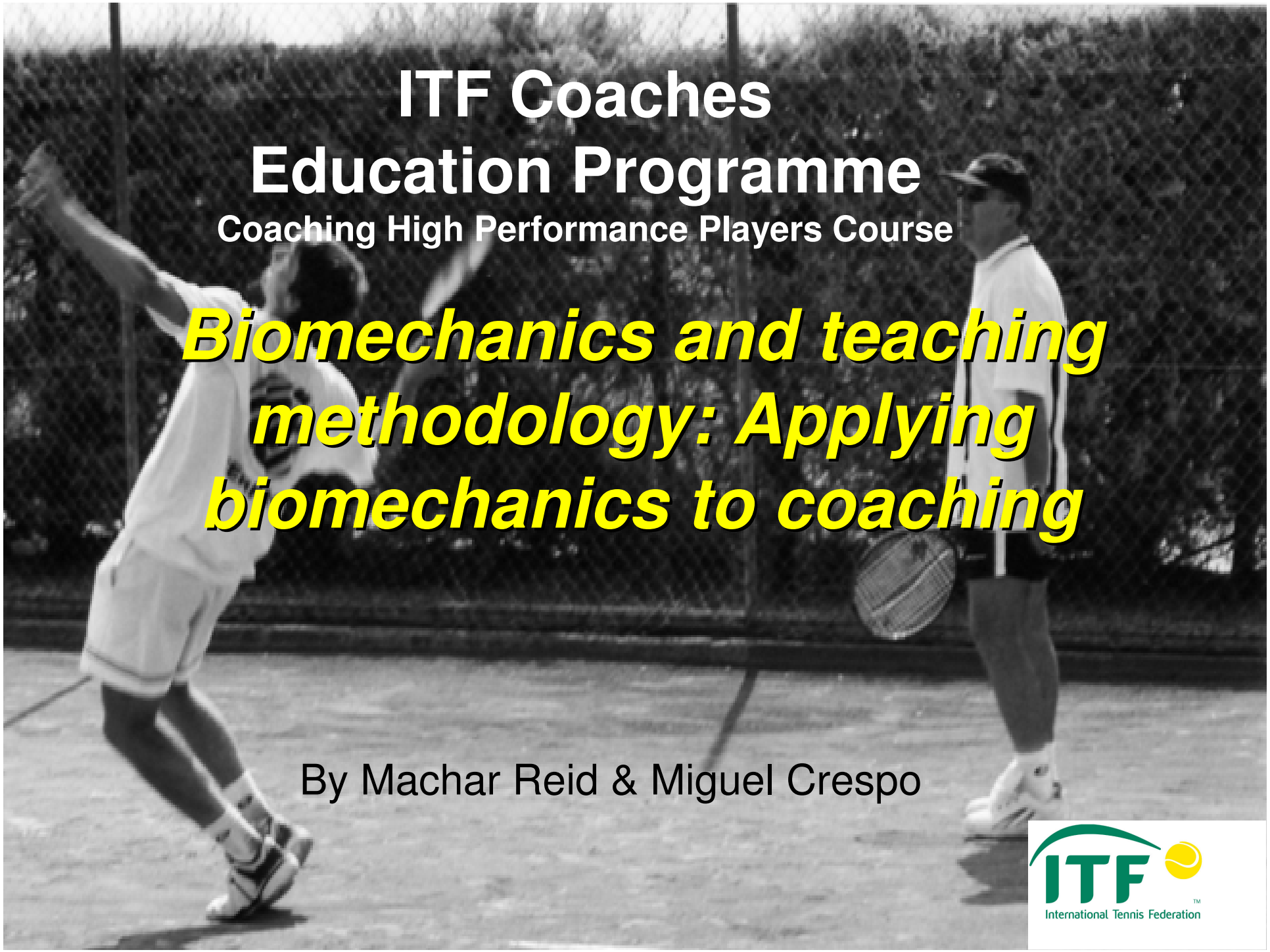


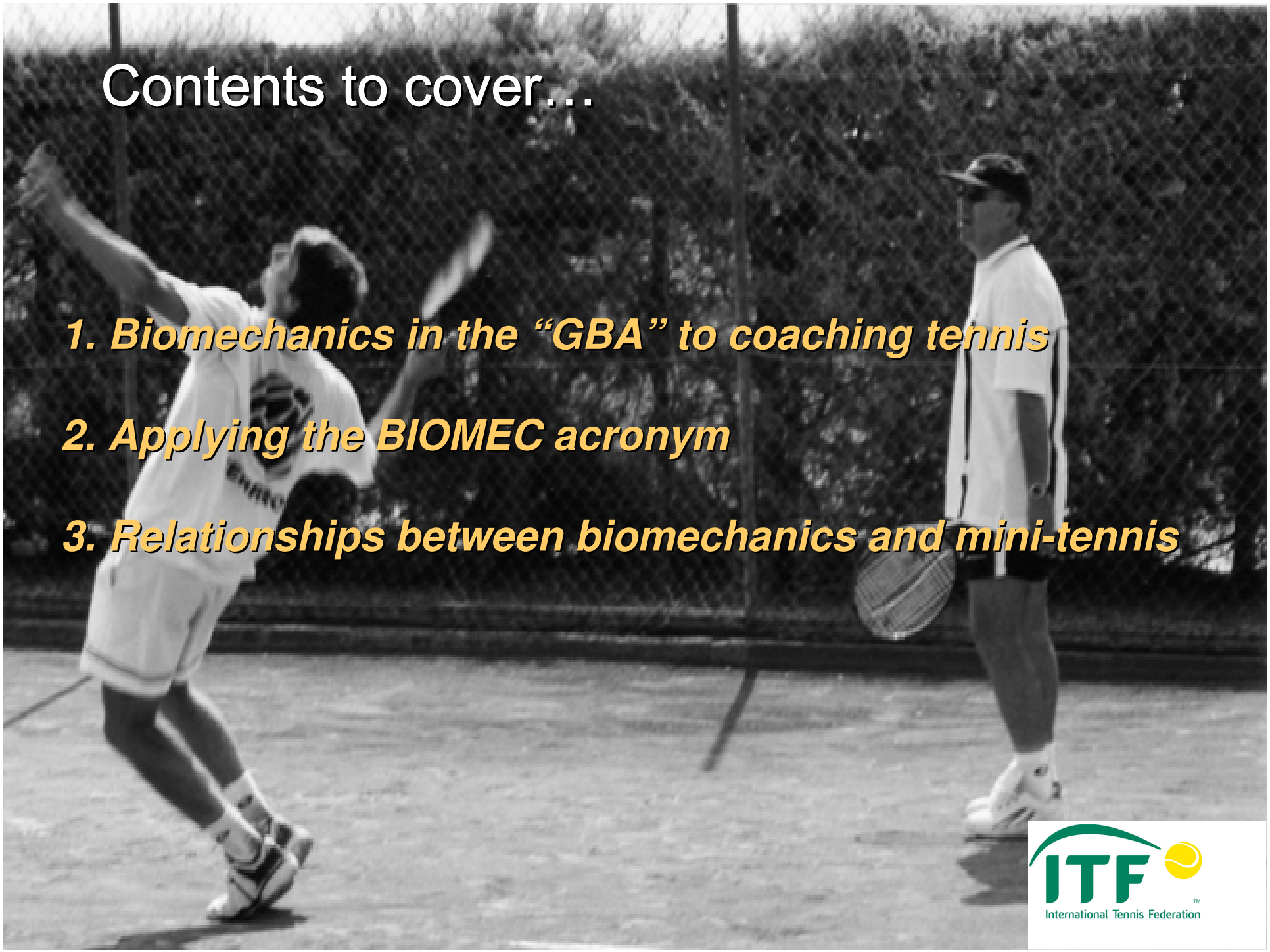
ITF Coaches Education Programme

Coaching High Performance Players Course

Biomechanics and teaching methodology: Applying biomechanics to coaching

By Machar Reid & Miguel Crespo

ITF™
International Tennis Federation



Contents to cover…

1. Biomechanics in the "GBA" to coaching tennis

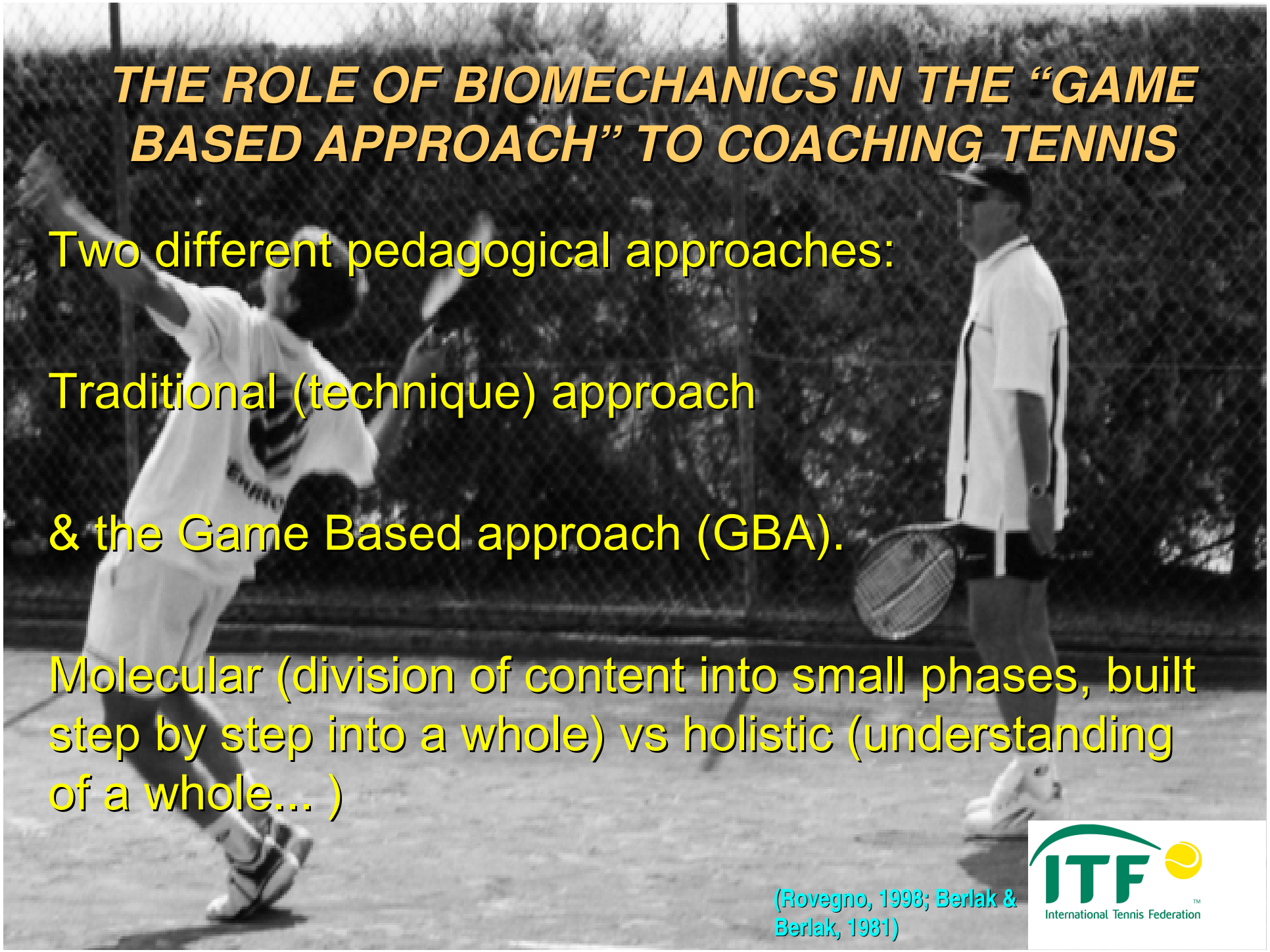
2. Applying the BIOMEC acronym

3. Relationships between biomechanics and mini-tennis

ITF™
International Tennis Federation

Characteristics	Traditional approach	Game based approach
Label	Technique approach	Games for understanding GBA
Main goal	Technical mastery	To understand the tactical problems of game play
Teaching styles	Command	Guided discovery
Teaching methods	Analytic	Global
Coach role	Teaching	Helping the player to learn
Player role	Following orders.	Player thinks and asks
Lesson structure	Drills with repetition of technique	Playing the game
Basic lesson contents	The tennis strokes	The game situations
Technical directives	Players copy optimal biomechanical model.	No model to copy. Many personal variations.
Tactics	Learned following mastery of technique	To be understood before the technique.
Feedback	Coach gives corrective tips	Coach asks players to adapt, not to eliminate.
Class organisation	Queuing, hitting only when coach feeds	Using stations, rallying, buddy teaching

ITF™
International Tennis Federation



THE ROLE OF BIOMECHANICS IN THE "GAME BASED APPROACH" TO COACHING TENNIS

Two different pedagogical approaches:

Traditional (technique) approach

& the Game Based approach (GBA).

