

Performance Analysis in Team games (ΑΠ-197επ)

Lecture 2

Sports Performance Data and Information

The Relationship Between Data and Information

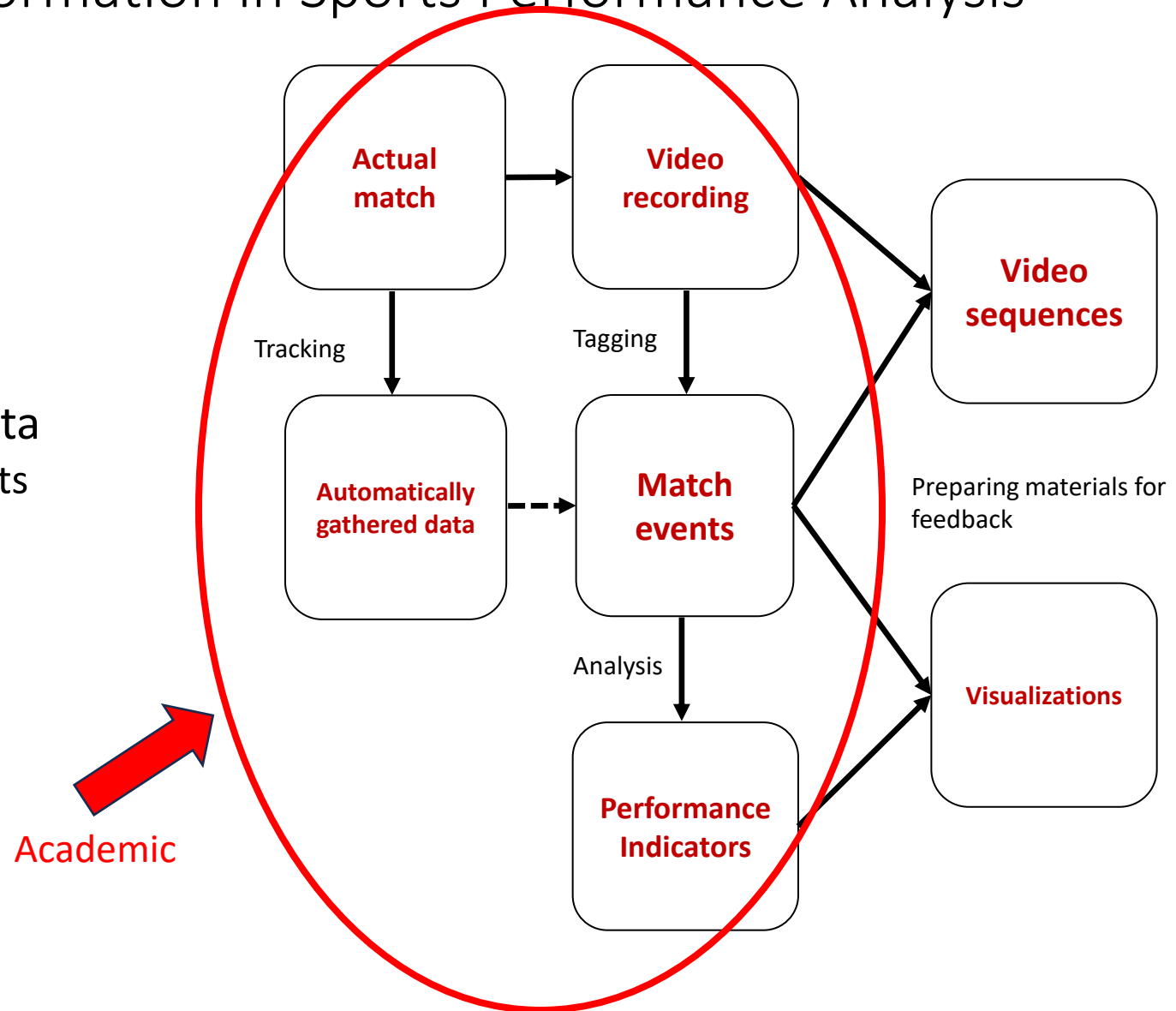
- The terms "data" and "information" are not interchangeable.
- "Data" is the input to a process, while "information" is the output.
- The purpose of the process is to transform data into concise information.
- Processes in sports performance analysis can be manual, automated, or a combination of both.

Data and Information in Sports Performance Analysis

- Sports performance analysis transforms data into information.
- Data comes from actual sports performance.
- Data includes visual patterns, videos, images, words, emotions, and thoughts.
- Information is used to make decisions about preparation and tactics.

