# Decision making and game performance of elite-basketball players with intellectual impairment: a step forward for an evidence-based eligility system

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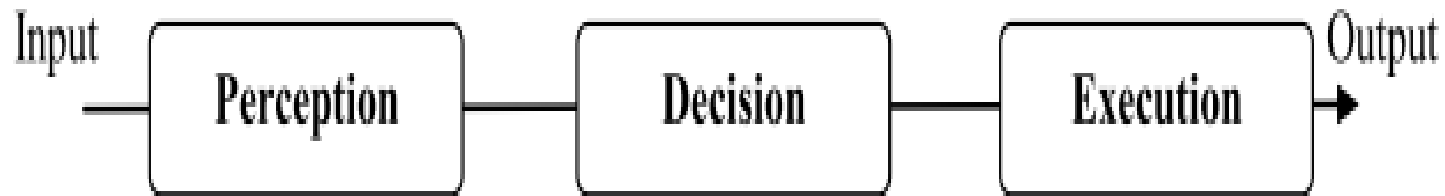
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## Cognitive process in basketball

Input → Perception → Decision → Execution → Output

**(Marteniuk, 1974; Sánchez Bañuelos, 1984)**

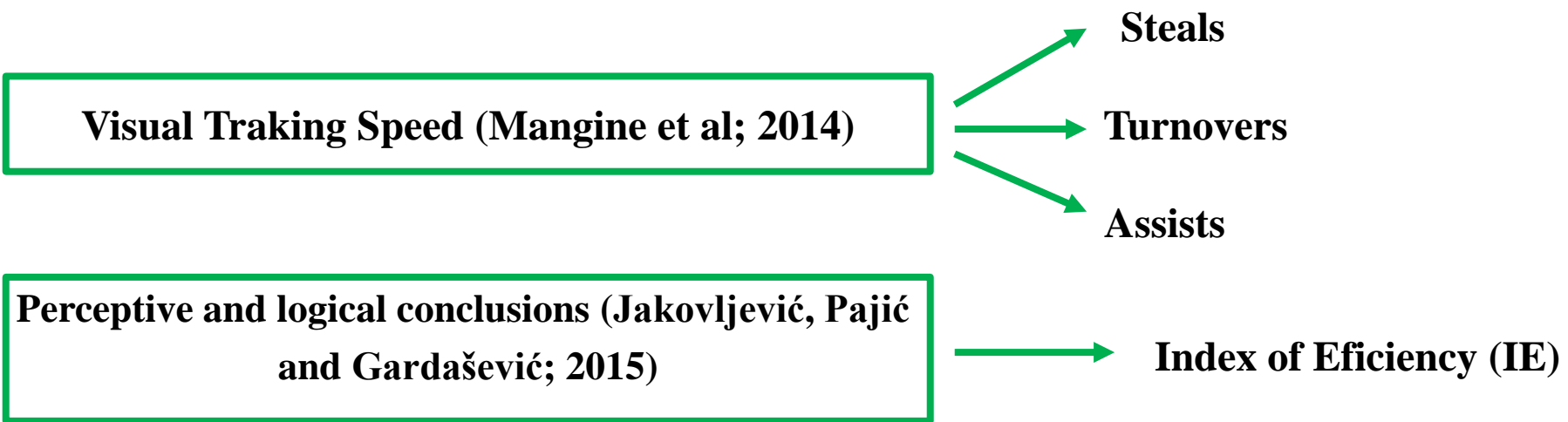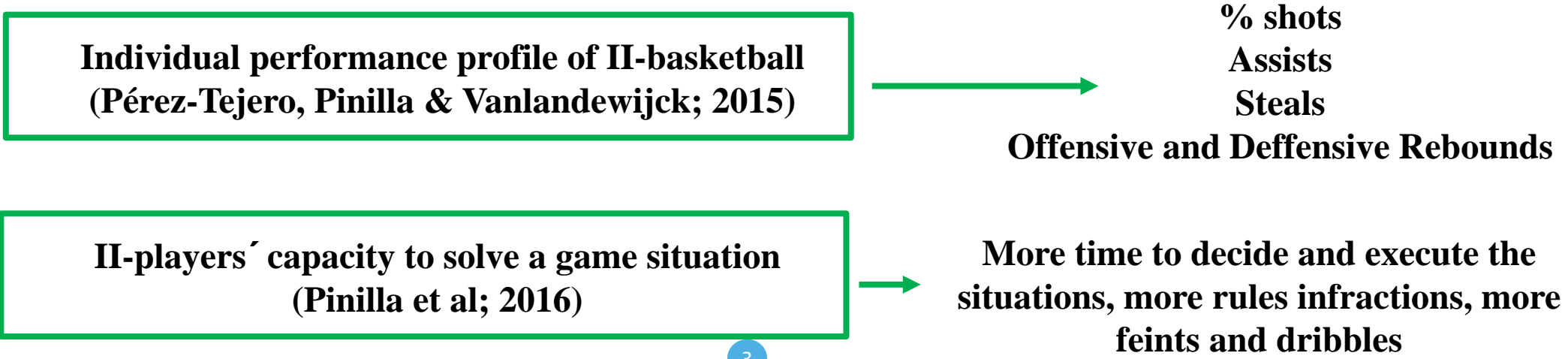| | |
|---|---|
| **Attention (Ruiz-Vargas, 1993)** | **Choice reaction time (Tenenbaum et al; 1993)** |
| **Knowledge (Garganta, 2001)** | **Anticipation capacity (Furley & Memmert, 2012)** |
| **Concentration (Furley & Memmert, 2012)** | **Selective attention (Craig & Watson, 2011)** |
| **Memory (Furley & Memmert, 2012)** | **Self-control (Gréhaigne et al: 2001)** |