Molecular (division of content into small phases, built step by step into a whole) vs holistic (understanding of a whole...)

(Rovegno, 1998; Berlak & Berlak, 1981)

ITF International Tennis Federation

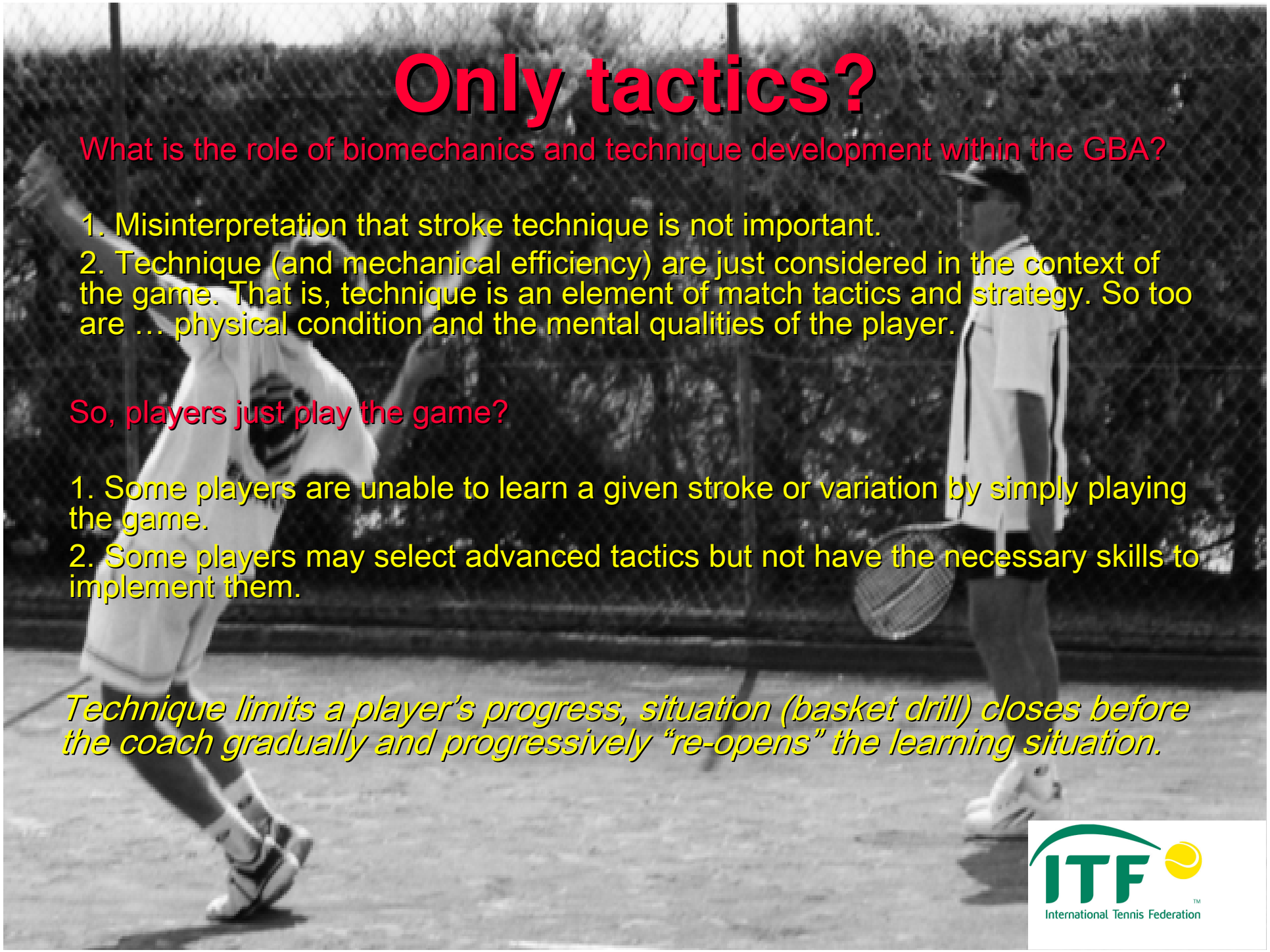
Proposed benefits…

- Technique approach
  - successful in improving skill acquisition but utility in helping players "play" the game has been questioned (Jones, 1982).
- GBA
  - encourages better game performance (control-accuracy and decision-shot selection) and higher levels of specific knowledge than players coached using the technique approach (McPherson, 1991; McPherson and French, 1991; 1992; Turner, 2003).
- HOWEVER, players taught with the traditional approach improved their tennis skills and cognitive decision-making, while the GBA saw players plan a greater number of tactical responses but not improve their tennis skills until taught directly.

