Analysis of stroke production in tennis: a review

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Introduction

Purpose

Games Based Approach

Analysis of Stroke Production

Types of Stroke Production Analysis in Tennis

Subjective Qualitative Analysis

Stroke Production Analysis and the GBA

Conclusion
INTRODUCTION

Coaches are aware of the new teaching methodology:
- Games based approach (GBA),
- Importance of strategy,
- Technique follows tactics…BUT…
COMMON SCENARIO IN COACHING

– Some confusion.
– Sometimes coaches do not know if and when they should mention technical aspects to his players.
– Evaluating / correcting stroke techniques
– Analysing / improvement of game play
– Often: over analysis up to “paralysis by analysis”.
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PURPOSE

To present and review several approaches to stroke production analysis and correction used in tennis

To discuss their role in the new GBA to teaching tennis
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GAME BASED APPROACH

• Well documented in recent years
• Many National Associations as well as the ITF have promoted it in tennis coaching.
• Research has shown that it can be a good way of helping people to learn and improve the game of tennis
GAME BASED APPROACH

• Concerns raised (Crespo & Reid, 2002):

• Role of:
  – Biomechanics,
  – Analysis of stroke production
  – Correction methods within this new approach
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ANALYSIS OF STROKE PRODUCTION

Definition

Process by which the coach studies the player’s stroke (s) and tries to improve its efficiency and effectiveness while simultaneously minimising the prospect of injury (Brechbühl, 1987).
ANALYSIS OF STROKE PRODUCTION

Name

- Traditionally labelled diagnosis and correction.
- The first implies a more positive approach toward the player and the process (Crespo & Miley, 1998).
ANALYSIS OF STROKE PRODUCTION

Importance

• One of the most important components of a good coach
• Much more than just diagnosing or detecting errors and making corrections (Knudson, 2001),
ANALYSIS OF STROKE PRODUCTION

Goals

• Provide the adequate technical skills according to the player’s characteristics and the demands of each game situation,

• Develop good technique:
  o Efficient: Using the appropriate amount of energy, and
  o Effective: Producing the desired outcome (winning the point),
ANALYSIS OF STROKE PRODUCTION

Goals

• Avoid injury and / or determine the causes of injury,
• Try to identify flaws in technique that may lead to poor performance or injury.
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TYPES OF ANALYSIS OF STROKE PRODUCTION IN TENNIS

Objective  Subjective  Predictive
OBJECTIVE ANALYSIS

- Collection, measurement and evaluation of data from a given stroke or movement
- Measuring several objective variables of a stroke or movement such as:
  - speed of racket head,
  - angle of joints, etc.
- Permanent record/s of a skill that can be analysed
- May require the assistance of a biomechanist
OBJECTIVE ANALYSIS

Types

- **Dynamometry**: Recording of force against the ground during strokes or movements.
- **Electromyography**: Recording of muscle activity during a stroke.
- **Cinematography**: High-speed recording of segment motion during stroke production.
PREDICTIVE ANALYSIS

• Study possible improvements in technique
• Provide answers to the question “What if?”
• Computer models to predict changes that would occur in a movement as a consequence of alterations to input values
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SUBJECTIVE ANALYSIS

• Most common analysis technique used by coaches
• Intuitive approach
• Watching of a stroke or movement with the eye
• Natural ability of top coaches
SUBJECTIVE ANALYSIS

• Can be learned and improved through practice, experience and study

• Coaches should have a mechanical model of each stroke or movement before using this method
SUBJECTIVE ANALYSIS

Phases

- Preparation
- Observation
- Evaluation
- Diagnosis
- Intervention
SUBJECTIVE ANALYSIS - I

Preparation or pre-observation

- Gather relevant knowledge
- Determine performance goal
- Identify / select critical variables
- Determine acceptable range
- Establish mechanical features
- Apply Biomechanics
- Decide parts of each stroke critical to performance

Intervention strategies

Diagnosis

Evaluation

Observation (strategies)

