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Research Paper

Evaluation of the Skill Performance Level of Students in the 110-Meter Hurdles Event According to The Cerebral Dominance of The Two Hemispheres of The Brain

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ABSTRACT

The concept of brain dominance has witnessed extensive studies on the way the human brain deals with it, which is the largest part of the brain, the center of higher mental processes, as the brain consists of two identical halves connected by a large mass of nerve fibers called the corpus callosum. The right half controls the left side, while the left half controls the right side of the body. After the controlling hemisphere, the hemisphere directs behavior and is the basic nucleus on which it is built. The concept of brain dominance means that sensory information enters a large space into one of the two halves of the brain, and this hemisphere is the one that integrates with it and operates it, so that behavior is directed in light of that. Accordingly, the problem of the study came through studying the brain dominance of the brain and determining which of the two halves is based on the mechanisms of analyzing and constructing the stimuli coming to the brain, one of the important foundations for achieving compatibility in the requirements and important features in selecting players, whether on the physical, functional or mental level, due to what the effectiveness of hurdle running requires in terms of elements of creativity, motor coordination, physical abilities and innovation in the technical requirements of performance. Here we can ask the following question;

Does brain dominance have an impact and reality in determining the level of skill performance of students in the 110-meter hurdles effectively?

In light of the above, the research objectives were formulated as follows:

- Classification of the researched sample according to brain dominance.
- Statistical description of the sample according to their classification by brain dominance.

For the research methodology, the researcher utilized the descriptive method along with the standard grading system. The sample of research was chosen at random from the community of research, this represented the second stage of students for the academic year 2023-2024, the numbering (173) was then assigned in a random manner. About the statistical methods employed, the researcher discussed a cohort of them in order to facilitate his endeavor and achieve his objectives. From the aforementioned, the researcher deduced conclusions that were of greatest importance, these were:

- The sample came in varying proportions of brain dominance patterns and were distributed among the three patterns (right, left, integrated).
- The sample achieved varying proportions in the level of skill performance in the effectiveness of running hurdles 110 meters according to the brain dominance patterns that the sample members enjoy.

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1. INTRODUCTION

Today's world is witnessing a dramatic increase in all aspects of life, including the physical education and sports sciences specifically. The degree to which sportspeople have improved their performance has generally increased in all sports, according to the principle of integrating knowledge, information and scientific principles based on multiple sports sciences like sports training and motor learning. These principles have taken a new approach to keep up with the current trends in education, training and employment, then connected them with the practical side to bring the individual to a global level. Learning sports skills is directly connected to the central nervous system and requires the utilization of the brain, the difference between the functions of the two hemisferges of the human brain, as documented in science and literature, is that the brain is said to be sovereign in humans, this is one of the most important topics in the field of thinking and learning and has not been sufficiently studied in the sports field.[1] The concept of brain dominance has witnessed extensive studies on the way the human brain deals with it, which is the cerebrum, which is the largest part of the brain, the center of higher mental processes, as the brain consists of two identical halves connected by a large mass of nerve fibers called the corpus callosum. The right half controls the left side, while the left half controls the right side of the body. After the dominant hemisphere, the half that directs behavior is the basic nucleus on which the concept of brain dominance is built, which means that sensory information enters a large space into one of the two halves of the brain, and this half is the one that integrates with it and operates it so that behavior is directed in light of that. The desire to investigate the functionality of the two halves of the brain has increased as a result of the increasing popularity of mental abilities, particularly thinking abilities, and their association with academic success and learning processes, this has helped educators and those in charge of the educational process to understand the full range of the learning process [2]. For (Fatima Ali El-Dosari, 2002), studies involving this field have demonstrated that the two halves have different higher mental abilities. The left hemisphere has a verbal, analytical, and logical function, while the right hemisphere is specialized in recognizing and maintaining models of sensory and visual responses that lead to creativity, as well as functions related to intuition, emotion, and conscience [3]. You discover that one half has a superior performance in certain functions, so the concept of control is employed to describe the presentation of labor between the two halves. Brain control is the process by which the nerve centers in one of the halves are more active and have a greater influence on the behavior of the individual than the nerve centers in the other hemisphere. The left hemisphere is typically dominant in the activity of individuals, this is apparent in the utilization of the right body parts by the majority of individuals in writing, eating, and other activities, while the right hemisphere will typically participate in some of the actions of individuals, this is evident in the utilization of the left body parts by individuals in writing, eating, and other activities. The control is often shared between the two halves, this indicates the presence of an integrated pattern. Athletics is one of the games that are based in their development on other sciences, most notably testing, measurement and sports training. By employing these sciences, the level of digital achievement of these events can be developed and an advanced digital level can be achieved in line with the physical requirements of the movement or event to be studied. The continuous scientific development and advancement witnessed by the world in general and the Arab world in particular has had a major impact on the development of all fields, including the sports field. The best evidence of this is the achievements and renewed global numbers in all sports games and events. Among these games is athletics, especially the 110-meter hurdles event, as the performance in it has reached the point of dazzle and enjoyment during the Olympic and international championships. The technical performance of the 110-meter hurdles event is characterized by diversity, comprehensiveness and quick response to muscle work within a compatible framework. The nature of the performance it depends on the nature of agility, flexibility, and compatibility to show the beauty of the motor performance as well as creativity and innovation. Between physical abilities and motor sense in a way that achieves the requirements for the technical performance of the 110-meter hurdles event.[4]

