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The effect of specific exercises based on visual scanning on handling accuracy in under-17 football players

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Abstract

This research aims to enhance specific exercises grounded in visual scanning and to identify their effect on enhancing the passing accuracy of under-17 football players. The researcher used an experimental design with two groups: an experimental group and a control group, and conducted pre- and post-tests. The research sample comprised 25 under-17 players from the Baghdad Municipality Club, selected purposively and divided into two equivalent groups. The experimental group underwent exercises based on visual scanning, while the control group continued with traditional training. The researcher used pre-developed tests to measure passing Precision based on visual scanning, and the data were statistically analyzed using a paired-samples t-test. The findings showed statistically significant differences in favor of the experimental group in all research variables, demonstrating the effectiveness of the proposed exercises in improving passing accuracy. The researcher infers that incorporating visual scanning exercises into training programs effectively enhances the skill performance of young players. The researcher emphasizes the importance of adopting these exercises within training curricula and conducting similar studies on different age groups and training levels.

Keywords: visual scanning, handling, Precision, football, visual perception, decision-making.

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introduction

Football is a major sport that occupies a large space in the sports community and attracts the attention of a huge number of sports fans. This has led those interested in football to conduct many studies and research to improve the game in terms of tactics, skills, speed of play, and exploiting opportunities through effective passes, especially those based on visual scanning. If we compare what is happening now with the past, we find a significant difference in terms of team and individual play, the tactics employed, and the nature of skills. In the past, most players would look at the field and their teammates after receiving the ball, which was a successful method at the time. Now, in the era of speed, we see the necessity of looking at the field, teammates, and opponents before receiving the ball. This contributes effectively to the speed of decision-making and the building of play. Football is characterized by being a dynamic game that requires a high level of integration between physical, technical, and mental skills to reach the highest levels. Because visual scanning requires combining visual information with motor decisions in a fraction of a second (as fast as possible), the better a player's visual scanning ability, the greater the likelihood of making correct and quick decisions, which is reflected positively in the level of technical performance and the success of the tactical aspect as well. Conversely, poor scanning performance leads to slower decision-making, increased errors in performance accuracy, or a reliance on passive play, such as playing backwards, especially in situations characterized by high defensive pressure or limited space. For those under 17, the stage of motor development and learning is in its early stages, necessitating the use of effective exercises and methods to properly develop fundamental skills. Incorporating visual scanning into specific training exercises is a progressive approach aimed at enhancing effective handling, which can be a decisive factor in matches, as well as motor response and accuracy. It also enhances other fundamental skills such as shooting and dribbling, contributing to the overall development of the game. The under-17 age group was chosen because they represent the fundamentals for future development, possessing flexibility and a capacity for learning at this age. They are at the beginning of their careers and possess a great deal of enthusiasm and energy to learn new techniques. The researcher substantiates focusing on the technical aspect over the tactical aspect in this research by stating that the emerging player (under 17) first needs to be professional in basic technical skills (receiving, passing, controlling, and shooting) under simple conditions, with frequent visual scanning incorporated during performance. Once the technical skills become automatic (with the use of visual scanning), the player is ready. Field observations and review of some matches involving under-17 teams revealed weaknesses in passing accuracy and delays in decision-making during and after receiving the ball, which slow down the game because the player does not collect adequate information about the positions of teammates, opponents, and the surrounding environment. He acts after missing the

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opportunity due to his lack of prior awareness of the field and the movement of teammates. There is also a decrease in passing or shooting accuracy due to not accurately determining the direction, distance, or position of the goalkeeper and defenders. There is also a weakness in positioning and movement off the ball, confusion during high-pressure or high-speed play due to a limited view of the entire situation, and poor shooting accuracy as a result of players looking at the ball without looking at the position of the goalkeeper or defenders. If we want to develop players, especially in basic skills, we need to give attention and scan the field repeatedly so that the athlete can exploit the available spaces and play into them to be more effective and take advantage of opportunities during building play and counter-attacks Regardless of the great efforts made by coaches, there is a weakness in this aspect, which leads players to play incorrectly or intercepted passes and slow in decision-making do to not knowing the right place. The researcher believes that employing exercises to develop skills with visual scanning can be a tool for success in this important and necessary aspect of football, further to the target group of the research, through which the researcher aims to build a base that uses this type of exercise to develop the game. The research aims to develop specific exercises based on visual scanning and determine the effect of the exercises on supporting the accuracy of passing skills in football for players under 17 years old.