**How can influence cognitive process in basketball-performance?**

**Visual Traking Speed (Mangine et al; 2014)** → Steals

→ Turnovers

→ Assists

**Perceptive and logical conclusions (Jakovljević, Pajić and Gardašević; 2015)** → **Index of Eficiency (IE)**

**How can influence cognitive process in II-basketball players?**

**Individual performance profile of II-basketball (Pérez-Tejero, Pinilla & Vanlandewijck; 2015)** → **% shots**
**Assists**
**Steals**
**Offensive and Deffensive Rebounds**

**II-players´ capacity to solve a game situation (Pinilla et al; 2016)** → **More time to decide and execute the situations, more rules infractions, more feints and dribbles**

## Eligibility process in sports for athletes with intellectual impairment



**PRINCIPAL REQUIREMENT:**

Primary evidence for II

-IQ $\leq$ 75

- Adapted behavior

- Age $<$ 18

SHOT    DRIBBLE    PASS

Van Biesen (2014)

## Objective

a) To assess specific cognitive abilities in elite II-basketball players and their actual performance trough game-related statistics

b) To analyze the influence of game-related statistics and specific cognitive abilities depending on team ranking and membership group (based on tests)

## Sample and Variables

### II PLAYERS

- II-Basketball World Championships (Turkey, 2013; Ecuador, 2015 and Italy, 2017)
- Players who played more than 10 minutes per match (Gómez & Lorenzo, 2007)
- 199 male II players
- 9 teams

- **Team game-related statistics (82 games):** two points shots attempted, two points shots score, three points shots attempted, three points shots scored, free throws attempted, free throws scored, offensive and defensive rebounds, assists, steals, blocks and fouls made.

