

РОЗДІЛ 8. ТЕОРІЯ НАВЧАННЯ

COMPARATIVE STUDY OF THE EVOLUTION OF ATTENTIONAL ABILITIES IN TWO CLASSES FROM PRIMARY CYCLE IN WHICH CHESS IS STUDIED

ПОРІВНЯЛЬНЕ ДОСЛІДЖЕННЯ РОЗВИТКУ УВАГИ ДВОХ КЛАСІВ ПОЧАТКОВОЇ ШКОЛИ, З РОЗДІЛУ ПРОГРАМИ ШАХИ

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Stegariu V.I.,
 Assistant Lecturer at Faculty of Physical Education and Sports
 Alexandru Ioan Cuza University of Iași

Abalașei B.A.,
 Dean and Professor at Faculty of Physical Education and Sports
 Alexandru Ioan Cuza University of Iași

Hakman A.V.,
 Doctor of Science of Physical Education and Sport,
 Professor at the Department of theory and methods of physical education
 Yurii Fedkovich Chernivtsi National University

Medvid A.M.,
 Lecturer at the Department of Physical Culture and Basics of Health Studies
 Yurii Fedkovich Chernivtsi National University

Chess is an extremely simple game because the general rules are well defined and during a tournament nobody can interfere in one's game. Besides this, due to the fact that a game of chess is played under time pressure, he must evaluate the position precisely in a very short amount of time. Every cognitive skill required in a professional chess game likely transfers to other related fields where comprehension, analysis, memory, attention and evaluation of complex phenomena is required. Chess requires cognitive abilities and sophisticated problem-solving skills, thus providing a good opportunity to study the mechanisms underlying cognitive expertise. Researches have shown that during a chess game the frontal and posterior parietal area, which are specialized in orienting and maintaining attention, perception and short-term memory are used with predilection. Objective. The objective of this research is to highlight how chess practice influences the development of specific skills so much needed to improve the educational process. Methods of research. In this experiment we observed the level of attentional abilities of two classes in the primary cycle who study chess as an optional subject. The Kraepelin and Toulouse-Pieron tests were used to quantify the level of students in the two classes. These are the initial results that will be completed by the final ones before the end of the second semester. We tested 38 first grade students from a school in Iași County. They represent the collectives of two parallel classes that study chess as an optional subject for one hour each week. Both classes were evenly matched, 19 children each, but their composition differ. First class, named I A have 10 boys and 9 girls, meanwhile I D have 11 girls and 8 boys. Results. The results recorded by the two groups show similar values in both tests. We used the independent sample t-test to show that there are no statistically significant differences. The dispersion of the results within the groups presents the differences of the characters of the two collectives.

Key words: chess, children, attentional abilities.

Шахи – це надзвичайно проста гра, тому що загальні правила чітко визначені, і під

час турніру ніхто не може втрутатися в гру. Крім того, через те, що гра в шахи відбувається під тиском часу, він повинен точно оцінити позицію за дуже короткий проміжок часу. Усі когнітивні навики, необхідні в професійній шаховій грі, швидше за все, переносяться в інші суміжні галузі, де потрібні розуміння, аналіз, пам'ять, увага та оцінка складних явищ. Шахи вимагають когнітивних здібностей і складних навичок розв'язування проблем, що дає хорошу можливість вивчати механізми, що лежать в основі когнітивного досвіду. Дослідження показали, що під час шахової гри з ухиленням використовуються лобова та задня тім'яна область, які спеціалізуються на орієнтуванні та підтримці уваги, сприйняття та короткочасної пам'яті. Об'єктивний. Мета цього дослідження – висвітлити, як шахове заняття впливає на розвиток конкретних навичок, настільки необхідних для покращення навчального процесу. Методи дослідження. У цьому експерименті ми спостерігали за рівнем розвитку уваги двох класів початкового циклу, які вивчають шахи як факультативний предмет. Для кількісної оцінки рівня учнів у обох класах були використані тести Крепеліна та Тулуз-П'єрона. Це початкові результати, які будуть завершені до кінця другого семестру. Ми протестували 38 учнів першого класу зі школи Яссського повіту. Вони представляють колективи двох паралельних класів, які вивчають шахи як факультативний предмет протягом однієї години щотижня. Обидва класи були рівномірно підібрані, по 19 дітей, але їх склад відрізняється. Перший клас, названий I A, має 10 хлопчиків і 9 дівчат, у той час як I D має 11 дівчаток і 8 хлопчиків. Результати. Результати, зафіксовані двома групами, показують подібні значення в обох тестах. Ми використали t-критерій незалежної вибірки, щоб показати, що немає статистично значущих відмінностей. Розподіл результатів у межах груп показує відмінності характерів двох колективів.