Previous studies

In this context, Asaad B. (2025) confirmed the emergence of strong relationships between mental and visual skills and between them and motor skills.

Similarly, a study by Kazem (2025) confirmed that specific exercises based on visual scanning increase players' visual awareness of their surroundings, thus enhancing their ability to make effective decisions in less time.

A study by (Amer, 2023) confirmed that the correct scientific method and the gradual increase in difficulty helped the experimental group reach the desired goal.

Similarly, (Sabah, 2024) prepared combined exercises for the skills of shooting accuracy and passing and receiving accuracy for young footballers and concluded that a high rate of development was achieved in favor of the experimental group.

The study by (Taha, 2025), which prepared exercises using assistive devices to teach some basic football skills to junior players, concluded that the use of manufactured educational tools with a performance-enhancing effect in learning some of the skills under investigation plays an effective role in raising the skill level of junior football players.

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Method and Material

The researcher applied the experimental method as it was appropriate for the nature of the research. The experimental and control groups were designed with pre- and post-measurements. The experimental group underwent the training program introduced by the researcher, while the control group continued with the traditional training program followed by the coach without any intervention from the researcher. Since the selection of the sample is a cornerstone of scientific research, as it demonstrates the original population or model on which the researcher conducts his entire work, the research population will contain the youth players of the Baghdad Municipality Football Club participating in the Iraqi Football League under (17 years) for the 2025-2026 season, numbering (25) players according to the records, who were selected purposively.

Tests Used in the Research;

1. Visual Scanning Passing Test

Test Name: Visual Scanning Passing

Test Objective: To assess the visual scanning passing fidelity of young football players.

Equipment Used: Football field, 6 small goals, whistle, stopwatch, football, measuring tape.

Performance Description: The player stands in front of three small targets 10 meters away, and behind them are three more small targets 10 meters apart, with a distance of 3 meters between each target. After hearing the whistle from the coach, the player prepares to receive the ball inside a designated 3-meter square. At the same time, the two defending players move in front of the back targets, each randomly occupying a specific target, leaving one target vacant. Each defender positions themselves at a target as the ball leaves the passing player's goal. This demands the player to perform repeated visual scans from the moment they establish to receive the ball to locate the vacant target (free of defenders). The player then passes the ball towards the forward target opposite the vacant back target as quickly as possible, as illustrated in Figure

Scoring: The player is given three attempts, and the best one is selected.

❖ The player receives 0 points if they receive the ball inside the square and pass it in the wrong direction.

❖ The player receives 1 point if they receive the ball inside the square and pass it in the correct direction, but it does not enter the goal. Two (2) points are allocated if the ball is received inside the designated area, passed correctly, and enters the target.

Years are awarded if the ball is received outside the designated area and the tester fails to control it.

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Note: The score is determined according to the formula: Score (Accuracy Score) / Time (Test Time). Test Time = The time from the moment the tester obtained the ball until the ball crosses the straight line of the small targets.

Figure1. illustrates handling according to the rear optical scan

Visual Scanning Passing Test;

Test Name: Right Lateral Visual Scanning Passing

Test Objective: To evaluate the visual scanning passing precision of young football players

Equipment: Football field, 6 small goals, whistle, stopwatch, football, measuring tape.

Performance Description: The player being measured stands with three small goals 10 meters to their right and three small goals 10 meters to their left, with a distance of 3 meters between each goal. Two players move around the goals to the right of the player. Upon hearing the whistle, the player prepares to obtain the ball. Each of the two players stands in front of a goal, leaving one goal vacant. Each defensive player stands in front of a goal as the ball leaves the passing player. The player must execute a quick visual scan from the moment they prepare to receive the ball to locate the vacant goal (free of defenders) on the right side. The player then kicks the ball towards the goal opposite the vacant one on the opposite side as quickly as possible. As shown in Figure 2

Scoring: The test subject is given (3) attempts, and the best one is filtered.

❖ The test subject receives (0) points if they receive the ball inside the square and pass it in the wrong direction.

