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# The effect of special exercises using a random visual device to develop the response speed of goalkeepers in futsal

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## Abstract

The objective of the research was to develop the response speed of futsal goalkeepers through the use of a random optical device due to the importance of the goalkeepers' response speed in blocking the ball. The lack of response speed in blocking the ball is a problem, in addition to the lack of training of goalkeepers with advanced devices. The experimental method was used by designing the control and experimental groups in a manner that suited the nature of the study problem. The study sample was deliberately selected from some teams of the colleges of the University of Baghdad, numbering 16 futsal goalkeepers, 8 in the experimental group, and 8 in the control group. After conducting the exercises, analyzing, and discussing the results, the researcher concluded that statistically significant differences were found in the post-tests in favor of the experimental group. Through this, the researcher reached some conclusions and recommendations, the most important of which is that the use of the random optical device develops the response speed of futsal goalkeepers. Additionally, the effect of repeated exercises had a positive impact on the performance results.

**Keywords**: optical random-access device, response speed, futsal, goalkeepers.

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## Introduction

Futsal is a popular sport both locally and internationally, due to its aesthetic appeal and enjoyment of technical and tactical performance. Furthermore, it can be played on small fields and is available in many locations. It is a dynamic and constantly evolving game that is easy to play in small spaces. (Murray 2010) One of its advantages is that it is a dynamic, fast-paced, and attractive game that requires a high degree of skill. (Hermans 2011) The most important thing that distinguishes futsal is the speed of performance as well as the response, especially the goalkeeper's response in blocking the opposing team's balls. Otherwise, it causes the team to lose and lose opportunities to win. Not exposing it to random stimuli in the speed of response and reaction in blocking balls is a problem. Hence, the importance of research into ways to improve goalkeeper response. The research aimed to identify the effect of specific exercises using a random visual device on improving the response speed of futsal goalkeepers.

Some studies have addressed the importance of training response speed, as well as using visual and auditory stimuli and tools to develop it:

The study (Ismael Qasim 2012) aimed to develop the response speed of futsal players through the use of audio-visual devices, especially the (random shot) device, where the researcher used the experimental method by designing two equivalent groups, the experimental and the control, and the sample was chosen intentionally and included 80 players from Baghdad clubs of the elite league to design the tests in addition to the exploratory experiment, and included the main sample which represents the players of the national futsal team.

The study (Ismael Qasim 2012) aimed to develop the response speed of futsal players through the use of audio-visual devices, especially the (random shot) device, where the researcher used the experimental method by designing two equivalent groups, the experimental and the control, and the sample was chosen intentionally and included 80 players from Baghdad clubs of the elite league to design the tests in addition to the exploratory experiment, and included the main sample which represents the players of the national futsal team. The conclusions were that the use of audio-visual devices improved the players' motor response speed.

The study (Ammar 2013) also aimed to develop the speed of motor response among young soccer goalkeepers through some exercises and auxiliary tools. The researcher chose the experimental method by designing the control and experimental groups. The researcher

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concluded that exercises using auxiliary tools contributed to developing the motor response among young goalkeepers.

Ismael's study (2017) aimed to develop the skill performance of handling through complex exercises in which the researcher used audio and visual stimuli devices. The researcher used the experimental method with a two-group equivalent design. The sample size was 20 players who were divided into two groups, a control and an experimental group, each group containing 10 players. The duration of the curriculum was 8 weeks, with 3 units per week. After arriving at the results, presenting and analyzing them, the researcher concluded that the exercises used in the research had a positive impact on developing the skill performance of handling.

The study (Muhammad Jabbar, Ahmad Khamis, 2019) aimed to design a device as well as prepare special exercises to develop response speed and some blocking skills among handball goalkeepers. The researchers used the experimental method with a single-group design with pre- and post-tests and reached the conclusion that the use of the designed device had developed response speed among goalkeepers through special exercises for ages 15-16 years.

Mustafa's study (2019) aimed to design an electronic target to develop simple and complex motor responses in handball goalkeepers. The method used was experimental, while the sample was deliberately selected, comprising six goalkeepers. After conducting the main experiment, the researcher concluded that the use of simple and complex visual exercises and devices improved goalkeepers' motor response speed.