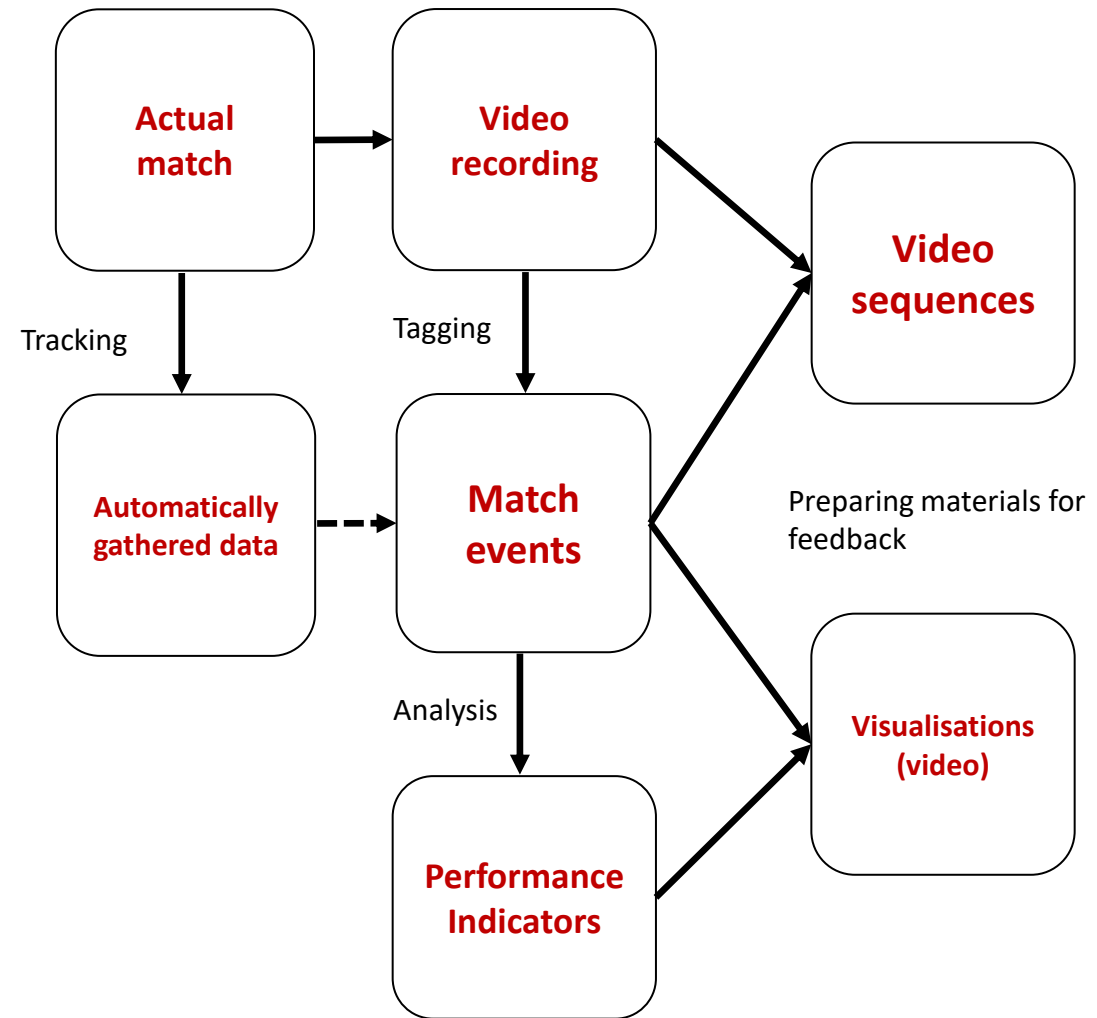
Data and Information in Sports Performance Analysis

- On field recording
 - Follow the ball
 - Of ball movements
- Emotions, thoughts
 - Body language (cues)
- Automatically gathered data
 - Player + ball= Match events
 - Tagging
- List of match events
 - What
 - Who
 - When
 - Where
 - How
 - Result
 - Additional data



Data and Information in Sports Performance Analysis

- Categorical data
 - Frequencies
 - Performance indicators
 - Successful passes
 - Unsuccessful passes
 - Total passes
- Alert
 - Areas of good playing
 - Areas requiring attention
- Video sequences /greater depth of analysis than quantitative info
- Additional visualisation.