Preparation or pre-observation
SUBJECTIVE ANALYSIS - II

Preparation or pre-observation

- Gather relevant knowledge
- Determine performance goal
- Identify / select critical variables
- Determine acceptable range
- Establish mechanical features
- Apply Biomechanics
- Decide parts of each stroke critical to performance

Observation (strategies)

- Overall impression of movement,
- Phases of the movement,
- From the ground up,
- From the most important features to the least important,
- From general to specific impressions
- Bat, ball, brain, body
- BIOMECH

Intervention strategies

Diagnosis Evaluation Observation (strategies)

Preparation or pre-observation
SUBJECTIVE ANALYSIS - III

Preparation or
pre-observation
• Gather relevant
knowledge
• Determine
performance goal
• Identify / select
critical variables
• Determine
acceptable range
• Establish mechanical
features
• Apply Biomechanics
• Decide parts of each
stroke critical to
performance

Observation
(strategies)
• Overall impression
of the movement,
• Following specific
phases of the
movement,
• Starting from the
ground up,
• From the most
important features to
the least important,
• From general to
specific impressions

Evaluation
• Compare
model and
observed
response
• Evaluate
differences
• Identify
strengths and
weaknesses
(errors)
• Determine
primary errors

Gather relevant knowledge
Determine performance goal
Identify / select critical variables
Determine acceptable range
Establish mechanical features
Apply Biomechanics
Decide parts of each stroke critical to performance
## SUBJECTIVE ANALYSIS - IV

<table>
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<td>• BIOME</td>
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Diagnosis:

- Determine the cause of a fault
- Relate actions to previous actions
- Maximise improvement
- In order of difficulty,
- In the sequence of the movement,
- From the base of support up,
- Critical features first.
## SUBJECTIVE ANALYSIS - V

### Intervention strategies
- Feedback: specific, corrective, cue words, immediate, varied, performance, sandwich
- Exaggeration,
- Visual model,
- Modify task, environment / practice,
- Manual guidance,
- Conditioning.

### Preparation or pre-observation
- Gather relevant knowledge
- Determine performance goal
- Identify / select critical variables
- Determine acceptable range
- Establish mechanical features
- Apply Biomechanics
- Decide parts of each stroke critical to performance

### Observation (strategies)
- Overall impression of movement,
- Phases of the movement,
- From the ground up,
- From the most important features to the least important,
- From general to specific impressions
- Bat, ball, brain, body
- BIOMECC

### Evaluation
- Compare model and the observed response
- Evaluate differences
- Identify both strengths and weaknesses (errors)
- Determine primary errors

### Diagnosis
- Determine the cause of a technique fault.
- Relating actions to previous actions.
- Maximising improvement,
- In order of difficulty,
- In the sequence of the movement,
- From the base of support up,
- Critical features first.

### BIOMEC (strategies)
- Gathering relevant knowledge
- Determining the performance goal
- Identifying and selecting critical variables
- Determining acceptable range
- Establishing mechanical features
- Applying Biomechanics
- Deciding on the parts of each stroke critical to performance

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SUBJECTIVE ANALYSIS

Advantages

• Attain a more complete picture of a player’s abilities,
• Focus on the most important technique factors,
• Limit irrelevant technical factors.
• Integrate:
  – Professional experience, and
  – Sport science.
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STROKE PRODUCTION ANALYSIS AND THE GBA

- Misinterpret the emphasis on developing tactics as undermining technique
- **GBA**: Analysis of technique put in correct place within the overall structure of the game
- **Technique**: Element of match tactics and strategy, as physical condition and mental qualities (Crespo & Reid, 2002)
STROKE PRODUCTION ANALYSIS AND THE GBA

• Coaches help their players understand the relationships between and the applications of different stroke techniques and the demands and challenges of match play

• Coaches:
  – Use subjective stroke analysis
  – Adopt innovative approaches for correction of stroke production
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CONCLUSION

• Analysis of stroke production is crucial within the GBA
• Effective stroke analysis and correction approaches:
  – Biomechanically sound
  – Consistent with the GBA (coach players with respect to the tactical challenges of game play)