**Method and tools:**

The researcher used the experimental method by designing two equal groups, control and experimental. The sample was chosen intentionally. The sample consisted of 16 goalkeepers from Bab Al-Muadham Colleges. The main sample was divided into two equal groups, 8 control and 8 experimental, using the odd and even arrangement method after conducting the pre-test. The exercises took place over 8 weeks, with 3 units per week, from 29/10/2023 to 28/12/2023. The experimental group was divided into two groups using two optical devices, with each target assigned a random optical device to maximize time and effort. The exercises were applied to the experimental group, while the control group trained with their teams. The experimental group's performance is divided into four players, with each player performing one goal. In the first and second weeks, each goalkeeper performs four sets, each with 10 repetitions. Each set is timed to 30 seconds, while the rest

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period for each player is the waiting period for the other three players to perform. The total number of repetitions in the unit is 40. In the following weeks, the device is gradually accelerated, as the number of repetitions increases gradually with constant time to become 16 repetitions, and the daily repetition number for each goalkeeper is 64.

The pilot experiment was conducted on a sample of 4 goalkeepers from some teams of the University of Baghdad colleges at the College of Arts stadium on 15/10/2023 to learn how the tests and exercises were conducted, how they were distributed, the method of organization, and the time taken.

**Test:** Futsal goalkeepers' response speed using a random optical device

**Objective:** To measure the response time of futsal goalkeepers.

**Tools and equipment used:** 1 Futsal soccer goal, 1 random optical device, 1 high-speed digital camera, 1 laptop, measuring tape, and adhesive tape.

**How to perform:** The goalkeeper stands in the middle of the goal, which is marked by a vertical line on the goal line, with his feet on both sides. When the device is turned on, which is 7m away, one of the arrows lights up simultaneously with the corresponding lamp on the goalpost (the purpose of the lamps on the goalposts is to photograph them when lit and record the start and end time of the response when the lamp is touched by the goalkeeper). Note that the device works randomly.

**Recording:** Each goalkeeper is given 4 attempts, and the arithmetic mean time of the four attempts is extracted. Note that the response time is extracted using the Kinovea program.

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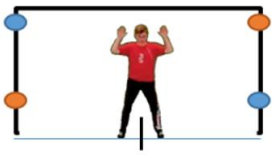

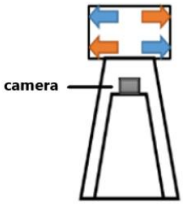


**The scientific basis for the test:**
Validity: Self-validity was used through a reliability root of (0.986) = (0.993).
Reliability: The test was conducted on five goalkeepers from various teams at the Faculty of Arts on 18/10/2023, and repeated on 23/10/2023 under the same conditions. Reliability was calculated using a simple correlation coefficient.

**(Table 1)**

It shows the reliability of the test for the research variables using the test-retest method.

| stability coefficient | sig |
|---|---|
| 0.986 | 0.002 |

**Objectivity:**

The test relies on conclusive evidence and is free from subjective evaluation. Judges and scorers are neutral instructors, with the examinees' understanding and appreciation of the test's vocabulary and content. (Ismael 2009)

In addition, the test leaves no room for subjective judgment or bias, as precise numbers are measured using a high-resolution camera and an accurate measurement program, resulting in no margin of error. (Asaad and Ismael 2017)

**Discrimination Ability:**

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After confirming the scientific basis of the test and determining its ability to differentiate between high- and low-level groups, the test was administered to 21 guards representing teams from 10 departments of the College of Languages on October 24, 2023. After collecting the data, the scores were ranked from lowest to highest, with 27% of the lowest scores and 27% of the highest scores. An independent samples t-test was used, and the data were statistically processed. The p-value was found to be less than 0.05.

**(Table 2)**

Demonstrates the discriminating ability of the search engine.

| Unit of measurement | Total of the upper levels | | Total minimum levels | | t | sig |
|---|---|---|---|---|---|---|
| | mean | Std. deviation | mean | Std. deviation | | |
| Time: second | 0.977 | 0.070 | 1.085 | 0.016 | 3.976 | 0.002 |

After that, the pre-test was conducted on the research sample in its two groups in the same stadium on 25/10/2023. rates the discriminating ability of the search engine.

