

Designing a Test to Measure the Speed of Field Decision-Making Using Illustrated Playing Situations Among Football Players

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Abstract: This research aims to design a scientific test to measure the on-field decision-making speed of youth football players using real, illustrated playing situations (photos and video clips). The research adopted a descriptive-experimental approach, and (30) youth players from Anbar Governorate, aged between 18 and 21, with at least three years of coaching experience, participated in it. A test was designed that included (12) illustrated playing situations taken from official matches, depicting offensive and defensive situations requiring immediate decisions. These were displayed on a large screen within a structured testing environment. Response times for each situation were determined in seconds, and decisions were recorded by having players select one of several options associated with each situation. The validity of the test was verified by presenting it to a group of experts, and reliability was calculated using a test-retest. The results showed a statistically significant correlation coefficient. The results showed that players in offensive positions were faster in making decisions than their defensive colleagues, reflecting differences in mental processing speed depending on the tactical tasks. The study concludes that the video test can be used as an objective and practical tool to assess players' field intelligence. It can also be used in player selection and the design of cognitive training programs aimed at improving decision-making speed under pressure. The study recommends developing interactive digital versions of the test and using them to assess the development of mental performance during various training phases.

Keywords: Decision-making, Football, Video Game Situations, Field Intelligence, Cognitive Performance Tests.

Introduction

Developing performance in football does not depend solely on physical skills or tactical plans, but also requires high cognitive abilities, most notably decision-making speed. On-field situations change rapidly, and players who can read the situation and make quick decisions are best able to influence the course of the game. However, tests to assess this cognitive ability remain limited and often lack relevance to the actual game.

Therefore, there is a need to design more realistic measuring tools, based on real, visualized game situations, that allow for the assessment of a player's decision-making ability under conditions similar to those they actually encounter on the field.

The importance of the research lies in:

- It provides a new tool to measure decision-making speed in a match-like environment.
- It contributes to the development of mental training programs for players.
- It helps coaches select players based on cognitive abilities, not just physical skills.
- It opens the way for the use of visual media in sports testing.

Research Problem

Coaches suffer from a lack of scientific tools that measure decision-making speed in an environment similar to that of real-life games. Most tests rely on paper tests or hypothetical decisions that do not reflect actual time and space pressures. This raises the question:

Is it possible to design a test using video game situations to measure the on-field decision-making speed of soccer players?

Research Objectives

- Design a test based on video game situations.
- Verify the validity and reliability of the test.
- Measure differences in decision-making speed among players based on positions.
- Evaluate response time to different situations.

Research Hypotheses

- There are no statistically significant differences in decision-making speed among players based on positions.
- The test has an acceptable degree of validity and reliability.
- Average response time decreases as the situation becomes clearer tactically.

Research Areas

- Human domain: Youth soccer players (18–21 years old) from clubs in Anbar Governorate.
- Spatial domain: A closed room, visually and acoustically isolated to ensure player concentration while recording responses.
- Timeframe: 1-5 to 1-6 2024.

Definition of Terms

- Decision-making: A player's choice of the best tactical action after observing the presented situation.
- Video-based situations: Short video clips or still images depicting a specific tactical scene taken from an actual match.
- Field Intelligence: A player's ability to read the scene, anticipate the opponent's behavior, and make a quick and appropriate decision.
- Response Time: The time elapsed from the moment the situation is presented until the moment the decision is recorded.

Theoretical Studies and Previous Studies

1. Theoretical Studies

A. Decision-making in Sports

Decision-making is the mental process by which a specific action is chosen from among several alternatives, within a limited time and under stressful conditions. In sports, especially football, decision-making is considered one of the most important components of actual performance, as it determines a player's behavior at a critical moment in the match. A distinguished player not only possesses excellent physical skills, but also possesses the ability to analyze the scene, anticipate movements, and make the optimal decision within seconds.

The literature indicates that the decision-making process involves three stages:

- Sensory perception: Receiving information from the environment (such as the ball's position, opponents' movements, and available spaces).
- Mental processing: Analyzing information and linking it to previous experiences.
- Behavioral response: choosing the appropriate action and executing it quickly.