Attention should be paid to developing the student's sense and ability to control the shape of his body while crossing the hurdle and also focusing on the three steps between one hurdle and another. In the 110-meter hurdle race, the fastest runners follow the three-step method, which means that there are three large steps followed between each hurdle and the action. This requires the runners to take long steps and maintain their speed throughout the race. If the student feels that he is starting to slow down during the three steps, this may be an indication that he is unable to take these steps between all the hurdles, and perhaps he should cover this distance using the four- and five-step method. In the case of covering the distance between the hurdles in three steps, the student will use the same first leg to cross all the hurdles.[5] However, if he covers the distance between the hurdles in four steps, he must change the first leg at each hurdle. Accordingly, the methods that the student relies on to organize and coordinate information about the technical construction of basic skills and the very precise details they include require the teacher to have a basic and complete idea about the level of awareness the student possesses to achieve these requirements and to know the effectiveness of the systems of receiving the means of information that flow through the various sensory channels and others to provide We have a clear idea about how to organize information to manage and build it in memory and whether these mechanisms are compatible with the nature of the motor duties required for training in the skill of technical performance to cross obstacles. Accordingly, the researcher sought to shed light on the importance and role of the cerebral dominance of the two halves of the brain and its impact on the success of skill

performance according to what the learner enjoys of mental specifications to match the specifications of the dominant half in processing the sensory stimuli that are transmitted to the brain and thus to clarify the extent of the possibility of dealing with it in this type of sport.

Research Problem

Studying the brain's cerebral dominance and determining which of the two halves the mechanisms of analyzing and constructing stimuli coming to the brain are based on is one of the important foundations for achieving compatibility in the requirements and important features in selecting players, whether at the physical, functional or mental level, due to the elements required by the hurdles running event in terms of creativity, motor coordination, physical abilities, and innovation in the technical requirements of the performance. Here we can ask the following question:

Does cerebral dominance have an impact and reality in determining the level of skill performance of students in the 110-meter hurdles running event?

2. RESEARCH OBJECTIVES

1. Classifying the sample studied according to cerebral dominance.
2. Statistical description of the sample according to their classification by cerebral dominance.
3. Setting standard grades and levels according to the sample classification according to cerebral dominance.

Research hypothesis

The sample is distributed in varying proportions according to cerebral dominance.

Research field

Human field: Second-stage students in the College of Physical Education and Sports Sciences, University of Babylon, for the academic year 2023-2024 AD

Time field: 11/1/2023 to 4/15/2024

Time field: The classroom and the outdoor stadium of the College of Physical Education and Sports Sciences/University of Babylon.

