

EXPERIMENTAL STUDIES OF COGNITIVE STYLES OF PRIMARY SCHOOL STUDENTS STUDYING CHESS

ESTUDIOS EXPERIMENTALES DE ESTILOS COGNITIVOS DE ESTUDIANTES DE ESCUELA PRIMARIA QUE ESTUDIAN AJEDREZ

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Abstract: The relevance of the research is due to the lack of experimental data aimed at studying the cognitive styles of students when learning the "Chess" subject. It is necessary first to study the cognitive styles of primary school students, and then find out how they manifest themselves in the process of learning and mastering the "Chess" subject. The purpose of the study is to identify the manifestations of cognitive styles in primary school students studying "Chess" in grades 3-4. In accordance with the purpose of the study, from the objective psychological complex "Egoscope" the method of Kagan "Comparison of similar drawings" was selected and used. Analysis of the result data shows that the 3rd grade students, regardless of their performance in a given academic year, mostly demonstrate an impulsive cognitive style. The 4th grade students with high academic achievements display a reflexive cognitive style; junior students with average academic achievements also exhibit an accurate cognitive style. A reflective cognitive style is characteristic of the 4th grade students with low academic achievements.

Keywords: "Chess" subject, cognitive style, impulsivity, reflexivity.

Resumen: La relevancia de la investigación se debe a la falta de datos experimentales dirigidos a estudiar los estilos cognitivos de los estudiantes al momento de aprender la asignatura "Ajedrez". Es necesario primero estudiar los estilos cognitivos de los estudiantes de primaria y luego averiguar cómo se manifiestan en el proceso de aprendizaje y dominio del tema "Ajedrez". El propósito del estudio es identificar las manifestaciones de estilos cognitivos en estudiantes de primaria que estudian "Ajedrez" en los grados 3-4. De acuerdo con el propósito del estudio, del complejo psicológico objetivo "Egoscopio" se seleccionó y utilizó el método de Kagan "Comparación de dibujos similares". El análisis de los datos de los resultados muestra que los estudiantes de 3° grado, independientemente de su desempeño en un determinado año académico, en su mayoría manifiestan un estilo cognitivo impulsivo. Los estudiantes de 4to grado con alto rendimiento académico muestran un estilo cognitivo reflexivo; Los estudiantes junior con logros académicos promedio también exhiben un estilo cognitivo preciso. Un estilo cognitivo reflexivo es característico de los estudiantes de 4to grado con bajo rendimiento académico.

Palabras-clave: sujeto "ajedrecista", estilo cognitivo, impulsividad, reflexividad.

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1. INTRODUCTION

Cognitive style (from Latin *cognitio* - knowledge and Greek *stylos* - literal core for writing) – is a stable individual characteristic of cognitive processes that predetermine the use of various research strategies (CLAUSS, 1978). In a non-obvious way, it is associated with the effectiveness of solving cognitive tasks, since it is characterized by the choice of any one of the possible and approximately equivalent ways of solving them. Cognitive styles are individually unique ways of processing information about one's environment in the form of individual differences in perception, analysis, structuring, categorization, and assessment of what is happening. In turn, these individual differences form some typical forms of cognitive response, in relation to which groups of people are similar and different from each other (CLAUSS, 1978). Thus, the concept of cognitive style is used to indicate on the one hand, individual differences in information processing, and on the other hand, types of people depending on the characteristics of the organization of their cognitive sphere.

In modern foreign and domestic literature, you can find a description of about two dozen different cognitive styles. First of all, let us describe those cognitive styles that were identified and described by the psychologist M. Kholodnaya (KHOLODNAYA, 2004). These include:

1. Gender dependence /gender independence.
2. Narrow/wide range of equivalence.
3. Width of the category.
4. Rigid/flexible cognitive control.
5. Tolerance to unrealistic experiences.
6. Focusing/scanning control.
7. Smoothing/sharpening.
8. Impulsivity / reflectivity.
9. Concrete / abstract conceptualization.
10. Cognitive simplicity / complexity.

Cognitive style is a collective concept for relatively stable methods of cognitive activities, cognitive strategies, which consist of unique methods of receiving and processing information, as well as methods for its reproduction and methods of control. Cognitive styles are also in some way styles of activity, since they characterize the typical features of intellectual activity (learning), including perception, thinking and actions associated with solving cognitive tasks mainly in a situation of uncertainty (CLAUSS, 1987).

Initially, Kagan studied the individual features of the categorization of objects (KAGAN,1964). Thus, the children were nominated for 3 well-known subjects, from which it was necessary to choose two similar ones. The study of the association of objects based on similarities allowed to distinguish 3 main means of categorization.

1 . Analytical – descriptive includes groupings which are made based on the object's individual parts' specific features or similarities, for example, a zebra and T-shirt having the same lines, or people with brown hair.

2. Thematic, includes groups based on the situational or functional relations of objects, for example, boiler and kitchen, man and woman, child and family.

3. Categorical conclusions, includes groupings based on a certain generalizing judgment, using the selected objects as an example of a certain category - clothes, people with the same profession (KAGAN, MOSS, SIGEL, 1963).

In his studies, Kagan showed that the frequency of analytical responses increases with age. It turned out that the junior students at the age of 7-10, who are dominated by analytical answers, were more attentive during their educational activities, preferring later intellectual professions – to become a scientist, a writer. As a result, it was concluded that children with a tendency to analytical categorization are more attentive to certain parts of the events that take place, they have better control over their intellectual behavior, that is, they act reflexively. Conversely, children who tend to show a thematic means of

categorization perform impulsivity in their behavior: they are less careful and hyperactive in their actions (KAGAN, MOSS, SIGEL, 1963).

