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RELATIONSHIP BETWEEN THE SPEED OF SIMPLE AND COMPLEX RESPONSES TO VISUAL STIMULI, COMPARING NATIONAL TEAM PLAYERS IN FENCING AND SQUASH

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ABSTRACT

Background. The speed of response is a vital skill crucial to any sport, although its significance varies depending on the specific technical and tactical demands of each sport. Its importance is particularly clear in sports characterized by rapid and dynamic performance, such as fencing, where players must be ready for unexpected moves. **Objectives.** The objectives are to examine the relationship between simple and complex response speeds to visual stimuli within each team and to compare players from the national squash and fencing teams. **Method.** A descriptive survey approach was utilized, with a purposive sample of ten players from each national team. Motor response speed was measured using the Batak Micro device, and data were analyzed statistically using SPSS. **Results.** There is no correlation between simple and complex response speeds to visual stimuli among national fencing players, but there is a correlation among national squash players. Significant statistical differences favoring fencing players were observed in simple response speed to visual stimuli, while no significant differences existed in complex response speed between the two teams. **Conclusion.** Fencers possess faster simple response speeds due to sport-specific requirements, emphasizing that training should include diverse stimuli tailored to the nature of the specialized sport.

Keywords; Simple And Complex Reaction Speed, Visual Stimulus, Fencing, Squash.

A. INTRODUCTION

Fencing is one of the oldest known sports, requiring significant muscular effort and the speed to shift body mass in different directions. The speed of motor response is considered an important ability that is essential in any sport, particularly those characterized by fast and changing performances. Squash is a modern racket sport that also combines strength, speed, and endurance, similar to fencing in that it is an individual competitive sport where the player uses a tool (racket).

Visual thinking skills have not received sufficient attention from those responsible for planning training and educational curricula. Furthermore, the application of educational models necessitates that the learning environment be rich in stimuli to keep pace with cognitive and technological developments. Response speed depends on muscle strength, especially in combat sports, requiring rapid movements such as a fencer lunging or advancing quickly.

Despite the notable similarities in the specifics of fencing and squash, certain differences are necessary to give each its distinctiveness. Therefore, it is important to identify the differences between players in simple and complex response times to visual stimuli, as well as to explore the relationships between these types of tests in both sports separately.

Through mutual observation between coaches and noting similar speed-based exercises between the national fencing and squash teams, the researcher aimed to verify a fundamental principle derived from sports training: the principle of specificity in performance and training.

The objectives of the research are to examine the relationship between simple and complex response speeds to visual stimuli within each team individually, and to compare the players from the national squash and fencing teams in both speeds. The hypotheses are: there is a statistically significant correlation between simple and complex response speeds to visual stimuli for both national teams; there are statistically significant differences between the two groups in simple response speed; and there are statistically significant differences in complex response speed between the groups

B. METHOD

Participant.

The researcher selected the study sample purposively, consisting of senior national team players in fencing and squash. The number of fencing players was (12), but two were excluded for failing to attend the tests. The number of squash players was (11), but one was excluded due to being (14) years old. Therefore, the total number of participants in the research sample was (20) players: (10) fencing players and (10) squash players.

Research Design.

The researcher used the descriptive survey method as it was suitable for the study's objectives.

Instrument.

Motor response speed was measured using the Batak Micro device. This is a modern, English-made device from 2011, imported through a Swedish company for use by postgraduate students. It consists of a box-shaped panel containing (12) pressure-sensitive lamps, each with a spring-loaded base. The device can be operated using both arms or one arm, and the researcher opted to use the preferred arm (the one holding the sword or racket). After learning how to use the device, two tests were identified:

a. Test Ten (Speed of Complex Response to Visual Stimulus): The test begins by lighting one of twelve lamps randomly. The subject must press the lamp opposite the lit one. When this happens, another lamp is lit, and so on until 25 lamps are lit. The time taken from lighting the first lamp until pressing the lamp opposite the twenty-fifth lit one is calculated and displayed on the small electronic screen in seconds and fractions thereof.
b. The twelfth test (simple response speed to a visual stimulus): The shortest possible time for the device was set to be (30) seconds to be parallel to the previous test, as well as being closest to the trait to be measured. The test begins when the device says the word GO. One of the lamps is lit up randomly, so the test-taker presses it to light up another lamp automatically, so the test-taker presses it as well, and so on until the time set for the test (30) seconds has ended, so the device counts the number of lamps that were pressed by the test-taker during this time.

Procedures and if relevant, the time frame :

A pilot study was conducted on a sample of (4) players, who were not part of the main research sample, with the assistance of the research team, on January 15, 2026. The objectives of the pilot test were to confirm the suitability of the cognitive test, confirm the suitability of the test location, determine readiness, determine time required, and identify any difficulties. Untuk pelaksanaan utama, the researcher conducted the two tests on the fencing players in the fencing hall (Al-Shaab Stadium) on Saturday, January 17, 2026, at 3:00 PM. The squash players were tested the following day, Sunday, January 18, 2026, at 4:00 PM in the College of Physical Education and Sports Sciences, University of Baghdad (Al-Jadriya).

Analysis plan.

The researcher used the SPSS statistical software package to statistically process the data.

Scope and/or limitations of the methodology you used.

The study specifically targeted senior national team players using their preferred arm (the one holding the sword or racket) for the test.

C. RESULTS AND DISCUSSION

Results

Table 1. Correlation relationship results between the simple and complex visual stimulus response speed tests for fencing and squash players

Sport	Simple response speed test		Complex response speed test		Calculated R value	Calculated R value	Degree of freedom	Significance level	Results
	Mean	St.d	Mean	St.d					
Fencing	54.5	3.533	24.38	3.096	0.397	0.683	9	95٪	Insig.
Squash	47.3	3.65	28.15	5.921	0.773	0.683	9	95٪	Sig.