- **Cognitive abilities (Pinilla, 2017):** time to decide, number of correct ítems and membership group (NIIBP: Non-Intellectual Basketball Player) and IIBP (Intellectual Basketball Player)
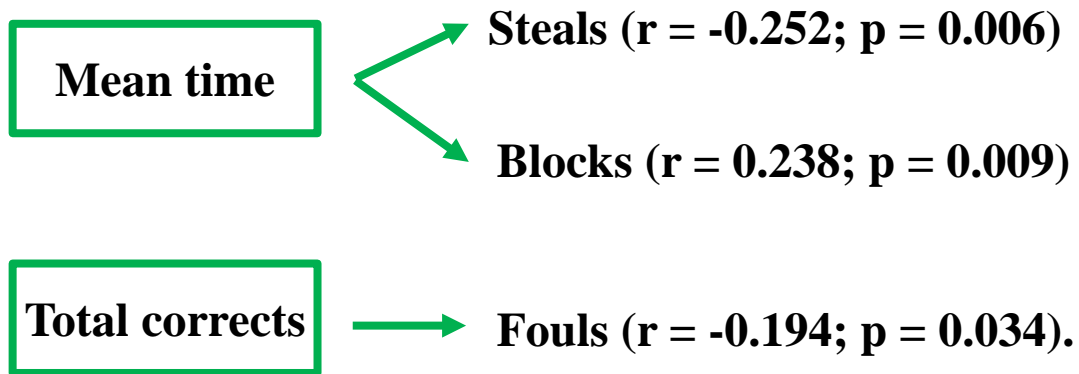

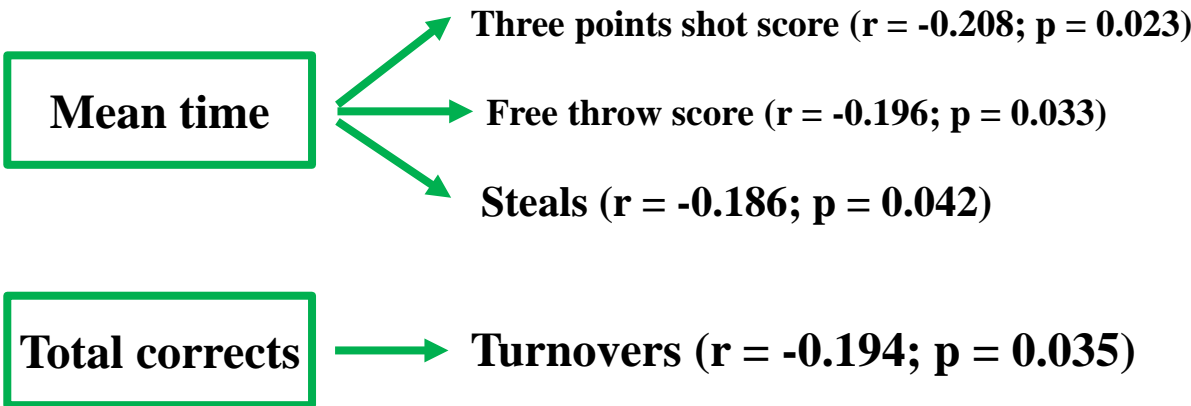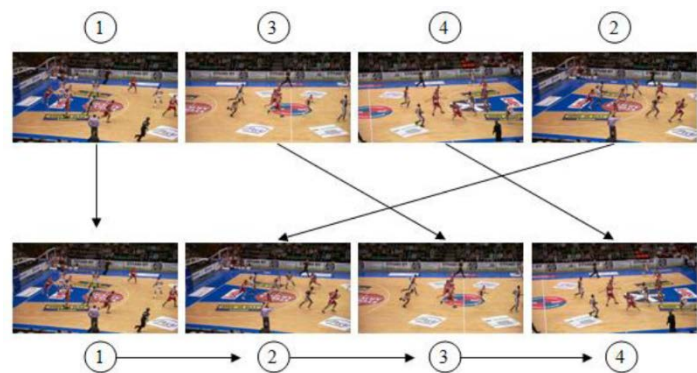
Computerized touch-screen test (TS-DMT).
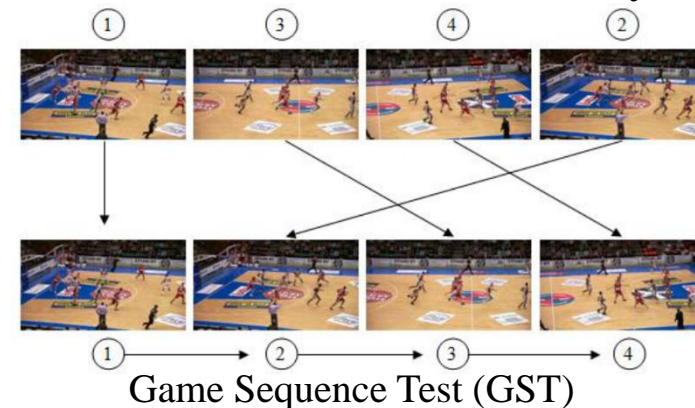
Game Sequence Test (GST)