Types of Data in Sports Performance Analysis

- Automatically gathered data:
 - player movement trajectories (GPS, LPS, image-based player tracking technology)
 - Biometric data (heart rate)
 - Automatic determination of some match events (passes and dribbles)
- Manually recorded data
 - Classify the event type
 - Include a descriptor for the team and player (e.g. area of the field or the court)
 - Frequencies of events (e. passes)
 - Exported for further processing spreadsheet packages
 - Presentation to coaches and athletes

Qualitative Data

- Includes visual patterns, videos, images, words, emotions, and thoughts.
- Interpreted by analysts based on personal judgment.
- Partially lost in analysis through video tagging.

Qualitative Observation

- Used in both training and athletic performance analysis.
- The observer does not actively participate in the activity.
- Used to evaluate performance and provide feedback.
- May include observation of technique and analysis of qualitative movements.
- Coaches observe during training or competition, based on knowledge and experience.
 - They do not use coding
 - Training: Periodic feedback
 - Competition: Breaks or time-outs

Qualitative Movement Diagnosis

- It consists of four stages: preparation, observation, evaluation and diagnosis, intervention.
 - Preparation involves developing knowledge about the sport and the athletes
 - Observation is based on a specific performance model.
 - Evaluation and diagnosis examine critical characteristics and prioritize areas for improvement.
 - Intervention involves providing enhanced feedback and coaching..
- Video skill Serve

Images

- They offer visual information about performance.
 - They can be used to analyze movements, positions and other elements.
 - Digital tools such as Stromotion (e-class) create single images with multiple impressions of the athlete's movement
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- The “Inner” athlete
 - The thoughts and feelings of athletes are not directly observable.
 - Self-observation interviews allow the exploration of the athletes' experiences.
 - They are used for analyzing the psychological state of athletes during performance.

Quantitative Data

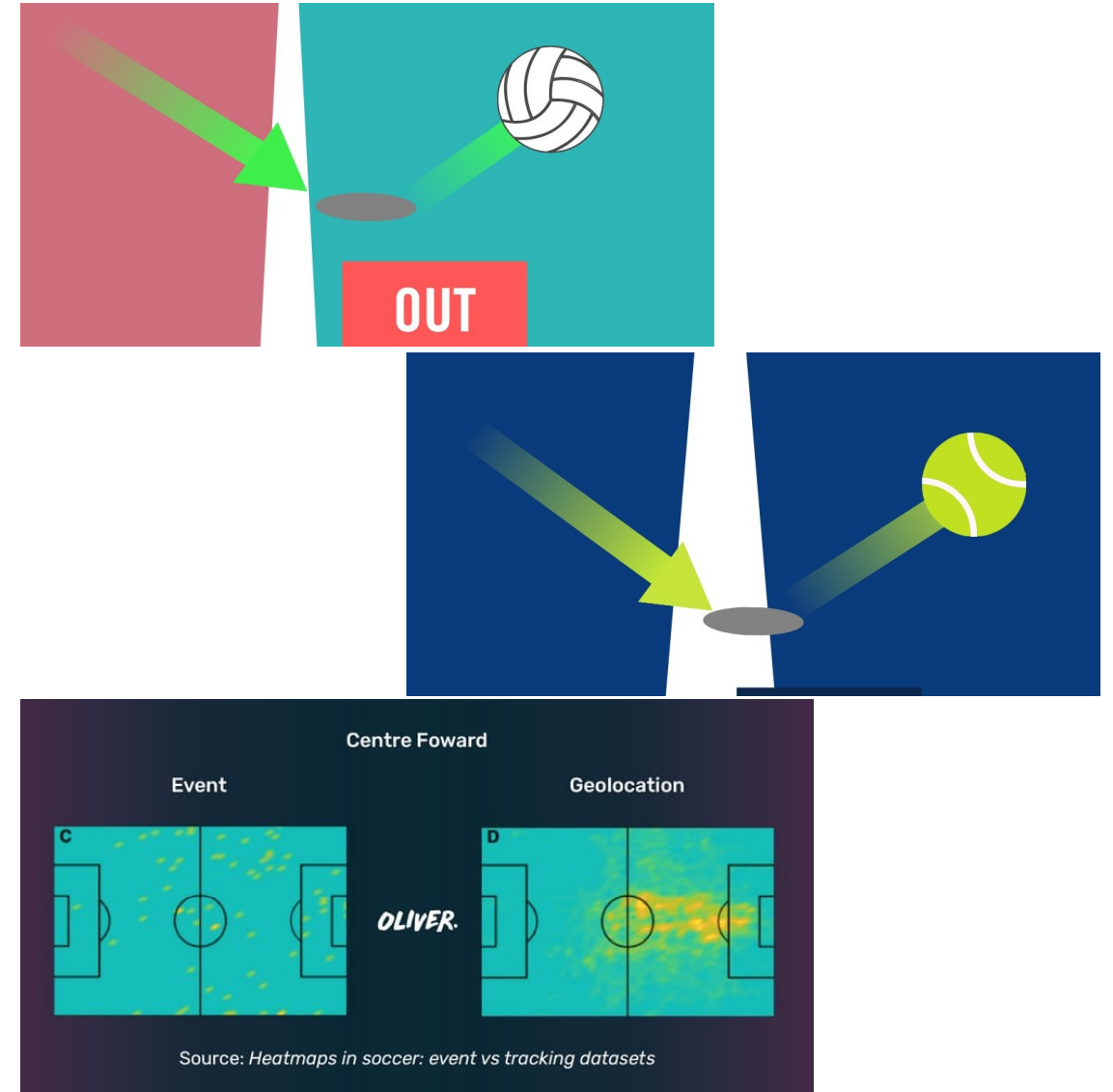
- Measurable data that provides numerical values.
- They include performance variables and action variables.
- Performance variables characterize aspects of overall performance.
- Action variables refer to individual match events.