These stages do not occur in a slow sequence, but rather in a very short time, ranging from 500–1000 milliseconds, making this ability an important indicator of mathematical intelligence (Williams & Davids, 1998: 118).

B. Characteristics of Field Situations in Football

The field environment in football is characterized by the following:

- Speed: Constant change in the positions of the players and the ball.
- Non-repetition: Each tactical situation has its own unique characteristics.
- Multiple influences: The player deals not only with the ball but also with the opponent's movements, the position of his teammates, and the space.
- Psychological pressure: Crowds, match time, and the importance of the result all influence the decision.

These characteristics make it difficult to use traditional tests to measure mental abilities, requiring the development of tests that simulate reality. (Mohammed Ali Bou Hamad, 2020: 95)

C. Factors Influencing Sports Decision-Making

- Experience: An experienced player possesses a "mental library" of situations, allowing them to make decisions more quickly and accurately (Ericsson et al., 1993: 71).
- Focus and attention: The ability to filter out unimportant stimuli and focus on key cues in the situation.
- Cognitive abilities: such as processing speed, working memory size, and anticipation.
- Physical condition: Fatigue reduces the accuracy and speed of decision-making.
- Position within the team: A defender makes decisions of a different type and timing than an attacker or midfielder.

D. Field Intelligence

Field intelligence is a term that describes a player's cognitive ability to understand the situation on the field, process data, and make sound decisions. Researchers distinguish between two types of on-field intelligence:

- Strategic intelligence: Related to understanding the game as a whole and anticipating the movements of both teams.
- Tactical intelligence: Related to the situation at hand and making the best decision in a tight timeframe.

Research indicates that field intelligence can be trained and improved, particularly through visualized situations that enhance the association between expectation and response (Roca et al, 2012).

E. Visualized Situations in Cognitive Assessment

The use of visuals and videos in the design of sports cognitive tests has become a recent trend. The reasons are:

- Increased simulation accuracy.
- Providing realistic situations without the need for an entire team.
- The ability to repeat the test under the same conditions.
- Reducing random effects in a real-world setting.

These media have been used in sports such as tennis, basketball, goalkeeping, and refereeing, and have demonstrated high reliability and validity. (Calle-Jaramillo et al., 2023)

F. Previous Models in Decision-Making Tests

- Ward & Williams' (2003) model: They used short videos of elite and novice players and demonstrated that decision speed and accuracy are related to the number of hours of training.
- Abernethy's (2013) model: presented a cognitive test model based on still images with multiple choices, emphasizing the importance of image clarity and determining the appropriate moment in time for decision-making.
- Roca et al.'s (2012) model: examined the relationship between peripheral vision and decision-making, showing that a reduced field of vision leads to slower and less accurate decisions.

2. Previous Studies

- Abdul Qader (2017): designed a cognitive test using handball footage, demonstrating that realistic visualization increases player interaction with the situation.
- Al-Hasani (2019): applied a video test to junior soccer players, and his results showed significant differences between players based on position.
- Abdel Salam et al. (2021): confirmed in a field study that the level of decision-making speed is significantly related to a player's position on the team (attack, midfield, defense).
- Almeida et al. (2016): developed an interactive digital test that measures processing and response speed, and recommended its use in player selection.

Methodology

Methodology Used

The researcher used the descriptive experimental method because it is most appropriate for the nature of the study (Fayyad et al., 2025; Khalaf et al., 2025), which combines a realistic analysis of a mental skill (decision-making) with the application of a field test designed for this purpose. The descriptive method describes the characteristics of the phenomenon as they are, while the experimental method allows for measuring the effect of the test and analyzing the sample's performance in a scientific, quantitative manner.

Research Population

The research population consisted of youth players (18–21 years old) from clubs in Anbar Governorate approved by the National Football Association for the 2024–2025 sports season. The total population was (90) players from six clubs in Anbar Governorate, all of whom had at least three years of continuous training experience and played in the youth league.