## Statistical Analysis

- Data normality: **Kolmogorov-Smirnov**
- Descriptive statistics (mean and standard deviation) distributed by teams.
- **Pearson's product-moment correlation coefficient (r)** (Hopinks, 2002)
- **One-way ANOVA and post hoc Tukey:** differences in game-related statistics variables, cognitive tests variables between teams
- **A t-test for independent samples:** differences between cognitive tests variables (mean time and total corrects) and both groups (NIIBP and IIBP).
- PASW statistics 20 (SPSS Inc., Chicago, IL, USA).
- $P<0.05$

**Mean time**
- Three points shot score (r = -0.208; p = 0.023)
- Free throw score (r = -0.196; p = 0.033)
- Steals (r = -0.186; p = 0.042)

**Total corrects**
- Turnovers (r = -0.194; p = 0.035)

**Mean time**
- Steals (r = -0.252; p = 0.006)
- Blocks (r = 0.238; p = 0.009)

**Total corrects**
- Fouls (r = -0.194; p = 0.034).

| Game related statistics | Post hoc Tukey´s test |
|---|---|
| 2p shots score* | 2>9 |
| Fouls* | 9>2,7 |
| Turnovers* | 9>2,3 |
| Steals* | 1<5,3; 3>6 |
| Blocks* | 1>7 |
| **Test 1** | |
| Mean Time* | 6>2,3,4, 7 |
| Total Corrects * | 9<1,2,3,4,5,7; 3<2,7 |
| **Test 2** | |
| Mean Time * | 9>1,2,3,5,6,7,8 |