Performance Variables and Action Variables

- Examples of Performance variables in soccer:
 - The number of shots on goal
 - The number of short passes.
 - The number of tackles attempted
 - % of time the team is in possession of the ball.
- Examples of Action variables:
 - Team (home or away team).
 - Event (shot, short pass, long pass, tackle, aerial attempt).
 - Outcome (successful, unsuccessful).
 - Possession (home team possession, away team possession, stoppage).
- The performance variables are expressed in terms of these action variables.
- Box score statistics
 - <https://www.esake.gr/el/action/EsakegameView?idgame=B7D95BE5&mode=3>
 - <https://www.slgr.gr/el/game/2425045/statistics/>
 - https://www.volleyleague.gr/datavolley/2023/Men/dvw/2013HVL23_24_1-4_.pdf?fbclid=IwAR2rv7ZKIftDeiFUDseVOyuKPAzpT8NWQxzbw-z3XMMa8btGnL9Oml0_WJE

Automated Data Collection

- Systems such as Hawk-eye are used to track the ball in tennis and cricket.
 - Use by Officials and Media
 - Goal line Technology
- They provide an accurate record of ball movement.
- GPS systems track the movement of athletes.
 - Event Vs tracking data sets
- Automated systems offer accuracy and greater data volume.



Quantitative Analysis of Qualitative Data

- Notational analysis, Match Analysis
- Match analysis involves subjective judgement at the point of data collection..
 - Observer instructions are essential
 - In research studies, it is a scientific obligation to train the observers
- Automatic tracking systems offer greater accuracy but may have limitations.
- +: SPA manage the complexity of sports performance. Abstract representation of the performance that aids analysis and feedback
- -: Reliability is typically lower than when automated data collection is used.
- Peculiarities_Example: The total duration of rallies in Tennis.

Self-Report Variables

- They provide information about the thoughts and feelings of athletes.
- They are used in self-observation interviews.
- They provide quantitative data for analysing the psychological or even physiological state of athletes.
 - Rating of Perceived Exertion (Borg, 1982)

Performance Indicators

- Performance indicators are ultimately derived from action variables that have been created during video tagging.
- This does not necessarily mean that any summary variable derived from event data is a performance indicator
- Variables must possess important qualities to be termed performance indicators:
 - Valid: A variable is valid if it represents an important and relevant aspect of the performance and if the variable itself is a valid measure of the aspect.
 - Objective: A variable is objective if its value is independent of a given observer's opinion.
 - Measurable: Known scales of measurement.
 - Interpretation: With a clear understanding of how to interpret its value.

Validity of Performance Indicators

- There are five types of validity relevant to PIs :
 - Logical validity (face validity): The variable is obviously valid (e.g., 10,000m time for a runner).
 - Content validity: The PI covers all relevant aspects of performance within a performance profile (discussed in Chapter 10).
 - Criterion validity: The PI correlates with the outcome (e.g., winning margin, time, distance).
 - Construct validity: A non-observable measure is created with clear distinction between different ability levels.
 - Decision accuracy: The PI can differentiate between winners and losers, even if the value isn't a perfect reflection of performance quality.