Table 1. shows the results of the correlation coefficient between the simple and complex response speed tests to visual stimuli for both the national fencing team players and the national squash team players. The arithmetic mean for the fencing players in the simple response test was 54.5 with a standard deviation of 3.533, while the complex response mean was 24.38 with a standard deviation of 3.096. The calculated value of (r) of 0.397 is less than the tabulated value of 0.683 under 9 degrees of freedom and a significance level of 95%, indicating the absence of a correlation between the two tests for the fencing players. For the

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squash players, the simple response mean was 47.3 (SD = 3.65) and the complex response mean was 28.15 (SD = 5.921). The calculated value of (r) was 0.773, which is greater than the tabulated value of 0.683, indicating the existence of a correlation for the squash players. *Presentation and Analysis of the Differences Between Fencing and Squash Players in Both the Simple and Complex Visual Stimulus Response Speed Tests.*

Table 2. Mean, sample size, calculated t-value, arithmetic mean of the differences, standard deviation, true significance, and result for both the simple and complex visual stimulus response speed tests between fencing and squash players

Tests	Fencing		Squash		Mean of differences	Std. of differences	Calculated T value	True significance	Results
	Mean	No.	Mean	No.					
Simple response speed test	54.5	10	47.3	10	7.20	1.607	4.479	0.000	Sig.
Complex response speed test	24.38	10	28.15	10	3.77	2.11	1.786	0.091	Insig.

Table 2. Shows the results of the simple and complex visual response speed tests for the research sample. The mean score between fencers and squash players in the simple response speed test was 7.20, with a standard deviation of 1.607. The calculated t-value was (4.479), and the true significance value was (0.000), which is less than (0.05). This indicates a statistically significant difference between fencers and squash players, favoring fencers, in simple response speed to visual stimuli.

As for the test of the complex response speed to the visual stimulus, the arithmetic mean of the differences reached (3.77) with a standard deviation of the differences (2.11) and the calculated T-value was (1.786) and the true significance value was (0.091), which is greater than (0.05), which indicates that there is no significant difference between the fencing players and the squash players in the test of the complex response speed to the visual stimulus.

Discussion

The decision to execute the appropriate response comes after comparing the stimulus with the stored information from previous experiences. The execution is carried out through sensory signals from the nervous system (brain) to the muscle groups via the spinal cord, corresponding to the movement's nature, intensity, and strength. These mental processes take a very short time in the athletic field, reaching fractions of a second. Training and repetition of these responses reduce the response time, while regulating the response requires time. The more complex the requirements of the response and the more varied the choices, the longer the response time. Performing relatively slow movements that effectively utilize the sense of sight will make sight the regulator of the movement (Khayoun, 2002, p. 15). These results are consistent with the study by Abdul-Hussein (2009, p. 70), which states

that "the learner's vision of the skill helps them understand the movement path and have the correct body sensation, i.e., control the technical performance." Abdulkarim adds, “One of the most important factors for the success of the attack is choosing the right timing and the appropriate distance, while taking into account the accuracy of the performance” (Abdulkarim, 2022, 23).

The response in fencing and squash is classified as a complex response, as the player does not know the type of stimulus that will occur. However, the difference between the two sports is that in fencing, the player deals with his opponent directly, trying to direct the tool used (sword) towards the specific place on the body as a legal target, and according to the type of sword, to achieve the touch, as the speed of movement plays a major role in this, in addition to the transitional speed. Also, the distance between the competitors, which is often a distance of a lunge or a step + lunge, when compared to the distance in squash, which is somewhat greater than fencing, as the player, although in direct contact with the opponent, deals with him indirectly by trying to hit the ball with the racket against the wall so that it bounces off him and touches the ground, so that the opponent meets it and tries to hit it against the wall as well, and so on until one of the players fails to pursue the ball or violates the rules of the sport (Al-Sayed, 2022, 43). Therefore, the motor anticipation time for detecting the opponent's movements is relatively shorter in fencing than in squash. Consequently, fencing players achieved a significant difference in simple response speed to visual stimuli. However, in tests of complex response speed to visual stimuli, no significant differences were found between fencing and squash players because their immediate response speed is better. The time lost was in the opposite of the motor response, which led to the absence of differences due to their equal ability in both sports. (Al-Kinani, 2019, p. 112) In this same regard, Mahjoub (2001, p. 130) indicated that gathering information that a player can obtain from various sources, whether internal or external, before, during, or after a motor performance, aims to modify motor responses to reach optimal responses. This is one of the basic conditions for the learning process. For this reason, Osama Abdel Rahman emphasizes that "there is no attack that is more successful than another, but rather it depends on the opponent's performance. Likewise, every attack must be linked to the opponent's plans, abilities, and skills." (Osama, 2002) 52)

The fencer’s stance is distinctive despite his continuous movements on the court, but he remains facing the opponent sideways with his armed arm towards the opponent. As for the squash player, his movements are different, although he sometimes performs a movement similar to lunging in fencing. He performs front and back shots and moves to the sides, in addition to his movements forward and backwards. (Omran, Al-Zubaidi, 2022, 89)

D. CONCLUSION

There is no correlation between simple response speed and complex response speed to visual stimuli among the national fencing team players. There is a correlation between simple response speed and complex response speed to visual stimuli among the national squash team players. There are statistically significant differences between the national fencing team players and the national squash team players in simple response speed to visual stimuli, favoring the national fencing team players. There are no statistically

significant differences between the national fencing team players and the national squash team players in complex response speed to visual stimuli.

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F. AUTHOR CONTRIBUTION STATEMENT

MF designed the study, conducted the data collection using the Batak Micro device, analyzed the data with SPSS, and wrote the complete manuscript.

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