

Comparative study of divided attention and reaction time among the players of Baghdad volleyball clubs

Zaman Saleh Abdulhadi*, Ahmed Khattar Saad, Mohammed Ibad Abd

General Directorate of Education of Kerbala, Ministry of Education, Iraq

* Correspondence: Zaman Saleh Abdulhadi; zamansaleh14@gmail.com

ABSTRACT

The purpose of this paper was to identify the differences in the level of divided attention and reaction time among volleyball players according to their specializations. The present study was conducted on volleyball players of Baghdad, who participated in the elite volleyball league in the 2012/2013 season. The study was completed within the time frame of March 2013 to May 2013 in the Center for Educational Studies and Psychological Research of the University of Baghdad. A total of 24 players were present in the research community. Participants were selected in a deliberate way. Most of the participants had participated at national level games. The statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS). Based on the findings of the study, the researchers concluded that a statistically non-significant difference was found in the volleyball players according to their specializations in the divided attention variable, and a statistically significant difference was found in the volleyball players according to their specializations in the reaction time variable.

KEYWORDS

Divided attention; Reaction time; Volleyball

1. INTRODUCTION

Mental operations are a major driver of the planning abilities and the skill performance of the players. Mental ability helps in matching the parts and vocabulary related to any reaction issued by the player in the form of skillful or schematic performance. The adoption of computerized technology today has become a supportive and an effective factor in determining various mental abilities of football players like attention, planning, executive functions, alternate attention and reaction time,

etc. The mental capacity of a player holds key importance in every sport especially in volleyball. It helps a volleyball player with a quick reading of the event and making the appropriate decision or changing the decision very quickly. The technology of computerized psychological laboratories has made this much easier.

The researchers noticed that most of the studies have been conducted with the focus on the comparison between the ability of divided attention and reaction time using advanced devices and high-accuracy programs, including peripheral perception, as the Contemporary Psychological Laboratory. It provides a firm database for the players and the training coaches to determine the extent of need to train each mental process for each specialization or integrate it with the skill or planning preparation. Hence, it constituted a recent trend in the process of developing the means of achievement ability in the game of volleyball.

The researchers summarized the research problem by identifying the significant lack of possession of sophisticated computerized standard and diagnostic tools that provide us with accurate data on mental abilities. Researchers noticed that most of the training coaches rely on the traditional methods of psychological measurement, which include paper and pencil tests, self-observation tests, etc. These methods are far from the methods of scientific and technological progress. Hence, the researchers found that the use of this technology and its use in measuring important mental processes and comparing them according to the competence of each player has an active role in evaluating performance, such as divided attention and reaction time. The accurate database and the results of the differences between the mental abilities that the coach will obtain by measuring and comparing this mental process (divided attention) with the neuro-mental ability (reaction), might help in diagnosing the strengths and weaknesses of each of the team players and the team as a whole which may inevitably reflect positively on the level of achievement of volleyball players.

The primary aim and objective of this study was to identify the level of ability (divided attention and reaction time) among the players of Baghdad volleyball clubs according to their specializations and to identify differences in the level of ability (divided attention and reaction time) among the members of the research sample according to their specializations. In the present study, the research team hypothesized that statistically significant differences would be found in the level of divided attention and reaction time among the members of the research sample according to their specializations.

2. METHODS

2.1. Design and participants

The nature of the problem and the objectives of the research determine the appropriate research method (Mahjoub, 2002), and accordingly, the researchers used the descriptive approach in a comparative manner to suit the nature of this research. A research community represents the origin or model on which the researcher conducts the entire work (Mahjoub & Al-Badri, 2002). In the present study, volleyball players of Baghdad clubs (Al-shorta Club and Al-Sinaa Club) and participants in the Elite Volleyball League in the season 2012-2013 constituted the research community. A total of 24 players were present in the research community. Participants were selected in a deliberate way. Most of the participants had participated at national level games. A total of 23 players were tested; three of them were tested in the exploratory experience and one player did not attend the tests. The study was completed within the time frame of March 2013 to May 2013 in the Center for Educational Studies and Psychological Research of the University of Baghdad.

2.2. Instruments and procedures

There are multiple ways by which the researcher can collect the data and solve the research problem in order to achieve the objectives of the research, using various tools, devices, sources, extensive review of previous literature and conducting personal interviews with the experts specialized in the field of volleyball.

Extensive review of literature was studied by the researchers. In the present study, many tools and devices were used for the purpose of data collection with the aim to achieve the objectives of the research. The various tools used in the present study included UPS electrical energy storage, Sony digital camera, seat for the player tested, a pen to take notes, one Dell laptop and one Sony laptop.