Ключові слова: шахи, діти, здібності до уваги.

Target setting in general and its connection with important scientific or practical tasks. The game of chess is accessible for all ages. Learning the general rules takes a little time, but its depth requires a large amount of time spent in front of the board. The chess player should be aware of the fact that he needs to comprehend the characteristics of the positions and also to be able to recognize well-known theoretical patterns. Chess is an extremely simple

game because the general rules are well defined and during a tournament nobody can interfere in one's game [12]. Besides this, due to the fact that a game of chess is played under time pressure, he must evaluate the position precisely in a very short amount of time. Every cognitive skill required in a professional chess game likely transfers to other related fields where comprehension, analysis, memory, attention and evaluation of complex phenomena is required [3].

Analysis of recent research and publications.

Distributing attention involves deliberately or reflexively setting priorities. Man is part of an environment super crowded with stimuli. At every moment of our lives, a significant number of sensory stimuli, often randomly distributed and with an unpredictable development, forces the analyzers to receive them. Our ability to process the information to which we are exposed either willfully or unintentionally is limited. According to some research, every second of life, about 100,000 bits of information bombard us by the analyzers who, on a conscious level, can process only a small amount, between 25 and 100 bits.

Masters access information in long-term memory immediately through familiar constellations of pieces on the board, the patterns acting as hints that trigger access to the information chunks. Thus, in blitz games, with short time for making decisions, this memory retrieval mechanism could be automatically activated, causing a quick response. Right hemisphere is slightly higher activated than left hemisphere during both, blitz and classical chess games [13].

Presentation of basic material of the research.

Besides this large set of cognitive abilities, chess requires a well-developed visuo-spatial ability. When a player is calculating different lines, he is representing future developments inside his head and this improves prophylactic thinking [4]. No external help is allowed during the game and this forces the player to have a concrete and detailed image of the board and of the possible transformations that might occur for the entire game.

Thinking is the pinnacle of processing and assimilating information about both the environment and the internal one. Thanks to this process humanity has been able to evolve to the present stage and will continue to do so further. Through it it is possible to move from the particular character of things to the general, from simple to complex or from necessary to essential. A thought model has a structure based on ideas with which we assimilate the information received empirically and we manage to form representations of objects from the environment. The scheme created is not the faithful copy of the object, we would not need all its features, the mind recording only the fundamental characteristics. We can say that the formed representations are only an approximation of the reality in which we live, an approximation devoid of most of the details that our mind has labeled as useless. Thinking plays an essential role for all people in everyday life. The way we think shapes our actions and defines our daily existence. It helps us to establish the goals on the basis of which we make decisions [2]. The mind can be compared to a neural computer, which has as its operating system a large number of algorithms based on causal and probabilistic reasoning about the elements of the environment.

The role of thinking in the practice of chess is obvious, practically, the game represents a mental struggle between two opponents, and the weapons are the notions previously assimilated. Their operationalization is present both in the pre-competition trainings and during the games. Hazard only arises when impulsiveness and too great a desire to win take the place of thought. Statistics have revealed a close connection between regular practice of chess and life expectancy. Thus, many chess players manage to reach the age of 80, 90 or even 100 years. It has been shown that the constant neural activity, specific to the superior cognitive processes such as thinking, memorizing or distributing attention during the chess game, produces an engaging of the entire nervous system. This alteration produces adaptations that are felt throughout the body, as the brain creates systems for the regulation and self-regulation of physiological functions. The more complex the logical thought process is, the more axons-type neural formations – dendrites – synapses are used.