Research Sample

A purposive sample of (30) youth football players from Anbar Governorate clubs was selected, distributed equally across the playing positions (defense, midfield, attack), as shown in Table (1). Their homogeneity was ensured in terms of age, years of training, physical fitness, and the absence of any injuries or cognitive problems that might affect response accuracy.

Table 1. Sample Distribution by Playing Position

Position	Number of Players	Percentage
Defense	10 players	33.3%
Midfield	10 players	33.3%
Attack	10 players	33.3%
Total	30 players	100%

Designed Test

A cognitive test was designed that includes 12 video-recorded situations taken from real international and Arab matches. Each video stops at a crucial moment, and the player is asked to make a quick decision from among several options.

Test Name: Cognitive Test of Real-Play Video-Recorded Situations for Football Players

Purpose of the Test: To measure on-field decision-making speed.

Tools and Equipment Used: 12 video-recorded situations taken from international and Arab matches - 55-inch LED screen - Computer equipped with video control software - Accurate digital timing device (Appendix 3) - A closed room with visual and sound isolation to ensure player concentration.

Performance Method: The test begins by randomly displaying real-play situations on the screen. The player makes their selection. After the player completes the selection, their response time is recorded using an accurate digital timing device (Appendix 3).

Scoring: Each correct choice is given one point, while each incorrect choice is given zero points. The score is also divided by the response time.

A form was created for each player to record data, as shown in Appendix (2).

Table (2): Sample data recording form for each situation

Situation number, chosen decision, response time (seconds), decision accuracy, trainer's notes

(The full form is attached in Appendix 2)

Figure (1) shows an example of an offensive situation within the test, in which the video was paused at the moment of decision making, with the alternatives displayed (Appendix (1)).

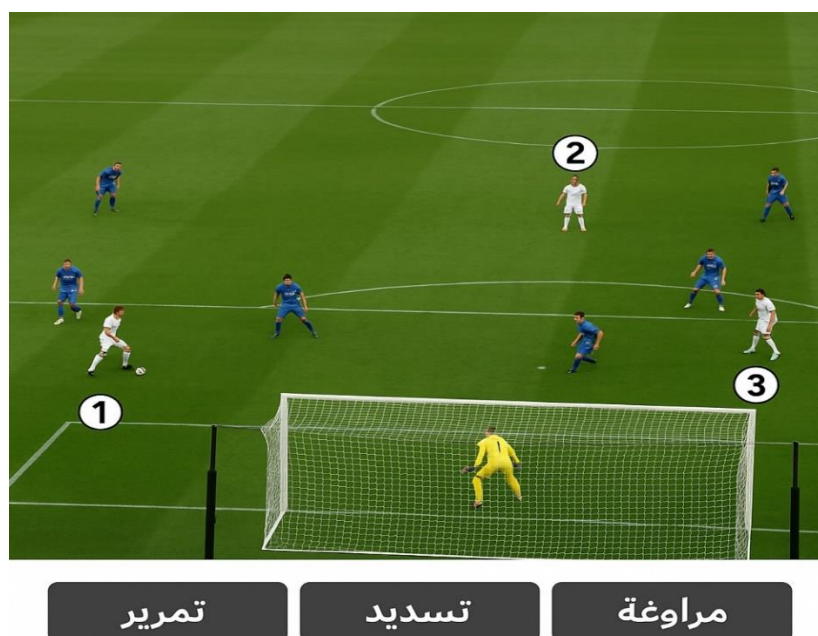


Figure 1. Model of an offensive situation within a decision-making test.

A player is shown possessing the ball on the edge of the penalty area, with three teammates in different positions. The player is required to choose the most appropriate action.

Stages of Research Implementation

1. Scientific Judgment of Situations

The depicted situations were presented to a panel of five certified coaches to evaluate the clarity of the situations and the realism of the decision. (See Appendix 4)

2. Initial Experimentation

A pilot test was conducted on five players to determine the level of difficulty and the appropriate time for each situation.

3. Formal Test Application

- The test was administered individually inside the hall.
- The situations were displayed randomly on the screen.
- The player's decision and response time were recorded manually and using digital timing.

4. Retesting to Measure Reliability

The test was readministered a week later to 10 players from the same sample to measure temporal reliability using Pearson's coefficient.

