



A COMPARATIVE STUDY OF ANALYTICAL THINKING AMONG VOLLEYBALL LIBEROS

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Abstract

The aim of this research was to compare the levels of analytical thinking among libero and setter volleyball players. The researchers used a descriptive approach to suit the nature of the research. The research population consisted of (20) volleyball players, (10) liberos and (10) setters.

Keywords: Comparative study, analytical thinking, setter, libero, volleyball

Introduction

Analytical thinking is an essential element of athletic performance, as it contributes to improving players' ability to make quick decisions and analyze tactical situations during matches (Ericsson, 2018). Volleyball is a sport that requires advanced mental skills in addition to physical abilities, as players need quick perception and accurate analysis of movement and counterattacks (Schmidt & Wrisberg, 2020).

Analytical thinking is one of the key factors contributing to athletes' success, especially in team games that require quick decision-making and adapting to tactical variables during play. Volleyball is a sport that relies heavily on the mental abilities of players, as each position on the team requires a specific type of thinking and mental strategies.

The libero and the setter play crucial roles on the court. The libero is responsible for organizing defense and reception, requiring a high ability to quickly analyze defensive situations and make appropriate decisions. The setter, on the other hand, is the mastermind of attacks, relying on analytical thinking to select appropriate passes and adjust the pace of play according to the game's variables. The role of the players on the court varies according to their positions. The libero is tasked with defense and reception, requiring them to read the opponent's movements and analyze attacking directions. The setter, on the other hand, is responsible for organizing the attack, relying on evaluating offensive options and making quick decisions about ball direction (Moreno et al., 2019).

The problem of the study is that analytical thinking is one of the key factors affecting athletic performance, especially in team games that require quick decision-making and adapting to changing match conditions (Ericsson, 2018). In volleyball, each position on the team plays a specific role that requires a set of different cognitive skills, raising questions about how these roles influence players' analytical thinking (Schmidt & Wrisberg, 2020).

In contrast, the coach relies on analytical thinking to direct play, as he is responsible for distributing balls and making strategic decisions that address the opposing team's weaknesses (Baker & Young, 2021). Despite the importance of these cognitive aspects, there remains a gap in research related to the differences in analytical thinking levels among players in these

positions, making it necessary to study this phenomenon to understand its dimensions and impact on athletic performance. Therefore, the problem of this study is the following question: Are there statistically significant differences in the level of analytical thinking between volleyball liberos and coaches?

This study contributes to providing scientific insights that help coaches develop training programs based on cognitive differences between players, thus enhancing the quality of overall athletic performance.

Based on these differences in roles, a comparative study of the levels of analytical thinking among liberos and coaches is needed to understand the impact of the nature of their position on mental abilities and determine whether there is a significant difference between them. This raises the question of the extent to which the nature of their position affects the mental skills required for each player. This research will contribute to providing scientific insights that help coaches develop appropriate training strategies to enhance analytical thinking among players according to their positions on the team.

This study aims to compare the levels of analytical thinking among volleyball liberos and coaches, based on models of cognitive analysis in the sports field. The results will provide valuable insights for coaches on how to develop training strategies to enhance analytical thinking among players according to their positions within the team. Field Procedures

The researchers used the descriptive approach to suit the nature of the problem.

Sample

The research sample consisted of volleyball players (libero - set player) in the Iraqi clubs participating in the Iraqi Volleyball League for the 2024-2025 season, totaling (20) players, (10) libero players, and (10) set players. Table (1) shows this.

Table (1) shows the numbers of the research sample

NO	Club	Free player	Prepared player
1	Police	2	2
2	Southern Gas	2	2
3	Peshmerga	2	2
4	Port	2	2
5	Daghara	2	2

The researchers performed homogeneity to ensure the reliability of the results by extracting the skewness coefficient as shown in Table (2).

Table (2) shows the homogeneity of the research sample.

NO	Variables	Arithmetic mean	Standard deviation	Coefficient of skewness
1	Age	20.24	0.286	0.018
2	Height	179.80	1.650	0.013
3	Weight	50.53	0.723	0.030

Research Tool

The researchers determined the theoretical definition of analytical thinking by adopting Gregory's (1988) definition, which defined the concept of analytical thinking as "the individual's ability to confront problems by carefully dismantling their parts in a systematic

manner, paying attention to details, and planning carefully before making a decision, as well as gathering as much information as possible and the ability to contribute to clarifying matters so that rational conclusions can be reached through facts" (Gregory, 1988: 101). To correct the analytical thinking scale, which consists of (15) items, each with two alternatives, the test scores were calculated upon correction: (1) for the alternative that represents the correct answer and (0) for the alternative that does not represent the correct answer. Thus, the highest score on the scale is (15) points, and the lowest score on the scale is (0).

The researchers applied a survey to conduct statistical analysis of the items: to calculate the discriminating power of the analytical thinking scale. The scale was applied to the research sample. The primary purpose of this procedure is to analyze the scale's items, because a good scale is based on good items that comprise it, and it is necessary to analyze each item. A paragraph from the scale's paragraphs was used to establish paragraphs that were consistent with the logical goals and foundations established for their measurement (Freeman, 1962: 112-113). The researchers used the extreme groups method and the relationship of the paragraph score to the total score as appropriate procedures in the paragraph analysis process.