**(Table 3)**

It shows the equivalence of arithmetic means, standard deviations, the value of (t), and the significance of the differences between the control and experimental groups for the research variable

| Unit of measurement | control group | | experimental group | | t | sig |
|---|---|---|---|---|---|---|
| | mean | Std. deviation | mean | Std. deviation | | |
| Time: second | 1.097 | 0.030 | 1.116 | 0.030 | 1.224 | 0.241 |

After conducting the main experiment on the experimental group, post-tests were conducted on the control and experimental groups on 2/1/2024 in the same place and under the same conditions as the pre-test. The researcher used the statistical package (SPSS) to apply the appropriate statistical treatments. (Kadhim & Mahmood, 2023)

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**Presentation and discussion of results:**

**(Table 4)**

Shows the arithmetic means, standard deviations, t-value, and their statistical significance for the test results for the control and experimental groups (pre-test-post-test).

| The group | Pre-test | | Post-test | | t | sig |
|---|---|---|---|---|---|---|
| | mean | Std. deviation | mean | Std. deviation | | |
| control | 1.097 | 0.030 | 1.085 | 0.045 | 1.667 | 0.14 |
| experimental | 1.116 | 0.030 | 0.916 | 0.025 | 31.429 | 0.001 |

**Discussion of the results (Table 4):**

The researcher attributes the improvement achieved by the experimental group to the efficiency of the random visual device, as well as the repetition used. That is, repeating the exercise on devices with visual or auditory stimuli and responding to these stimuli in a deliberate manner improves response time. Also, using the device with stimuli that are in harmony with the players' response through ease of operation in performance has improved response time. When there is harmony between the characteristics of stimuli or incentives and the response requirements, performance time decreases. (Magill 2010) Since there are stimuli at different speeds, the athlete must respond in rapid succession. (Cashmore 2002) Moreover, automatic execution and changes in stimuli lead to the development of the player's skill in responding. (Luiselli 2011) Finally, repeating the correct performance helps to improve execution. (Mufti Ibrahim 1998)

**(Table 5)**

shows the arithmetic means, standard deviations, t-value, and their statistical significance for the test results for the control and experimental groups (post-test).

| Unit of measurement | control group | | experimental group | | t | sig |
|---|---|---|---|---|---|---|
| | mean | Std. deviation | mean | Std. deviation | | |
| Time: second | 1.085 | 0.045 | 0.916 | 0.025 | 9.121 | 0.001 |

**Discussion of the results (Table 5):**

When the exercises are properly implemented, as well as their consistency and the use of appropriate tools, they lead to improved response time for the player, and this is what has been worked on. Reaction and response training can reduce response time to stimuli when

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performed correctly. (Bompa 2009) Continuous training, in addition to its diversity, helps develop reaction time, which adapts the player to this performance and hones his skills. (Mulqueen & Others, 2010) Practicing tasks reduces errors and enhances responses. (Williams 1999) Taking full advantage of modern and advanced technologies in training equipment and tools can raise players to a better level... Through this, the coach can give exercises in an easy or difficult way, or by gradually moving from easy to more difficult, as he wishes, and in a way that achieves the purpose of developing the players. (Hanfy 1998) This is what we have gone for in terms of using appropriate devices and repetitions to develop the goalkeepers' response speed. (Jawad, M., & Jabbar Shinen, 2016)

**Conclusions:**

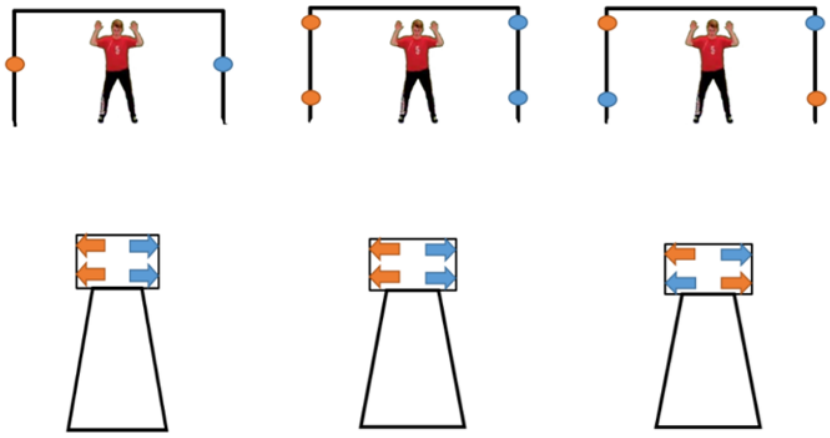
- The use of a random visual device has a positive effect on developing the response speed of futsal goalkeepers.

- The use of a random visual device reduces the development time of futsal goalkeepers, saving time and effort.

- The appropriate repetition of the exercises used had a positive impact on performance outcomes.

**Appendix 1**

In the first and second weeks, the exercises were performed using only two lights aligned with the arrows, with specific repetitions. In the third and fourth weeks, four lights were used instead of two, also aligned with the arrows, with slightly more repetitions. In the remaining weeks, the order of the lights was changed to increase the difficulty, with more repetitions, and with a gradual increase.



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