3. RESEARCH METHODOLOGY & FIELD PROCEDURES

Research Methodology: All scientific research resorts to solving its problems by choosing a method that is compatible with the nature of the problem based on the fact that the method: "is the method or style that the researcher follows in his research and study of his problem and reaching solutions to it". The researcher must use the descriptive method with the survey and standard studies methods that are appropriate to the nature of the problem"[6].

Research community and sample

The research community was determined by the second-stage students in the College of Physical Education and Sports Sciences - University of Babylon / for the academic year 2023-2024. The research sample was selected by (69) students using the simple random method (lottery).

Tools used in the research

- Opinion poll form.
- Linen measuring tape with a length of (50) meters.
- Legal barriers, number (20) barriers.
- Athletics field.
- Torrance scale for brain sovereignty.

Field research procedures

1. Main experiment

1.1 Field research procedures

1.1.1 Technical performance evaluation form for the 110-meter hurdles running event for students

1. Hurdle crossing test

Name of the test: Performance evaluation for the hurdle crossing stage

Purpose of the test: Performance evaluation

Tools used: Determining the performance evaluation form for the skill of crossing the hurdle. The researcher prepared a survey form (see Appendix 1) by dividing the appropriate percentage of grades for the technical performance sections according to what was stated in the form. The forms were distributed to a group of experts and specialists, whose number is (13) experts. After that, the researcher unloaded the results of the forms and using Law (215), the division that resolved the agreement percentage greater than (85%) was nominated if the calculated value of (Chi-square) was greater than its tabular value at a degree of freedom (1) and a significance level of (0.05), as shown in Table (1).

Table 1: Experts and specialists explain the value of Chi-square

Skills	Division of the degree	Number of experts				Chi-square		Statistical significance
		Agree	%	Disagree	%	Calculated	Tabulated	
Technical performance stage crossing the barrier	First division (3_4_3)	1	7.69	12	92.30	9.30	3.84	Non-moral in favor of non-approvers
	Second division (4_4_2)	0	0	13	100	13		Non-moral in favor of non-approvers
	Third division (3_5_2)	12	92.3	1	7.69	9.30		Sig.

From this, the division (3_5_2) was nominated to evaluate the technical performance of the barrier crossing stage.

4. RESULTS & DISCUSSIONS

Biorhythm patterns of the research sample

By comparing the percentages achieved for the research sample degrees in their patterns of cerebral dominance, we find that they indicate the presence of a difference in the patterns. If the sample is distributed into three patterns (right, left, integrated), the left pattern comes with the highest percentage. To reinforce this matter, the researcher tested this distribution statistically using the (Chi2) test, and from it, the results confirmed what he reached, as the calculated (Chi2) values came, respectively (13.52, 16.88), which are greater than their tabular value of (3.84) at a degree of freedom (1) and a significance level of (0.05), and this indicates that the two distributions (observed and ideal) do not match.

Table 2: Shows the numbers and percentages of the research sample items in the patterns of cerebral dominance

Variable	Right		Left		Integrated		Calculated value of (Chi-square)
	N	%	N	%	N	%	
Morning	**27**	**39.13**%	**33**	**47.82**%	**9**	**13.04**%	**13.52**

Standard scores for the results of the skill performance level in the 110-meter hurdles event. The researcher seeks to know the levels of the research sample members to evaluate the level of students' performance in the 110-meter hurdles event, which is enjoyed by students in the second stage/College of Physical Education and Sports Sciences. Therefore, this measurement must be unified by converting the raw scores resulting from the tests into standard scores and from there to the standard levels of the research sample members in each of the brain dominance patterns, which facilitates the process of evaluating the students' skill performance level if the research sample members are on. For the researcher to be able to obtain the standard scores, the following law was used:[7]