The researchers used the Vienna Test System (VTS). Vienna Psychological Assessment and Measurement system is one of the computer-based systems produced by the Austrian company Schuhfried. It is one of the most important systems of the contemporary psychological laboratory, and the portable (mobile) laboratory, which is called the (VTS) system for short. It is also one of the world's leading procedures in the field of computer-supported medical and psychological examination, evaluation and diagnosis, through which various types of examinations, tests and measurements can be applied by developing and employing the latest technology within this system.

The computer based evaluation provided the results with highest proportions of accuracy and objectivity by giving error free test-results. Thus, the Vienna Test System for Psychological Examination and Assessment was manufactured and prepared in a way that makes the use of complex and in-depth psychological tests simple and convenient by developing and employing the latest technology within this system.

The Vienna Test System was based on a high quality modern technology. It is an essential central system for any contemporary psychological center or laboratory. The system is easily portable that can be carried outside the laboratory in a special bag, specifically prepared for the purpose. Hence, it is one of the mobile psychological laboratory systems. With this system, the tests can be applied in multiple languages. The basic program of the system is available in eight different languages. In fact, many tests are available in more than 24 different languages, including our Arabic language. It is a safe health and medical system that conforms to international standard specifications. It incorporates, receiving and sending data to and from other systems or software such as the bag Statistical SPSS or MS-Excel program and automatic generation of reports immediately after the completion of the application of the tests. It is a safe health and medical system that conforms to international standard specifications. The Vienna test system consists of basic software, a dongle, and a set of tests to be conducted in the research. In the present study, the researcher chose more than 130 tests.

Certain steps were followed by the research team to work with the Vienna Test System which include, Entering the full examination data and information details of the examinees along with the case history that can be retrieved during the time of need, choosing the type of test; The VTS system contains an integrated set of modern and contemporary tests in the field of examination, diagnosis and psychological assessment. There are diagnostic tests and stress tests, as well as tests for children over 4 years old and other tests that work on multimedia technology and are based on the latest technology.

After completing the initial two steps, the selected tests were conducted by the researchers. The application of the test was carried out face-to-face directly in front of the computer screen (fixed or mobile computer) and according to the psychological laboratory whether it is fixed or mobile. After successful completion of the tests by the examinee, the VTS system evaluated the test automatically. The results of the tests were made available on the computer screen in a tabular form, taking into account gender, age, educational attainment, and other factors. Results data can be obtained in the form of percentages, t-values (Standard T-score), and/or z-values (Z-score) and

others. The results can also be exported directly to word processing programs, and the results can be stored and processed by common statistical programs such as SPSS and MS-Excel.

The researchers applied the Peripheral Perception test. This test was designed to assess the perception and processing of external visual information. Good visual perception is a necessity for many activities that humans and machines engage in both. This test was conducted with the intent to identify the abilities of the players to perceive or feel the stimuli emanating from his surroundings. Peripheral perception test belongs to the Vienna Test System of the company Schuhfried. The participant was instructed to perform a motion-following exercise in the central field of vision. Simultaneously, surrounding light stimuli were sent, to which the examinee must generate reactions. An additional USP serial port on the computer for connection was required for the unit.

The Peripheral Perception Test (device) consists of the following three components: main apparatus, which consisted of an external surround screen (in the form of two wings), consisting of: a matrix of small LED Matrix lighting, with 8 rows and 64 columns on each side (from the right-wing and the left-wing), a light stimulus from the central field of vision to the peripheral field of vision and ultrasound distance meter which recorded the position and distance of the head of the participant in front of a computer screen. The distance of the head of the participant should not exceed the allotted distance for him, which ranges between 40-60 cm, as shown in the figure 1.



Figure 1. Peripheral Perception device.

The Peripheral Perception Test (device) also consisted of a Response Panel, Universal. It is a comprehensive keyboard (input panel) used by the participant to respond the Vienna Test System as well as and to all the tests in that system, including the ocean perception test. This panel consists of various parts and components, which included seven colored keys (red, blue, yellow, green, white, gray, black), ten numbered keys (1, 2, 3, 4, 5, 6, 7, 8, 9, one sensor switches (golden color), two calibration knobs (white), two standard joysticks, the ability to connect the board with foot pedals connected to the computer via a USB type socket. This is showed in figure 2.



Figure 2. Response Panel, universal.

In addition to the aforementioned universal keyboard, digital foot pedals (the right foot bears the symbol R, and the left foot bears the symbol L) were also placed on the ground in front of the participant to record their activities and apply the scale. These pedals were usually connected to a special socket located on the backside of the aforementioned universal keyboard as shown in the figure 3. These pedals were used in tests that require pressure in two positions: “on” and “off”. In other words, tests that require double-click, including the ocean perception test, and there were many other tests that worked within the Vienna testing system that required this type of pedals



Figure 3. Digital Foot Pedals.