When to apply??

- Beginners aged nine and above as well as intermediate and advanced players.
- Thorpe (1983) - the GBA is best used with children aged over eight years old.
- GBA initially introduced as a means to teach sport to secondary school students aged 12-18 (Thorpe et al., 1986).
- Use mini-tennis with child beginners (≈ 4 to 8 years old) to facilitate fundamental motor skill and tennis skill development.
- Many child beginners do not possess the necessary cognitive or motor abilities for GBA to be applied most successfully, and more direction is required.

ITF™
International Tennis Federation



Only tactics?

What is the role of biomechanics and technique development within the GBA?

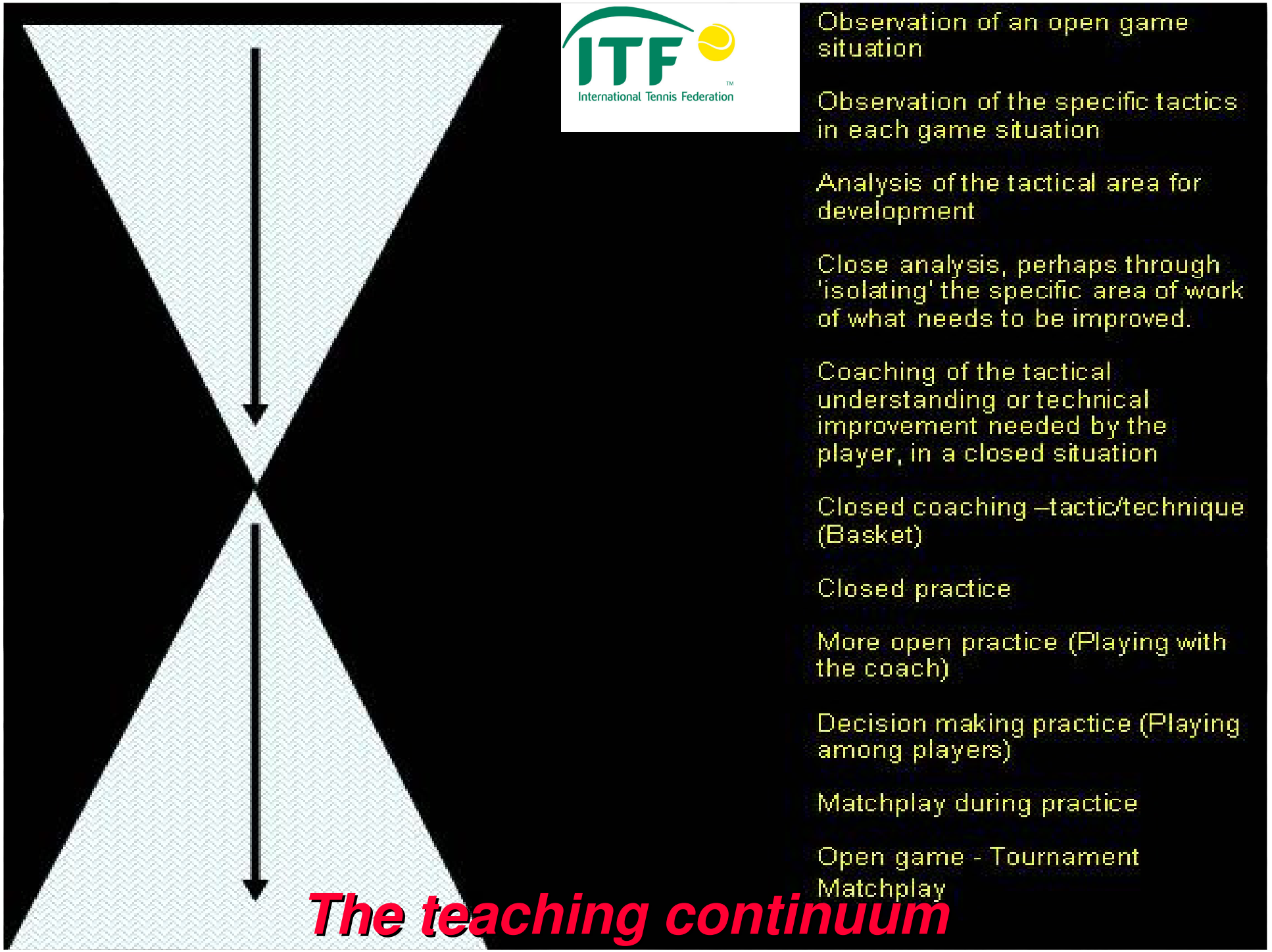
1. Misinterpretation that stroke technique is not important.
2. Technique (and mechanical efficiency) are just considered in the context of the game. That is, technique is an element of match tactics and strategy. So too are … physical condition and the mental qualities of the player.