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❖ The test subject obtains (1) point if they receive the ball inside the square and pass it in the correct direction, but it does not enter the target.

❖ The test subject receives (2) points if they receive the ball inside the square, pass it in the correct direction, and it enters the target.

❖ The test subject receives (0) points if they receive the ball outside the square and do not control it.

Note: The score is determined according to the formula: Score (Accuracy Score) / Time (Test Time).

Test Time = The performance time is assessed from the moment the test subject obtains the ball until the ball crosses the straight line of the small targets

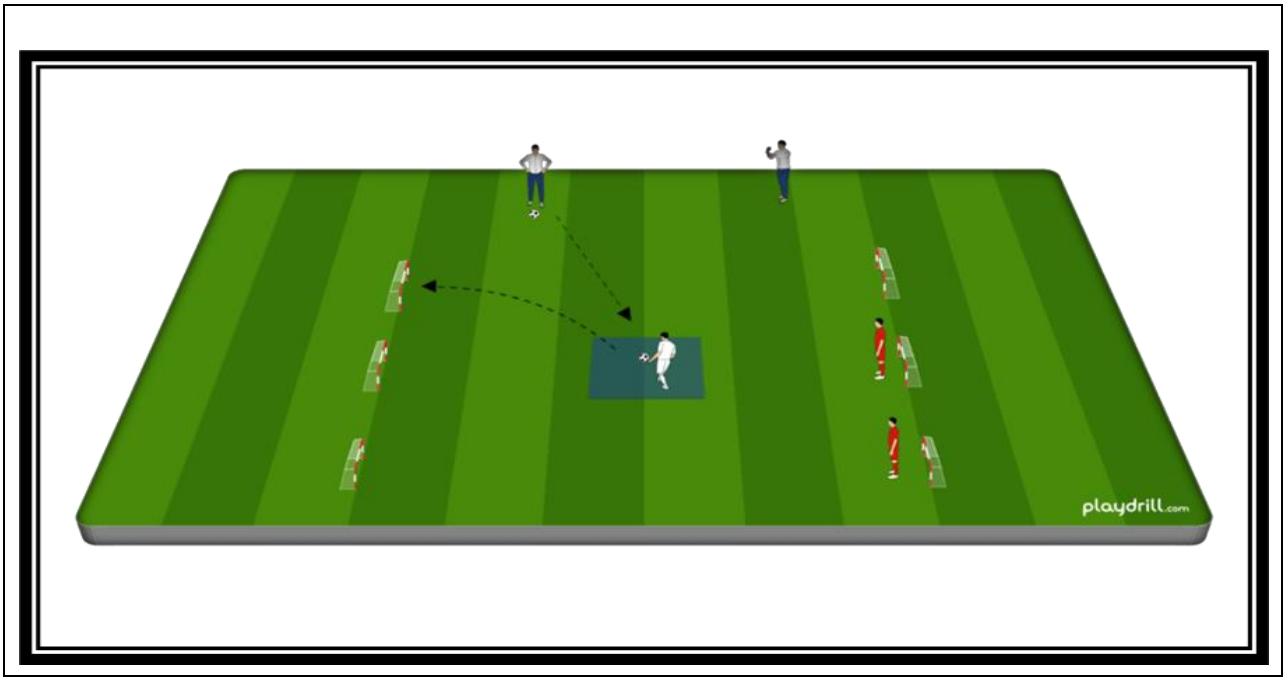

Figure2.handling accuracy according to the visual scan of football players.

3. Passing Test Based on Visual Scanning

Test Name: Passing Based on Right Side Visual Scanning

Test Objective: To assess the passing precision of young football players based on visual scanning.

Equipment Used: Football field, 6 small goals, whistle, stopwatch, football, measuring tape.

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Performance Description: The player being measured stands with three small goals 10 meters to their right and three small goals 10 meters to their left, with a distance of 3 meters between each goal. Two players move around the goals to the left of the player being tested. immediately hearing the whistle, the player being tested prepares to obtain the ball. Each of the two players stands in front of a goal, leaving one goal vacant.

...Each defensive player stands in front of a goal as the ball leaves the passing player's position. This demands the player being tested to perform a quick visual scan from the moment they procedures the ball to locate the vacant goal (free of defenders) on the left side. The player then kicks the ball towards the goal opposite the vacant one on the other side as quickly as possible, as shown in Figure 3.