A. Extreme Groups Method: To calculate the discriminating power of each paragraph from the scale, the researchers applied the scale to the research sample. After determining the total score for each questionnaire, the questionnaires were arranged in descending order of their total score, from highest to lowest. Then, 27% of the questionnaires with the highest scores and 27% of the questionnaires with the lowest scores were assigned, representing the two largest and most distinct groups (Anastasi, 1976: 208). The discriminating power of each paragraph from the scale's paragraphs was calculated by subtracting the number of people who answered the paragraph correctly in the lower group from the number of people who answered the paragraph correctly in the upper group, divided by Depending on the number of individuals in the upper or lower group, according to the Ebel criterion, a paragraph or situation is considered good if its discriminating power is (0.40) or more, and is considered very good. Paragraphs between (0.30-0.39) are considered good, while paragraphs between (0.20-0.29) are marginal and can be improved. Paragraphs are considered weak if their discriminating power is (0.19) or less. Table (3) illustrates this.

Table (3) Discriminating power of the analytical thinking scale

discrimination coefficient	No	discrimination coefficient	No
0.38	9	0.33	1
0.31	10	0.49	2
0.33	11	0.41	3
0.42	12	0.32	4
0.30	13	0.33	5
0.35	14	0.37	6
0.38	15	0.42	7
		0.45	8

B. The relationship of the paragraph to the total score of the scale:

This procedure is concerned with determining whether the paragraph or situation in the scale follows the same path as the entire scale. Therefore, this method is considered one of the most

accurate means used to calculate the internal consistency of the positions of the scale or test. The relationship of the paragraph to the total score of the scale was extracted using the original point bipartite correlation formula between the scores of individuals on each paragraph or situation and their total scores on the scale. The critical degree of the correlation coefficient was at a degree of freedom of (19) and a significance level of $(0.05) = 0.087$, which is a good indicator of correlation. Reliability:

Reliability is a necessary and obligatory aspect of a test or scale, as it "refers to the degree of accuracy, mastery, or consistency with which the test measures the phenomenon for which it was developed" (Muhammad Nasr al-Din, 2006: p. 98). To verify the reliability of the psychological immunity scale under study, the researchers used the following methods:

The split-half method: The researchers divided the scale's items into two halves, a first half and a second half. The correlation coefficient between the total scores of the two halves was extracted using Pearson's method. Its value was found to be (0.731). The correlation coefficient here indicates the reliability of one half of the scale, and then the full reliability according to the Spearman-Brown equation to correct the reliability, resulting in a total reliability of (0.783). The Cronbach's alpha method: Cronbach's alpha is considered the internal consistency of the scale and is considered one of the most common and most appropriate reliability coefficients for psychological scales. Cronbach's alpha relies on the consistency of an individual's performance from one item to another and the strength of the correlations between the items of the scale. It provides us with a good estimate of reliability (Nunnaly, 1978: p. 250). Table (4) shows the reliability coefficients for the scale using split-half and Cronbach's coefficient.

Table (4) shows the reliability coefficients for the scale.

Cronbach's alpha	Half-split	
	Reliability coefficient	Half-test reliability
0.879	0.783	0.731

Discussion of the results

Table (5) shows the t-test for the difference between the means of analytical thinking.

Group Statistics									
	N	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Prepared	10	14.4000	.84327	.26667	3.243	18	.005	1.90000	.58595
Free	10	12.5000	1.64992	.52175					

The setter players scored an average of 14.4, 1.9 points higher than the libero players' average of 12.5. This indicates a superiority of setter players in analytical thinking. The p-value was 0.005, which is less than 0.05, indicating that the difference between the two groups is statistically significant. This means that the difference in analytical thinking between players

in the two positions is not random, but rather reflects a fundamental difference. The setter is the team's mastermind, controlling the flow of attacks and making quick decisions based on the movements of teammates and opponents. Research indicates that players in this position have high analytical abilities due to the demands of their role (Paoli & Bianco, 2012). The setter requires rapid information processing and strategic decisions in split seconds, which requires them to adapt to changes in the game, enhancing their cognitive abilities (Schmidt & Wrisberg, 2008). Highly analytical thinking is associated with increased activity in the frontal lobe of the brain, which is responsible for planning and decision-making (Fitts & Posner, 1967). Although the libero's role is important in defense and reception, its role is less complex than that of the setter in terms of strategic decision-making. Its role revolves around quick reactions rather than advanced planning. The libero relies on anticipation and immediate response, but it does not control the distribution of balls like the setter. Studies indicate that tasks that require reaction speed more than strategic thinking are associated with greater activity in the cerebellum and motor system than in the frontal lobe (Gravetter & Wallnau, 2020). Players must perform all skills at a level that enables each player to properly perform their duties during play. Therefore, technical skills must be divided into stages to facilitate learning them accurately and correctly, while ensuring they comply with the rules of the game. Although the skills appear easy to perform, they require a great deal of effort to master them precisely. This is due to the precise nature of their mastery, as dictated by the rules of the game, including the short duration of touching the ball with the fingertips, the small size of the court, the speed of the ball's flight, and other legal aspects (Ruslan et al., 2021). The game of volleyball consists of a set of movements called basic technical skills or basic principles, as shown in Figure (1).



Conclusion

The results show that the setter possesses higher analytical thinking skills than the libero, which reflects his primary role in directing the game. Coaches are advised to take these differences into account when designing training for each position.

Recommendations

Based on these results, the following recommendations can be made:

1. Train setters in exercises that enhance analytical thinking, such as video analysis and training on decision-making under pressure.
2. Enhance the mental capabilities of the libero through exercises that require advanced defensive strategies to improve their analysis of the game.

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