The participant was asked to be seated in a way that his/her eyes were leveled to the green markers to the right and left of the frame of the perception device unit. The researcher was also in the sitting position in a way that the head of the researcher (the horizontal position of the middle of the eyes) was facing the middle of the frame (the blue indicator on the frame). The metal (the square base that holds the perimeter-perceived device and is placed on the table) must be within the level of the edge of the table, and that the computer screen was central and centered within the square metal frame of the device (Figure 4).

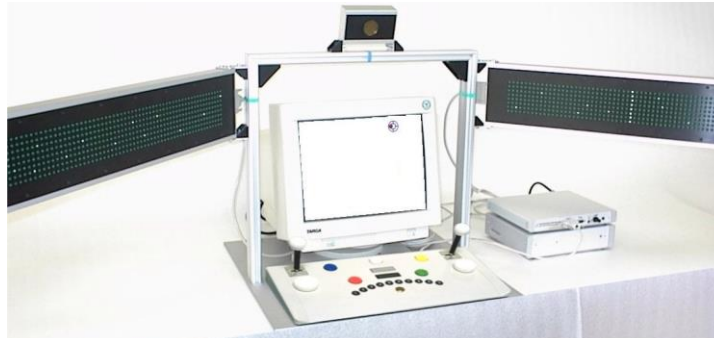


Figure 4. Correct setting and positioning of the peripheral perception device.

At the start of the examination, participant was made to sit in a comfortable position. A photo stimulus which occurs by emitting signals emerging in the device - will move at a predetermined speed (when changes occur). On the foot pedal placed under the foot of the participant on the floor. Followed by this, the participant was asked to look at the at the computer screen with full focus on the center of the screen, which should be separated from it (40-60 cm). When the examinee moved less or more than the permissible distance, an alert appeared on the computer screen to alert the examinee to return within the standard range. Then the device measured the angle of view of the examinee's total field of view, as shown in the figure 5.



Figure 5. One of the subjects of the sample conducting the peripheral perception test.

Each test applied within the VTS system, including the research tools (peripheral perception) and (mental stress), passed through three main stages, namely instruction phase, practice phase and the test phase. In the instruction phase, each participant was given step-by-step instructions and all the necessary information about the test. A set of instructions included the difficulties that a participant may encounter the method of using comprehensive keyboard, the method of using foot pedals, etc. Practice phase is the phase that follows the instruction phase in which the examinee is trained regarding the process of response to test by giving some illustrative examples. The exercise program was stopped in case of any mistake done by the participant or failing to give any response within the period of 5 minutes and further instructions were given to the participant. Followed by

this, the test implementer may take appropriate measures, either by repeating the entire stage again, or returning to the stage of instructions. The last phase was the test phase, that directly followed the exercise phase in which the rotary knob on the comprehensive response panel (aforementioned) was used with the right or left foot pedal as desired, provided that the examinee was made aware regarding avoiding using both pedals at the same time.

Followed by the completion of the test phase, the results were computed in the form of standard T-Scores and Z-Scores relative sequence PR- percentile Rank for each paragraph with the time it takes to answer the test, showing the detailed profile test based on the standard grades.

The primary experiment was conducted inside the psychological laboratory within the timeframe of March 2013 to May 2013. The sample members were trained regularly and sequentially, and the work steps within the training process conducted by the system before the start of each test were clarified successfully.

2.3. Statistical analyses

The statistical analysis was done using the Statistical Package for the Social Sciences (SPSS) by computing arithmetic mean, standard deviation and percentage. In the present study, the Kruskal-Wallis H test, which is considered as an alternative to the one-way analysis of variance in parametric tests, was implemented. This test depends on the H distribution, which is very close to the chi-square distribution and is used to test more than two independent samples (Jooda, 2008).

3. RESULTS

Table 1 presents the results of divided attention of the volleyball players of the sample according to their specializations. The highest (the best) value of divided attention was found in the setter (94.375), while the lowest value of divided attention was found in the libero (86.25).

Table 1. Divided attention of volleyball players according to their specializations

	Libero/Free	Setter	Outside Hitter/ Left Side Hitter	Middle Hitter	Opposite Hitter/ Right Side Hitter	TOTAL
Mean	86.25	94.375	90	91.875	86.875	89.875
SD	9.24211	8.26009	5.40062	14.63087	15.05199	10.40227

Table 2 presents the results of reaction time of the volleyball players of the sample according to their specializations. The highest value of reaction time was found in the middle hitter (0.7075), while the lowest (the best) value of reaction time was found in the setter (0.5125).