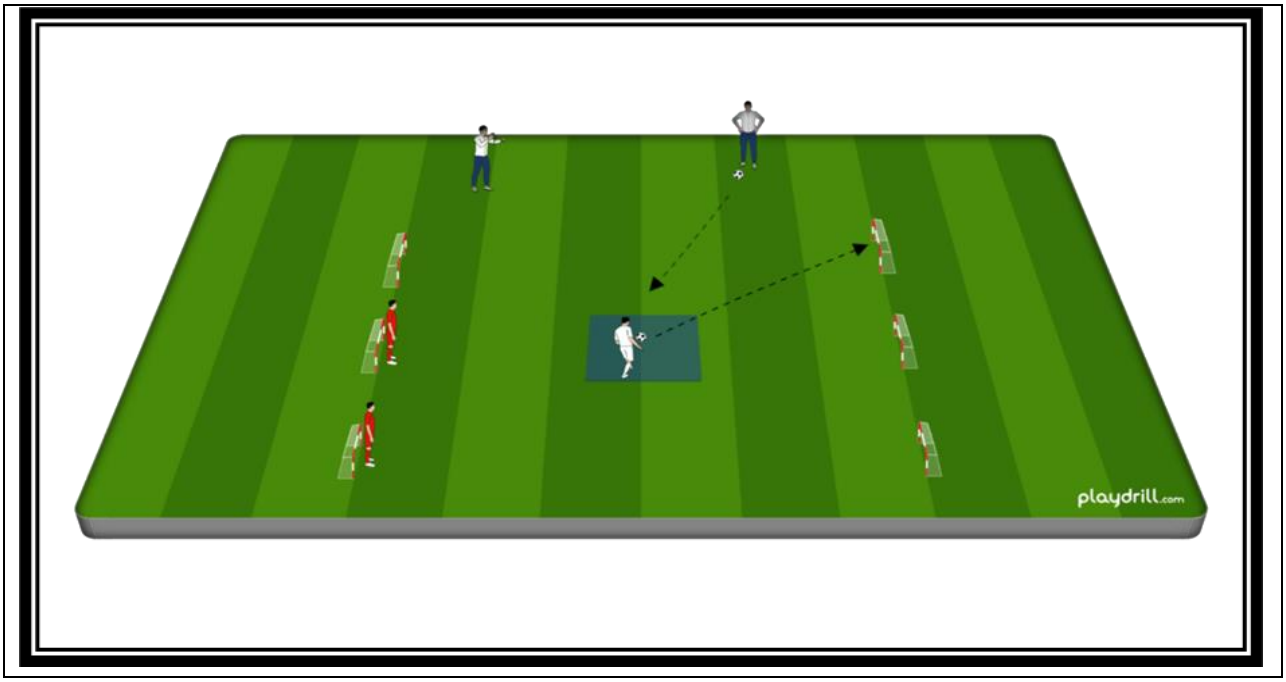

figure3. Handling according to the right lateral optical scan.

Scoring: The test subject is given (3) attempts, and the most effective one is selected.

❖ (0) points are awarded to the test subject if they obtain the ball inside the square and pass it in the wrong direction.

❖ (1) points are awarded if they obtain the ball inside the square and pass it in the correct direction, but it does not access the target.

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❖ (2) points are awarded if they receive the ball inside the square, pass it in the correct direction, and it enters the target.

❖ (0) points are awarded to the test subject if they receive the ball outside the square and do not control it.

❖Note: The score is determined according to the formula: Score (Accuracy Score) / Time (Test Time). Test Time = The performance time is evaluated from the moment the test subject receives the ball until the ball crosses the straight line of the small targets.

Pilot Study:

The researcher administered a pilot study on a sample of players from the Baghdad Municipality under 17 years of age to verify the validity and applicability of the research instruments and to assess the suitability of the procedures for the main study. If the pilot study highlighted that the instruments used were suitable or unsuitable in terms of their formulation and the time needed, this would help the researcher make any necessary adjustments before proceeding with the main study.

Pre-tests:

The researcher performed pre-tests on the research sample after recognizing the tests specific to the research variables and taking into account the conditions associated to the tests in terms of time, place, equipment and tools used, method of implementation, and the improving team, to ensure their availability in the post-tests. This took place on Tuesday, November 11, 2025.