Statistical Methods Used

The following statistical methods were used (Ali, 2022) (Ali & Hamid, 2021) (Hammood et al, 2024).

- Arithmetic mean and standard deviation: to analyze response time and accuracy.
- Pearson's correlation coefficient: to test temporal reliability
- t-test: To compare averages of some situations by decision type.
- Accuracy-time correlation coefficient: To measure the inverse relationship between speed and accuracy.
- Analysis of Variance (ANOVA): To test differences in performance by position.

Table 3. Statistical methods used and their purposes

Statistical Analysis	Purpose of Use
Mean and Standard Deviation	Describe sample performance
Pearson (Reliability)	Test stability of performance over time
ANOVA	Compare differences between playing positions
t-test	Compare two groups in a specific situation
Correlation Coefficient	Examine the relationship between decision time and accuracy

Result and Discussion

Presentation and Analysis of Results

This chapter presents the results of applying the illustrated field decision-making test to a sample of soccer players. It analyzes data related to response time and decision accuracy, highlights differences between players according to playing positions, and examines the relationship between decision speed and quality.

Descriptive Results of the Sample's Performance

Table 4. Arithmetic Mean and Standard Deviation of Decision-Making Time and Accuracy for All Players

Variable	Mean	Standard Deviation
Response time (seconds)	3.92	0.66
Decision accuracy (out of 12)	8.41	1.75

Table (4) shows that the average response time was 3.92 seconds, which is moderate and indicates acceptable cognitive ability among the sample. The average accuracy was 8.41 out of 12, indicating that most decisions were correct.

Differences by Playing Position

Table 5. Differences in Decision-Making Time and Accuracy among Defenders, Midfielders, and Attackers (ANOVA)

Variable	F Calculated	p-value	Statistical Significance
Time	5.21	0.011	Significant at 0.05
Decision accuracy	4.67	0.017	Significant at 0.05

The results of the analysis of variance in Table (5) indicate that there are statistically significant differences between player positions in both time and accuracy, which means that playing position affects the speed and accuracy of decision-making.

Table 6. Averages by playing position

Position	Response Time (s)	Decision Accuracy (out of 12)
Defense	4.35	7.80
Midfield	3.90	8.45
Attack	3.52	9.00

Attackers were the fastest and most accurate, while defenders showed the longest response time and the least accuracy. This is consistent with the nature of the game, where the attacker faces situations that require quick decisions under defensive pressure.

Test-Retest Reliability

The test was re-administered a week later on a sample of 10 players, and the results were as follows:

Table 7. Correlation coefficient between the first and second applications

Variable	Correlation Coefficient (r)	Significance
Response time	0.82	Significant
Decision accuracy	0.79	Significant

The values in Table (7) indicate a high degree of stability in the test results, confirming its reliability.

The Relationship Between Response Speed and Decision Accuracy

Table 8. Correlation Coefficient Between Time and Accuracy

Relationship	Correlation Coefficient (r)	Significance
Time × Accuracy	-0.68	Significant

The results indicate a strong inverse relationship between time and accuracy: the shorter the response time, the higher the decision accuracy, enhancing the test's effectiveness in distinguishing between players in terms of cognitive proficiency.

Conclusions

1. Effectiveness of the Video-Based Test

The field decision-making test using video-based situations proved to be a valid and reliable tool for measuring decision speed in soccer players, due to high degrees of validity and statistical reliability.

2. The Effect of Playing Position

Significant differences were observed between players according to their position within the team. Attackers showed the fastest response time and highest accuracy, followed by midfielders and then defenders, reflecting the nature of the tactical tasks associated with each position.

3. The Relationship Between Speed and Accuracy

A clear inverse relationship emerged between decision-making time and accuracy; the faster a player makes a decision, the more accurate they are. This indicates that decision speed is an important indicator of the quality of mental processing.

4. The Test Simulates Field Reality

The use of realistic videos contributed to making situations more clear and motivating for players, compared to traditional theoretical or paper-based tests.