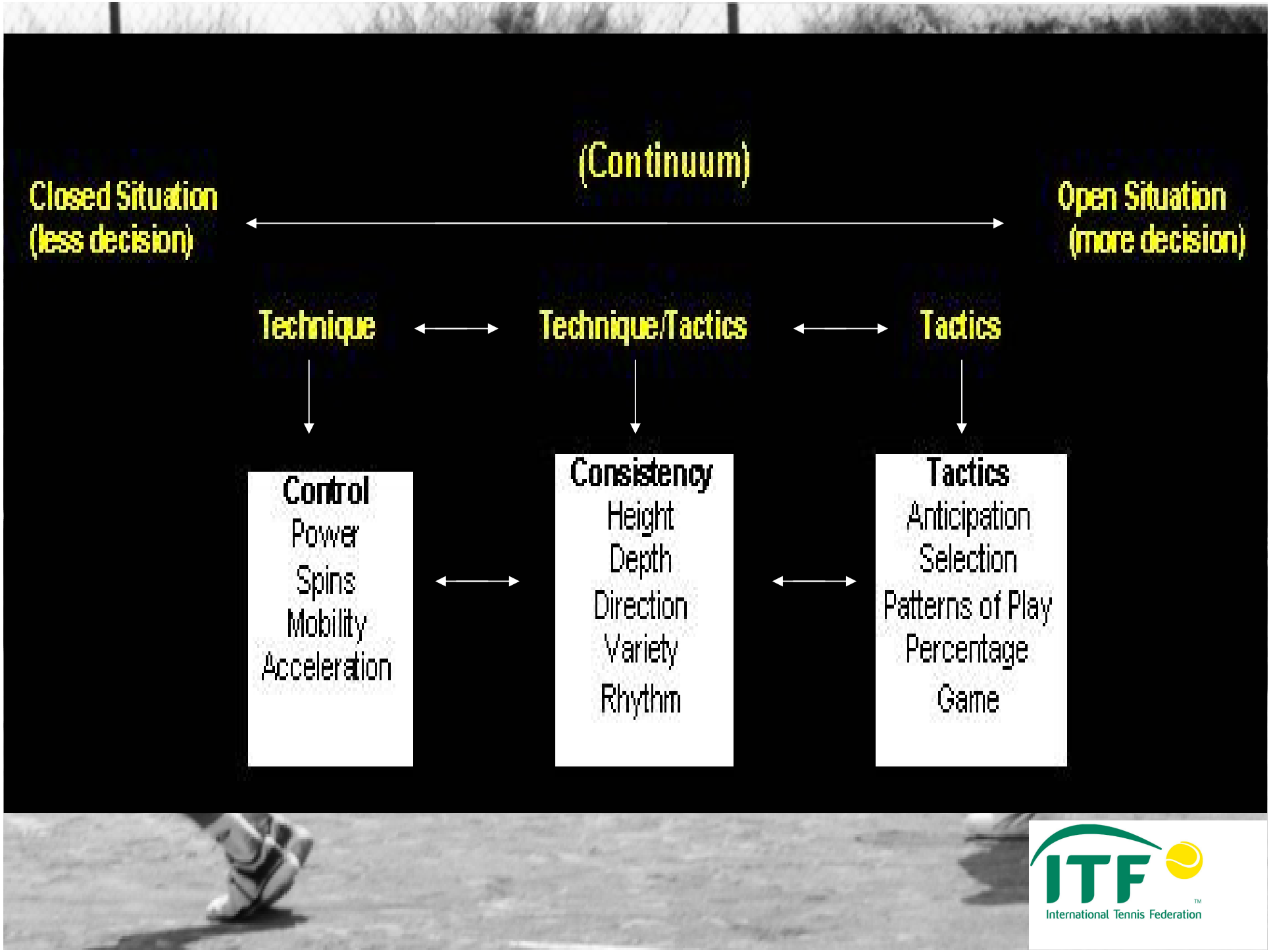
So, players just play the game?