Table 2. Reaction time of volleyball players according to their specializations

	Libero/Free	Setter	Outside Hitter/ Left Side Hitter	Middle Hitter	Opposite Hitter/ Right Side Hitter	TOTAL
Mean	0.5525	0.5125	0.6175	0.7075	0.63	0.604
SD	0.02872	0.00957	0.005	0.04031	0.06	0.0757

A statistically non-significant difference was found in the volleyball players according to their specializations in the divided attention variable, and a statistically significant difference was found in the volleyball players according to their specializations in the reaction time variable (Table 3).

Table 3. Results of Chi-Square for the variables divided attention and reaction time

	Mean	SD	Degree of freedom	Chi-Square	p
Divided attention	89.875	10.40227	20	3.263	0.515
Reaction time	0.604	0.0757	20	16.28	0.003

4. DISCUSSION

Based on the statistical analysis and comparison between groups, the researchers stated that the divided attention variable of the research sample was related to the ability of the players to narrow or expand the focus of attention during their performance during the game, where the narrowing represents the focus of attention towards one topic (Marsh et al, 2002).

Psychological, motor and mental functions of a player are key functions that contribute to the assimilation and acquisition of habits and motor abilities in many activities among players that require accurate estimation of spatial, temporal and kinetic relationships. The sensory receptors for perception are responsible for changing the position of the body in the internal environment as well as in the external environment (Adel, 1998). Based on this theory, the researchers believed that all centers of volleyball players need to be expanded. The attention should equally be directed towards the ball, towards his/her own team and towards the opposing team.

Khalaf (2003) in their study stated that “whenever the process of receiving the transmission is carried out in an accurate and elaborative manner, the possibility of the success of the numbers for the attack gets higher because most of the skills depend on the process of receiving the transmission, and good delivery helps to prepare the ball and make various offensive plans”.

Many studies have been conducted by various authors that have proven the effect of training (practice) on divided attention. A similar study was conducted by Hirst et al (1980). In their study, the authors provided training to a group of university students to read a story silently, and simultaneously write words that are recited to them from the researcher. Authors found that a certain level of difficulty was encountered by the students in performing two tasks simultaneously. They also found that their reading speed decreased significantly and their writing was disorganized. Followed by the training of six weeks, the reading speed of the students reached to a level and handwriting was also organized and improved. The long term training of the students further helped them in dividing their attention and as a result they were able to categorize the words they were writing (e.g. they write the word 'fruit' when they hear the word 'apple') without any delay in their reading speed. According to Best (1986), training (practice) changes the limits of ability and capacity for attention.

Based on the statistical analysis and comparison between groups, the researchers stated that significant differences were found for reaction time according to the specializations of the players. Justifying the findings of the study, the researcher stated that the variable of motor response speed has a relationship with the type of stimulus, the player's situation and his/her sensory abilities, as well as the direct reaction time relationship with the ability of the muscular and nervous systems to work with a high degree of speed of muscle contractions, which is an important factor in sports that require muscle contraction and relaxation in a short period of time. This theory is also applicable for the volleyball skills as they are performed very quickly and in a short period of time.

5. CONCLUSIONS

Based on the findings of the study, the researchers concluded that a statistically non-significant difference was found in the volleyball players according to their specializations in the divided attention variable, and a statistically significant difference was found in the volleyball players according to their specializations in the reaction time variable. Considering the results of this study, the authors recommend the use of the Vienna test system as a basis for selecting volleyball players. It is also recommendable to conduct similar studies on more samples of young volleyball players to detect early strengths and weaknesses in their mental abilities.

6. REFERENCES

1. Adel, O. (1998). *The effect of developing some sensory-motor perception variables on learning breaststroke*. Master's thesis, University of Jordan, College of Physical Education.
2. Best, J. B. (1986). *Cognitive Psychology*. West Publishing Company, St. Paul, Minnesota, U.S.A.
3. Hirst, W., Spelke, E. S., Reaves, C. C., Caharack, G., & Neisser, U. (1980). Dividing attention without alternation or automaticity. *Journal of Experimental Psychology: General*, 109(1), 98-117.
4. Jooda, M. (2008). *Advanced statistical analysis using SPSS*. Dar Al-Awael Publishing, Damascus, Syria.
5. Khalaf, N. Z. (2003). *A training curriculum for kinesthetic awareness and its impact on developing the performance level of defensive skills in volleyball*. Master's thesis, Diyala University, College of Physical Education.
6. Mahjoub, W. (2002). *The principles of scientific research and its methods*. Amman, Dar Al-Mahraj for Publishing and Distribution.
7. Mahjoub, W., & Al-Badri, A. (2002). *Scientific research*. Babylon University Press.
8. Marsh, R. L., Hicks, J. L., & Davis, T. T. (2002). Source monitoring does not alleviate (and may exacerbate) the occurrence of memory conjunction errors. *Journal of Memory and Language*, 47(2), 315-326.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no external funding.

COPYRIGHT

© Copyright 2022: Publication Service of the University of Murcia, Murcia, Spain.