5. Applicability and Replicability.
The test is easy to administer in a simple display room and can be reused at different times of the season, whether for selection or periodic evaluation purposes.

Recommendations

1. Adopt the test in selection and training programs.

It is recommended to use the video test as part of mental training plans at clubs, especially during the initial selection phases of new players.

2. Develop an interactive electronic version.

It is recommended to program the test within an electronic application that allows for automatic timing and data storage, facilitating its use in clubs and sports schools.

3. Develop specific tests for each position.

Since playing positions affect decision-making, it is best to develop customized versions of the test that suit the characteristics of each position (e.g., defensive positions for defenders, offensive positions for attackers).

4. Integrate cognitive exercises into training modules.

It is recommended to incorporate exercises that simulate video situations into daily training sessions to stimulate rapid cognitive processing and improve on-the-field decision-making speed.

5. Conduct similar studies for different age groups.

It is necessary to expand the scope of the study to include junior and professional players, identify cognitive differences based on age and experience, and conduct comparative studies.

6. Link cognitive data to actual match performance.

It is recommended to compare the results of this test with the player's actual performance in official matches to verify the relationship between laboratory results and on-field behavior.

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Appendices

Appendix 1: Samples of video situations used in the test

- Description: (12) real tactical situations were captured from local and international matches. The appropriate moment to stop the video and display alternatives was determined.

- Examples:

Situation 1 (Attack)

- Scene: A player on the edge of the penalty area, and three teammates in different positions.

- Options:

a) Pass to a teammate in depth

b) Direct shot

c) Cross pass

d) Dribbling inside

(Figure 1, previously generated, is included as a representative image of this situation)

Appendix 2. Scoring form for each player

Player ID	Situation No.	Chosen Decision	Response Time (s)	Decision Accuracy (✓/✗)	Notes
A1	1	A	3.5	✓	Fast
A1	2	C	4.1	✗	Clear hesitation
A1	3	B	3.2	✓	Direct choice
A1	4	D	4.7	✗	Delayed decision
A1	5	A	3.1	✓	Excellent accuracy
A1	6	B	3.8	✓	Correct reading
A1	7	B	4.5	✗	Hesitation, delay
A1	8	A	2.9	✓	Quick response
A1	9	C	3.4	✓	Logical decision
A1	10	D	4.2	✗	Confusion
A1	11	B	3.0	✓	Good accuracy
A1	12	A	2.6	✓	Successful attack

(This form is used to collect complete quantitative data. A paper copy is attached for manual completion.)

Method of Calculating the Score for Each Player

- Number of situations in the test: 12 illustrated situations
- Each situation has only one correct answer, predetermined by a panel of experts
- Evaluation Method:
 - If the player chooses the correct decision for the situation, they receive one (1) score
 - If they choose an incorrect decision, they receive zero (0)
- The player's final score = the sum of the correct decisions

Applied Example

If player A1 answers the situations as follows:

- ✓ In situations: 1, 3, 5, 6, 8, 9, 11, 12

→ Number of correct answers = 8

- ✗ In situations: 2, 4, 7, 10

→ Number of incorrect answers = 4

Final score = 8 out of 12

Appendix 3: Image of the digital timing device

- Description: The device used is a digital model with an accuracy of 1/100 of a second, linked to a button A control used by the coach to stop time immediately after selecting a player.

Appendix 4. Expert Committee Evaluation Form for Positions

Situation No.	Scene Clarity	Option Variety	Scene Duration	Suitability for the Test	Suggested Modification
1	Very clear	Good	8 seconds	Suitable	None
2	Moderate	Limited	5 seconds	Needs improvement	Increase viewing angle

Number of experts: 5

The full evaluation form is attached to document the scientific arbitration of the content.

Appendix 5: Participation Consent Form

Text:

I, the undersigned, agree to participate in the scientific research entitled "Designing a Test to Measure Field Decision-Making Speed Using Illustrated Game Situations." I authorize the researcher to use my results for academic purposes only, without mentioning my name.

- **Full Name:**
- **Age:**
- **Club:**
- **Signature:**
- **Date:**

(These forms were signed by all sample members prior to the start of the application.)