1. Some players are unable to learn a given stroke or variation by simply playing the game.
2. Some players may select advanced tactics but not have the necessary skills to implement them.

Technique limits a player's progress, situation (basket drill) closes before the coach gradually and progressively "re-opens" the learning situation.

ITF™
International Tennis Federation


ITF
International Tennis Federation
Observation of an open game situation
Observation of the specific tactics in each game situation
Analysis of the tactical area for development
Close analysis, perhaps through 'isolating' the specific area of work of what needs to be improved.
Coaching of the tactical understanding or technical improvement needed by the player, in a closed situation
Closed coaching –tactic/technique (Basket)
Closed practice
More open practice (Playing with the coach)
Decision making practice (Playing among players)
Matchplay during practice
Open game - Tournament Matchplay
The teaching continuum


(Continuum)
Closed Situation
(less decision)
Open Situation
(more decision)
Technique
Technique/Tactics
Tactics
Control
Power
Spins
Mobility
Acceleration
Consistency
Height
Depth
Direction
Variety
Rhythm
Tactics
Anticipation
Selection
Patterns of Play
Percentage
Game

To best develop stroke production when using the GBA coaches should consider:

1. Strict imposition of certain grips, stances, backswings and follow-throughs is not recommended. Consider the skill's key mechanical features and the flair and the physical characteristics of the player in developing individualised models.

2. Relate the stroke/movement's biomechanical characteristics to tactical intention. In this way, provide opportunities to experience how the technique will be most effectively applied in the game.

3. Use realistic drills (i.e. if feeding, it should resemble the match situation).

4. Repetition is important. Players should repeat the stroke or movement as many times as required to achieve the tactical (and/or technical) goal.