Main Experiment:

Implementation of the Prepared Exercises, Appendix No. (1): -

The researcher implemented the prepared exercises on the members of the research sample in the experimental group, taking into account the type of training units given to the members of the control group by the coach.

Particular exercises were constructed within the framework of the training program of the Baghdad Municipality Football Club for under-17s, considering the available resources and the general level of the research sample. These exercises were based on the scientific principles of sports training and some scientific sources and references. The exercises, as visually assessed, emphasized enhancing motor response speed and some basic football skills.

❖ The researcher implemented the exercises at the Baghdad Municipality Club's field on Palestine Street, as the vital training equipment was available, along with ample space for full freedom of movement.

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❖ The duration of the units was 8 weeks, with 3 units per week.

❖ The researcher exercised high-intensity interval training (HIIT) when implementing the exercises.

❖ The exercises were implemented from November 16, 2025, to January 9, 2026. ❖ The work-to-rest ratio fluctuates (2:1) throughout all exercises.

❖ The researcher adopted the principle of fluctuation (80-85-90) in high-intensity interval training and (90-95-100) in repetitive intensity training during the training units. This is the intensity adopted in high-intensity, repetitive interval training.

❖ The duration of the exercise ranges from approximately (30-35) minutes within the main session.

❖ The maximum performance time for each player was used to standardize the training intensity used in each exercise during the training units. All players obtained similar arithmetic means

An average test was conducted after the end of the fourth week and before the start of the fifth week, after the application of 12 training units, to measure the extent of enhancement and to standardize the intensity used in each exercise.

Post-tests:

The researcher administered post-tests after eight weeks under the same circumstances and facilities as the pre-tests. The main aim was to gather data on the players for statistical analysis and to determine the importance of specific exercises for wider dissemination and application. The post-tests were administered on Sunday, January 11, 2026, at the Baghdad Municipality Club's under-17 football field.

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Table No. (1) Shows the values of the pre-test and post-test results, the t-value, the percentage, and the consequence of the handling variables consistent with the visual survey of the experimental group.

Variables	Unit of measurement	Pre-test		Pos-test		Different mean	Different SD	T	SIG	Significance
		mean	SD	mean	SD					
A		0.447	0.295	0.714	0.138	0.267	0.068	3.909	0.004	Significant
B	M/S	0.541	0.373	0.820	0.222	0.279	0.083	3.361	0.008	Significant
C		0.588	0.307	0.851	0.301	0.263	0.045	5.842	0.000	Significant

Table (1) shows that the sig value for the research (experimental) group is less than the value of the consequence level of (0.05) in the variables, as the statistical results for the experimental group demonstrated a substantial and significant improvement in all the variables under study.

The researcher characteristics that the enhancing achieved cannot be understood apart from the nature of the special exercises based on the visual survey that aimed to link decision-making and skill execution within the framework of training situations that simulate the real playing environment for the members of the research sample in the experimental group who underwent special exercises prepared by the researcher, and that the training age of the members of the research sample was less than (17) years, and this helped to improve quickly and contributes effectively to learning skills because this group is moving toward obtaining skills. Moreover, the researcher subjected the exercises of the target group to the scientific foundations (training loads).

Visual scanning, as recent studies demonstrate in many research papers, is not merely a random eye movement by the player, whether through or before obtaining the ball. Rather, it is a selective, organized, and sequential cognitive process that is in agreement with the type of skill, the location of the ball, and the proximity of opposing players to the player using visual scanning. Through it, the most relevant information to the competitive situation is detected and then converted into appropriate motor decisions of great importance in creating an attack on the opposing team, making a decisive pass to a teammate, or relieving pressure on players by changing the player's direction in the safest area. This is done through acceptable scanning without alerting the opposing team to the direction of the pass or the location of the ball (Williams and Hodges, 2005, pp. 637–650).

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Schmidt and Lee (2019) validated that training involving diverse and rapidly changing visual stimuli leads to improved information processing speed and attenuated cognitive latency. This skill requires high speed in its execution and very short times, in fractions of a second, in order to complete at maximum speed. Consequently, there is a high guarantee of attaining positive passes that effectively contribute to building play and moving into empty spaces, thus reducing the number of negative or ineffective passes.

