy

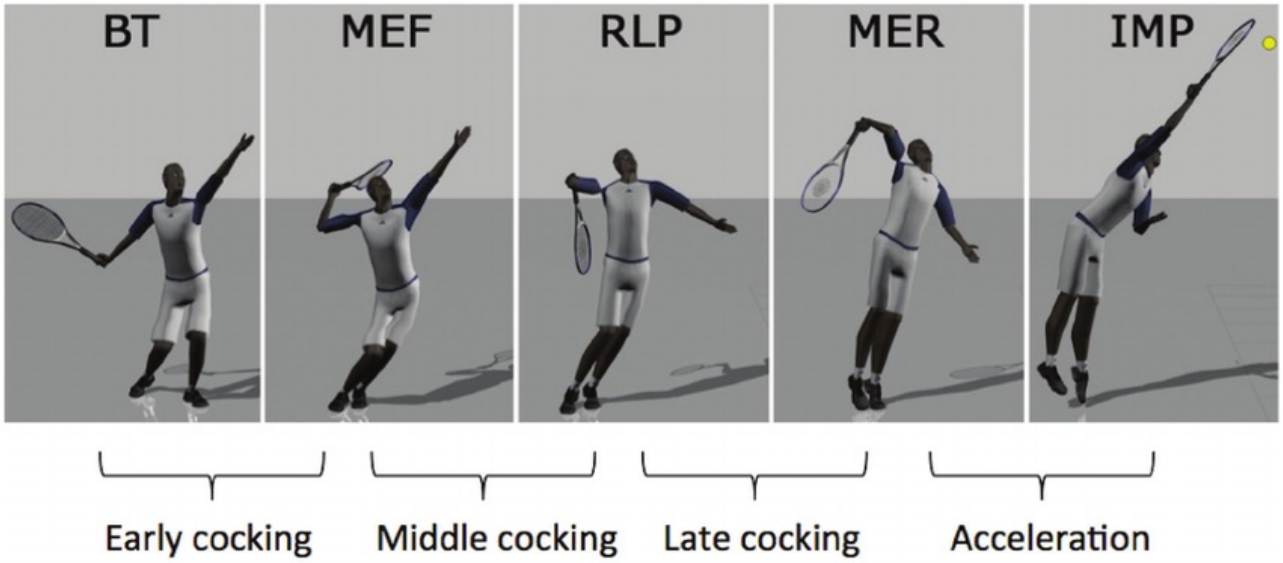


Creating tension between the axes of the body

- Timely preparation of major body parts (legs, hips, shoulders),
- Generation of tension between body parts (hips, shoulders),
- Dynamic performance.

Coordination chain

Escalator principle - serve



- The timing of the inclusion of each part,
- From the large to the small body parts, from the inside to the outside,
- The racket is the last link in the chain.

Escalator principle - forehand

- Time of recording and transfer of momentum to the next segment,
- Principle of the discus thrower (?),
- Throwing movement,
- Lower energy consumption,
- Long-term development: "From swinging to throwing"!

Questions?