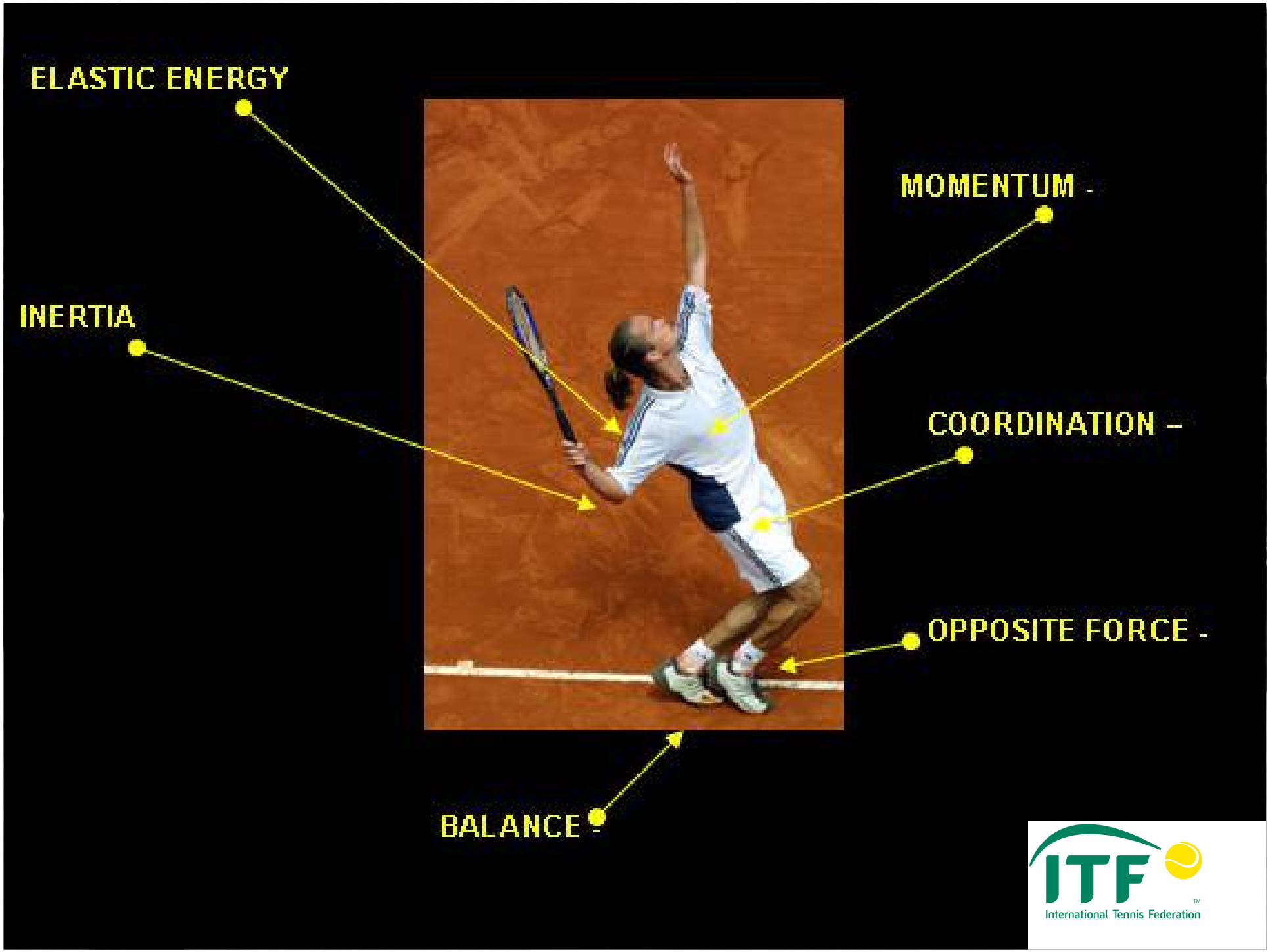
ITF™
International Tennis Federation

THE USE OF BIOMECHANICAL PRINCIPLES IN PRACTICAL COACHING THROUGH THE BIOMEC SYSTEM

- Traditional coaching practices have viewed stroke production phasically (ready position, …)
- This encourages coaches to pinpoint stylistic differences in stroke production.
- Coaches need to understand relationship between biomechanics and stroke technique (and being pedantic stylistic variation).
  - Two players can have very different techniques yet use biomechanics principles in an appropriate way such that both shots are effective and do not increase the prospect of injury.
- Coaches should be confident in their interpretation of "good biomechanics" but not too rigid in their implementation of "a certain technique".

BIOMEC' acronym - each letter of the acronym relates to a particular biomechanical concept or principle that is universally important to stroke and movement production in tennis.

ITF™
International Tennis Federation


ELASTIC ENERGY
INERTIA
MOMENTUM -
COORDINATION –
OPPOSITE FORCE -
BALANCE -
ITF
International Tennis Federation

ITF
International Tennis Federation

Relationship – Biomechanics and Mini-tennis

Development of ABC's (agility, balance and coordination) of physical skills essential for children <10.

Mini-tennis activities have been shown to be effective for developing the fundamental motor skills of running, throwing, catching, jumping and hitting (Quezada et al., 2000).

Science has demonstrated the need for racquet size to be related to body size as indicated by age (Elliott, 1981).

Equipment modification:

- Racquets of reduced mass, concentrated closer to the handle.
- Wider racquet heads, typically associated with higher polar moments of inertia.
- Foam or soft (lower pressure) balls that lose more energy during the racquet-ball impact, travel through the air slower and bounce less.

ITF™
International Tennis Federation

Summary

All strokes have a fundamental mechanical structure and to play tennis with maximum effectiveness players need to be able to play these strokes in all game situations.

Well-planned GBA coaching helps players better understand the tactical challenges of tennis and encourages them to develop techniques within the tactical context of the game.

More extensive study is required to determine the effect of the technique and GBA coaching approaches on both the cognitive and skill components of tennis performance.

Calls to abandon traditional teaching approaches, which have been shown to be effective in helping players learn the skills of the game are premature.

Mini-tennis is one very positive step in integrating biomechanics to this level of the game.

ITF™
International Tennis Federation