Objective Measurement Process

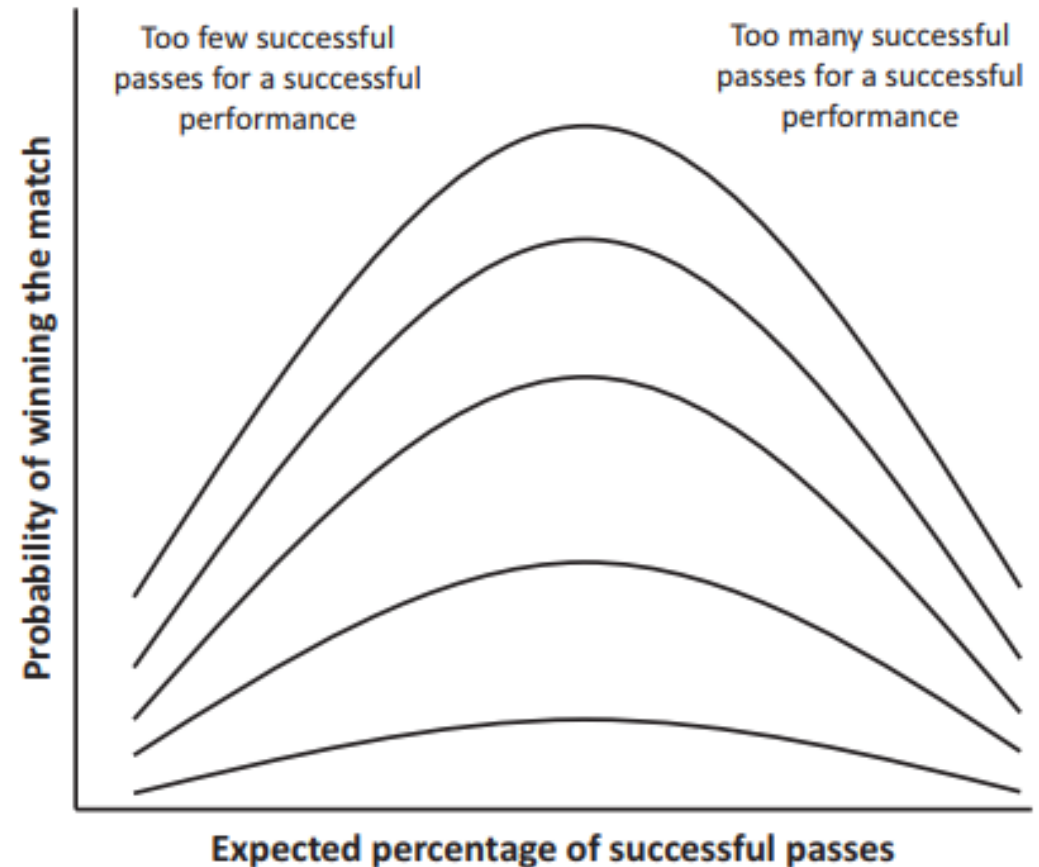
- PIs derived from automatically measured data (ball and player tracking, heart rate) are considered objective.
- Analyst-tagged video data can be objective if based on match officials' decisions (e.g., infringements, scores).
- Difficulty arises when analysts classify subjective behaviors (e.g., forced vs. unforced errors).

Known Scale of Measurement

- Pls benefit from having a known scale of measurement, allowing for easier interpretation.
- Frequency variables (e.g., number of passes) don't always have a defined upper limit.
- Match length variations (sets in tennis, volleyball) might require expressing frequency per set.
- The range of values for some Pls might differ depending on player positions.

Interpreting Performance Indicators

- High and low values are not the only factors in interpreting PIs.
- We need context: good values for outcome indicators (points won) are different from good values for success-based indicators (unforced errors).
- Optimal values exist where high success doesn't equate to high quality (e.g., safe soccer passes hindering scoring opportunities).
- Figure depicts a conceptual model of this concept (requires further research).



Interpretation of Pls

- **Rafa**

- 4 aces vs Tsitsipas
- Average in GS matches: 6 aces
- Average of the last 7 matches: 4 aces

- **Tsitsipas**

- 8 aces vs Rafa
- Average in GS matches: 6 aces
- Average of the last 7 matches: 9 aces

Rafa (3,3,3,3,3,3,10) M.O.= 4

Tsitsipas (4,5,5,7,12,15,16) M.O.=9

Is the mean the proper central tendency measure?

Alternatively, median or mode.

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