Several researchers have tried to explain how chess helps children's intellectual development and most of them find interesting results. Different cognitive abilities were improved such as spatial orientation [9], general intelligence [5] and attention [8; 14]. Because these abilities are used in the teaching process, some researchers have decided to observe how the children who play chess are doing in the subjects that are somehow similar to the game like mathematics [2; 6; 11] and the results were promising. A justification for this correlation is the link between similar situations that occur during a game of chess and solving a mathematical problem. In order to play a good game, the player should be able to maintain a high level of attention and concentration on a task, to identify the details and recognize the patterns from different situations and apply them [11]. There is also a need to be critical on own actions in order to fix the problems and improve the quality of the play. Somehow, due to the nature of chess, one is taught this lesson anyway because every bad decision taken during a game can, and at professional level will be punished by the opponent. The game of chess has extremely simple rules, but the depth of it can mimic the real world and this makes it so great [12].

This competitiveness has its drawbacks and one of the main risks is the mental and physical fatigue. Every professional player should be in an outstanding physical condition because during competitive chess the mental fatigue which occurs in the latter stages of the game begins with deprivation of glycogen [14].

The role of attentional skills and the ability to cope with pressure were described as the main factors towards performance [10]. The game of chess requires a high level of attentional abilities and this can be said also about the educational process. Today's children are used to concentrate their attention on

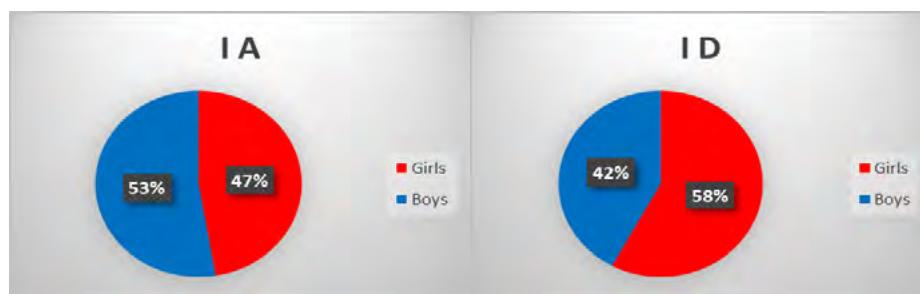


Figure 1. Classes composition

more activities at the very same time and this is possible primarily due to the fact that they are surrounded by technology. This indirect training has its drawbacks and the most dangerous thing is the fact that they may become superficial due to the inability to maintain attention on an important task. During the game of chess, it is necessary to channel attention and maintain focus on a situation for a long time [11]. This exercise is repeated with each game played, and if it is neglected, then the game will result in a loss. The prompt mechanism of receiving feedback forces the child to acquire this ability to distribute and maintain attention towards an important element.

Methods. We tested 38 first grade students from a school in Iași County. They represent the collectives of two parallel classes that study chess as an optional subject for one hour each week. Both classes were evenly matched, 19 children each, but their composition differ. First class, named I A have 10 boys and 9 girls, meanwhile I D have 11 girls and 8 boys.

The students performed two tests, the Kraepelin and Toulouse-Pieron tests. Both of them aim at observing and analyzing the attentional abilities, but, because of their different form, they reveal distinctive cognitive elements. In the case of the Kraepelin test, the child is obliged, by channeling attention to this task, to perform a simple mathematical operation and to identify as many identical cases as possible. Their work was limited to 5 minutes. In the case of the Toulouse-Pieron test, students only had to find shapes identical to those of the model in the worksheet without the need to think. Maintaining attention and concentration was done for 10 minutes.

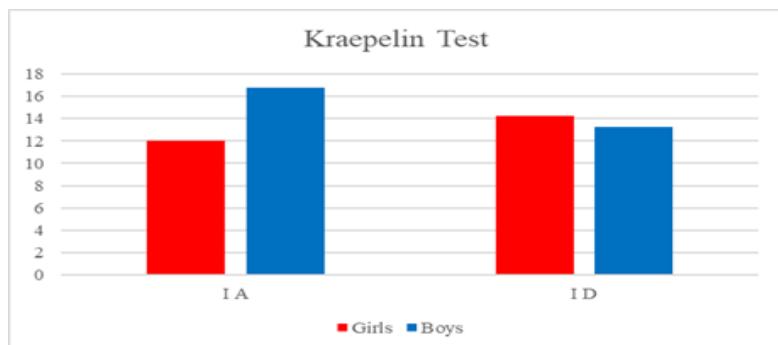


Figure 2. Descriptive statistics

Results

In figure 2 we can see the results obtained by the 2 classes in the Kraepelin test. Within the same class we highlighted the differences by gender. The boys from I A recorded the best results and the difference between them and their colleagues is significant. In the other class we can see two, almost evenly matched results, with a small edge in favor of the girls. In both classes, the gender who obtained higher values (boys in I A; girls in I D) was better represented within the group (10 boys out of 19, respectively 11 girls out of 19). Although the distribution within the two classes differs completely, the average recorded by them is approximately equal (14.52; 13.84).