$$Z = x\text{-}\bar{x}/y$$

From this, the researcher extracted the raw scores for skill performance. Extract the arithmetic mean and standard deviation and place them in the standard table. After converting the raw scores to standard scores and placing them in a special table, the researcher can extract any standard score for any of the raw scores that the students obtained in any of the tests they underwent... In the following, Table (2) shows the standard scores for the research sample individuals. The researcher did not stop at this point, but his presentation went beyond the standard levels. He had to place three standard levels starting from (good, average, and weak) on the basis that every two standard scores from the decimal division of the standard scores and below one level except for the middle level with three standard scores. For example, the standard score (1,2) has a (weak) level. Standard levels according to the brain dominance patterns of the research sample individuals. By comparing the percentages achieved for the research sample scores in the level of skill performance and according to the classifications (good, average, weak) and in each standard level with what it represents from the percentages in light of the ideal distribution. The above percentages are close to the ideal percentages for the area under the moderate curve, and from this, we find that the distribution of the sample items in the level of skill performance and according to the pattern of brain dominance they enjoy came somewhat identical to what it is supposed to be, and this is an indicator that expresses according to the distribution. To reinforce this matter, the researcher tested this distribution statistically with the (Chi2) test, and from it the results confirmed what he reached, as the calculated (Chi2) values came (to 1.44) which is less than its tabular values which amount to (5.99) at a degree of freedom (2) and a significance level (0.05), and this indicates the matching of the two distributions (observed and ideal).

Table 3: Shows the numbers and percentages achieved for the research sample items in the level of skill performance according to brain dominance

Variables	Good		Medium		Weak		Calculated value of (Chi-square)
	N	%	N	%	N	%	
Left	**3**	**9.09**	**26**	**78.78**	**4**	**12.12**	**1.09**
Right	0	**0**	**18**	**66.66**	**9**	**33.33**	**2.58**
Integrated	**1**	**11.11**	**5**	**55.55**	**3**	**33.33**	**1.44**

The right half of the brain processes the suspension of movement space and non-verbal sounds such as music and is distinguished by faces and shapes. It deals with complex and complex relationships. Therefore, we find that those working in the field of planning use the right half more than the left half. It specializes in responding to visual and moving instructions using imagination in processing information perceiving musical tones dealing with several problems at the same time and innovating in solving problems and providing a lot of information through representation and movement and understanding new and unspecified facts. A brain injury in any of its cells leads to various disorders. A right half injury leads to a loss of spatial ability and loss of sense of time disorders in following information and the inability to recognize shapes,

sizes, distances, and directions.[8] Studies and research confirm that the processes of pronunciation and word formation are the responsibility of the left half of the brain, which is the dominant half that is often dominant. A person who has left-brain dominance has a high ability to absorb and is more inclined and organized. This is derived from a group of different studies that confirmed this idea. These studies confirmed that this person, despite his high ability to absorb, is characterized by weakness in remembering Numbers and shapes, and its distinction in emotional and social maturity.[9] The characteristics and functions of the left hemisphere include recognizing and denying names, responding to verbal and serious instructions, order, and planning to solve problems logically with a tendency to understand facts objectively and deal with one problem at a time that the injury of the left hemisphere leads to disorders in movement,[10] writing, arithmetic ability, failure to recognize colors, and language disorders and that the fact that each hemisphere of the brain is responsible for actions in this part of the place does not mean functional independence of the two hemispheres of the brain, i.e. there is no sharp separation between the two hemispheres of the brain,[11] as one of them completes the other and they interact in clarifying our perception of the world, and despite this interaction, the predominance or control in some situations is for one of them at the expense of the other and the dominant or prevailing pattern is known.[12]

5. CONCLUSIONS

1. The sample came in different proportions of brain dominance patterns and was distributed among the three patterns (right, left, integrated).
2. The sample achieved different proportions in the level of skill performance in the 110-meter hurdles event according to the brain dominance patterns enjoyed by the sample members.
3. The students who enjoy the left pattern showed superiority in their level of skill performance compared to the rest of the students who enjoy the other patterns.

6. RECOMMENDATIONS

1. It is necessary to rely on the results of the current study because of its great importance to the dominance pattern in the lives and production of students in the College of Physical Education and Sports Sciences.
2. It is very important to evaluate the skill performance in the athletics events of students periodically to show the real levels and according to other variables they have.

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