When evaluating skills using posterior and lateral visual scanning in the experimental group, the principle of systematic repetition of situations requiring multidirectional visual scanning can be relied upon, leading to the development of decision-making speed. These skills needed high repetitions to achieve automatic mastery with visual scanning

Magill and Anderson (2021) believe that training in conditions similar to real-life performance enhances what is known as qualitative information coding or realistic interpretation of the opponent's movement or the direction of a teammate's movement according to the course of the game. That is, the brain learns to differentiate between motor and visual patterns applicable to the situation, so decision-making becomes faster and less resource-intensive.

Conclusions

1. The development in post-test scores denotes the effectiveness of the researcher's exercises in enhancing the speed and accuracy of visual performance.
2. The improvement in the experimental group's motor skills indicates the positive effect of the exercises on developing the skills related to motor performance.
3. The decrease in motor reaction time in the experimental group is an indicator of enhanced neuromuscular efficiency and faster decision-making.
4. The improvement in the experimental group is linked to the effectiveness of the scientific exercises and not solely to growth factors or routine training.
5. Significant differences in dribbling skills were measured between the two groups, indicating the similarity in the impact of traditional training on this specific skill. Dribbling is an important skill and the primary method of ball movement on the field.
6. Improved visual scanning directly impacted the validity and speed of executing basic skills and improved decision-making speed.
7. Exercises concentrated on developing visual scanning and other variables contributed to improving integrated (cognitive-motor) performance indicators, not just secluded skill performance. This reflects the comprehensive nature of the exercises.
8 .The study findings confirm the importance of integrating visual aspects with skill training in football player development programs across different age groups.

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Recommendations

1. Implemented the proposed exercises into enhanced training curricula for developing visual and motor skills, given their statistically and practically proven effectiveness.
2. Integrate visual scanning exercises into regular training units and do not restrict them to traditional skill training, as these exercises have a direct effect on improving response speed and the accuracy of skill performance.
3. Accentuating the link between visual and skill training when designing training programs to ensure the extensive development of the neuromuscular system
4. Carry out similar studies on different age groups and performance levels to verify the generalizability of the study's findings.
5. Multiply the use of standardized tests to measure visual and perception-related abilities when evaluating training programs to ensure the accuracy and objectivity of the assessment.
6. Utilize the study's findings in developing rehabilitation programs to improve players' motor response speed, especially in sports requiring rapid decision-making.
7. Execute future studies comparing different types of visual-motor programs to determine which are most effective in enhancing performance.

(1) Appendx

A model of the training units used is shown

First training unit: (First week)

Training session duration: Total session time :32 to 35 minutes

The aim of the unit :is to improve the skill aspect and motor response according to visual scanning

The exercise	Intensity	Volume	Rest between groups	Total exercise time	Transition time between exercises
M1	80%	2x3	90S	6.41m	2m
M2	80%	2X3	60S	3.54m	1.5m
M3	80%	2 X3	60S	4.48m	1.5m
M4	80%	2X 3	90S	6.16m	2m
M5	80%	3 X 3	60S	5.39m	

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Training unit two: first week

Training session duration: Total session time:32 to 35 minutes
This unit aims to improve the skill and motor response capabilities based on visual scanning

Transition time between exercises	**Total exercise time**	**Comfort between groups**	**Volume**	**Intensity**	**The exercise**
1M	3.24m	60 S	2x 3	85%	**M6**
1M	5.39M	60S	3x3	85%	**M7**
1.5M	6.45M	60S	2X2	85%	**M8**
1.5M	5.54M	45S	3X3	85%	**M9**
	8.3M	60S	2X4	85%	**M10**

Third training unit: first week
Training session time: total session time:32 to35 minutes
The aim of this unit is to improve the skill and motor response capabilities based visual scanning

Transition time between exercises	Total exercise time	Rest between groups	Size كXم	Intensity	The exercise
M 1	M 7.51	S 45	3X4	%95	M11
M 1.5	M 5.45	S 45	2X4	% 95	M12
M 1	4.33M	S 45	2X3	%95	M13
M 1.5	M 5.21	S 90	3X3	%95	M14
	M 6.27	S 60	2X3	%95	M15

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