* significant differences

**Note.** Test 1 = Basketball game sequence test and Test 2 = Touch-screen computerized basketball test

| National team | GST | | TS-DMT | |
|---|---|---|---|---|
| | NIIBP | IIBP | NIIBP | IIBP |
| 1 | 1 | 17 | 2 | 16 |
| 2 | 6 | 6 | 5 | 7 |
| 3 | 0 | 12 | 0 | 12 |
| 4 | 6 | 12 | 7 | 11 |
| 5 | 3 | 11 | 1 | 13 |
| 6 | 1 | 9 | 3 | 7 |
| 7 | 5 | 11 | 1 | 15 |
| 8 | 0 | 10 | 5 | 5 |
| 9 | 1 | 8 | 0 | 9 |
| Total | 23 | 96 | 24 | 95 |
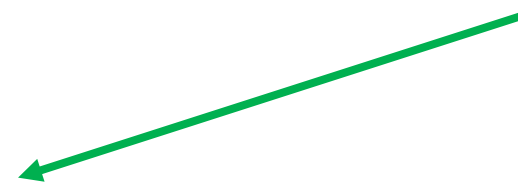
Significant differences in Assists and Fouls in GST between NIIBP and IIBP (p≤0.05)
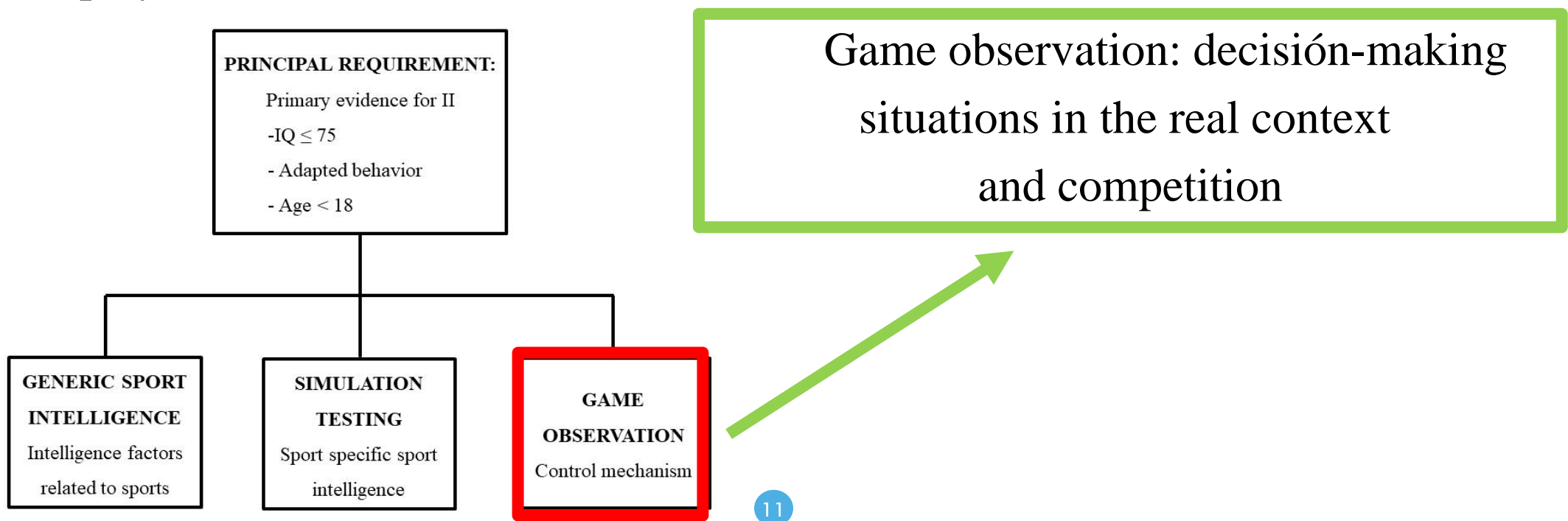
➢ Precision of a shot depend on a proper technique of shooting, the constitution of players, their physical abilities and psychological characteristics (Karalejic & Jakovljevic, 2008)

➢ **Individual and collective tactical offense** are those components components of basketball performance in which II-players presented higher limitations in opinion of II-basketball coaches and referees (Pérez Tejero, Polo, Pinilla Arbex, & Coterón, 2017)

➢ **Significant differences in game-related statistics between teams´ranking:** similar results between II-winning and II-losing basketball players (Pérez-Tejero et al; 2015)

➢ **Best teams showed less time to resolve both specific test and resolved more items correctly in compare to worst teams**: similar results between II-basketball players and non-II basketball players (Pinilla 2017)

➢ Results of cognitive tests were different between IIBPP and NIIBP

➢ The present study evidenced significant differences between teams and game-related statistics / cognitive abilities

➢ To increase this analysis with a **larger sample** is needed.

➢ **Comparison between samples:** basketball players with II and basketball players without II

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GENERIC SPORT
INTELLIGENCE

Intelligence factors
related to sports

SIMULATION
TESTING

Sport specific sport
intelligence

GAME
OBSERVATION

Control mechanism

Game observation: decisión-making situations in the real context and competition

# Thank you for your attention

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IDEAL: "Intellectual Disability and Equal opportunities for Active and Long-term participation in sport". Erasmus+ funded Project