In the case of the Toulouse-Pieron test, which is presented in figure 3, a uniformity of the results was highlighted. In both groups, the girls recorded higher values. In this situation, the gender differences within the groups influenced the average results in favor of class I D ($80.68 < 85.63$). Even so, the difference is not statistically significant ($p=0.322$ and $p=-0.467$).

Table 1

Presents the descriptive statistics of the two groups

Variables	I A	I D
N	19	19
Gender (Boys; Girls)	10; 9	8; 11
SD (K; T-P)	5.86; 30.72	7.18; 34.41
M (K; T-P)	14.53; 80.68	13.84; 85.63
CV (K; T-P)	40.33; 38.07	51.89; 40.19

K, Kraepelin; T-P, Toulouse-Pieron; M, mean; SD, standard deviation; N, number of subjects; CV, coefficient of variation.

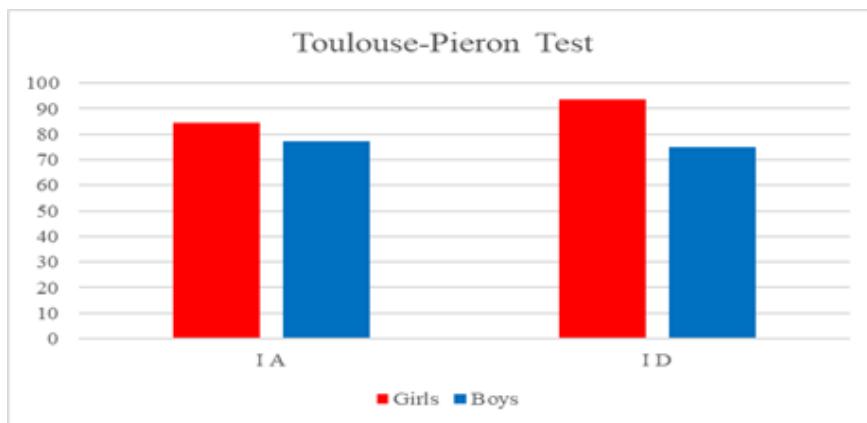


Figure 3. Toulouse-Pieron test results

Conclusions and research perspectives.

The two tests assess students' attentional abilities but in different circumstances. The Kraepelin test challenges the child to perform a simple mathematical operation in a limited time (5 minutes). In this case, the maintenance of attention is triggered by the involvement of thinking, so the children who developed the speed of this process, recorded a better score. In the case of class I A, the boys managed to get a promising result. Class I D provided a balance between the two results, with a small plus for girls. The Toulouse-Pieron test differs from the previous one in the simple fact that it does not involve the thought process. In this case, the child is forced to maintain attention and concentration on a simple task for 10 minutes. The fact that the process of identifying similar squares involves a routine and has no demanding elements, affects the ability to maintain attention. It should be noted that the average age of the classes (7.63, 7.68 years) implies that their spatial-temporal ability to is still poorly developed. Also, the only observation regarding the conduct of the test is that it lasts longer than the previous one. In this test there is a similarity between the results obtained by the two classes, namely, the girls recorded a better score. The bigger difference in class I D is mainly given by the unequal distribution within the group (11 girls and 8 boys). This result indicates that in both classes girls are more disciplined and rigorous in performing tasks, while boys need an element of novelty to keep their attention on the same task.

It is important to note that boys' chess games end faster, often with major mistakes. Algorithms for solving typical positions (for example: mat with the queen) are assimilated faster by girls, and this is consistent with the results recorded in the two tests. The obtained results represent the initial testing, performed at the beginning of the 2nd semester of the 2020-2021 school year, being followed by a final one at the end of this semester. As a preliminary conclusion, we can say that girls from this research are more disciplined and do better in solving tasks where

the power of concentration is required, while boys are able to think faster and are more agile in tasks involving intellectual effort. Although the distribution of results within the two classes differs, the average result is approximately equal, with no statistically significant differences.

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