Based on the analysis of the obtained results, J. Kagan concluded that there is an individual feature of the "cognitive temp", ie, the speed of decision making: children with impulsive style make quick decisions, and children with reflexive style make slow decisions. J. Kagan also defined 5 stages of decision-making.

1. decoding the problem situation, understanding the problem;
2. a selection of possible hypotheses that can be relied upon to find a solution;
3. taking the necessary actions to substantiate the baseline hypothesis;
4. evaluation of the accuracy of the decision selected in the 3rd stage;
5. replying to the teacher or researcher (KAGAN, 1966).

According to J. Kagan, the tendency to act reflexively or impulsively is manifested in the 2nd and 5th stages, that is, it is connected with the intellectual choice, expressing and announcing the hypotheses.

An interesting fact was recorded by J. Kagan. The fact that the causality of the speed of decision-making is connected with the motivational-affective sphere of the person. Thus, propensity for reflection (decision-making takes a long time) or impulsivity (decision is made quickly) is the balance of two subjective values: the orientation towards quick success or the alarm of possible error. If a child is more likely to make a mistake than to want to succeed quickly, he or she will develop a reflexive cognitive style; otherwise, an impulsive cognitive style. (KAGAN, 1966).

Since 2011, when "Chess" was adopted in the 2nd-4th grades of schools in the Republic of Armenia, experimental psychological studies have been conducted in the field of chess education. Considering the problem from the point of view of four basic directions widely spread in psychological research: behaviorism, cognitivism, theory of social education, humanities psychology and pedagogy, V. Sargsyan considers that within each of them there are certain achievements and risks, which are invisible as a result of chess teaching (SARGYAN, 2019). According to the author, from the point of view of cognitive

psychology, the experimental studies made to reveal a number of students' cognitive abilities due to the teaching of the subject of chess are possible (SARGYAN, 2019).

Research on mental processes based on a general methodological orientation is conventionally divided into three parts.

1. revealing the possibilities of the intellectual potential of chess,
- 2 . regarding the educational value of chess,
- 3 . research on the social value of chess (KARAPETYAN and GEVORGYAN and PETROSYAN, 2014).

A group of researchers has found that convergent and divergent thinking types are manifested in chess lessons and games, combined with and in unified way, which define the role of chess as an intellectual game in primary school, because convergent and divergent thinking are directly part of the three-dimensional model of intellect. Depending on the situation it is possible that thinking will make the transition from divergent to convergent and the opposite, which are inclusive, typical and go beyond stereotypes of thinking (GEVORGYAN, 2019).

In order to find out the correlation between attention and sophistication of primary school students studying the "Chess" subject, it was found out that there is a very high correlation ($p > 0,9$) between attention efficiency and stability indicators (KHACHATRYAN and SARGSYAN and LPUTYAN, 2019).

In the Republic of Armenia one of the research in the field of chess education is the influence of the "Chess" subject on the speed of students' decision-making. For the purpose of comparative analysis, students in 4th, 5th and 6th grades have been selected, out of which the 4th grade students have been studying chess for three years, the 5th grade students have not studied chess for one academic year, and the 6th grade students have never studied chess at school. It is assumed that the number of accurate reactions and the high level of reaction are indicators of decision making speed. It turned out that the number and speed of accurate reactions of the 5th grade students exceeds the number of the 6th grade students who at school did not study chess at all. This is due to the fact that decision-making is an essential condition for the

internal planning of mental activities, during which it is necessary to reduce the probability of mistakes as much as possible. That is, the 5th grade students who have mastered chess are able to make optimal decisions in a limited period of time, which is the result of mastering chess (KHACHATRYAN and SARGSYAN and LPUTYAN, 2017).

Thus, various experimental data in the field of chess education still need to be supplemented. At present, there is no research work aimed at revealing the peculiarities of students' cognitive styles during the teaching and mastering the "Chess" subject. Therefore, the research group of psychologists of the "Chess" Scientific Research Institute of the "Armenian State Pedagogical University after Khachatryan", distinguishes a field that needs to be studied, that is the manifestations of the cognitive style of the junior primary school students of the 3rd and 4th grades in the process of mastering chess.

2 DEVELOPMENT

2.1 Methodological basis

It should be pointed out that at present there are no experimental data aimed at studying the manifestation of students' cognitive styles during the teaching and learning of the "Chess" subject.

Therefore, in order to reveal the cognitive style of primary school students in grades 3 and 4, in 2019 the team of psychologists of the "Chess" Scientific Research Institute conducted an experimental study in the following stages:

1. Development of video-methodological bases of the research.
2. Selection of research method, experimental application, adaptation.
3. Implementation of scientific research work.
4. Analysis of the received data, formulation of conclusions.

The video-methodological basis of research is Kagan's theory of cognitive styles (KAGAN, 1966).

2.2 The selection of the research

The experimental study was conducted in 2019 in school No. 2 after Kh. Abovyan in Yerevan city, Republic of Armenia, with a total of 30 students of the 3rd and 4th grade students. The participants were selected according to the level of academic achievement in the given academic year: high, average, low.

Table 1 - Research selection School No. 2 after Kh.Abovyan in Yerevan

N	GRADE	Number of participants /students/ /Total/	Students' academic achievements		
			High	Average	Low
1.	3 rd	15	5	5	5
2.	4 th	15	5	5	5

Source: From authors

2.3 The stages and methods of the experimental research

The research was conducted in two stages.

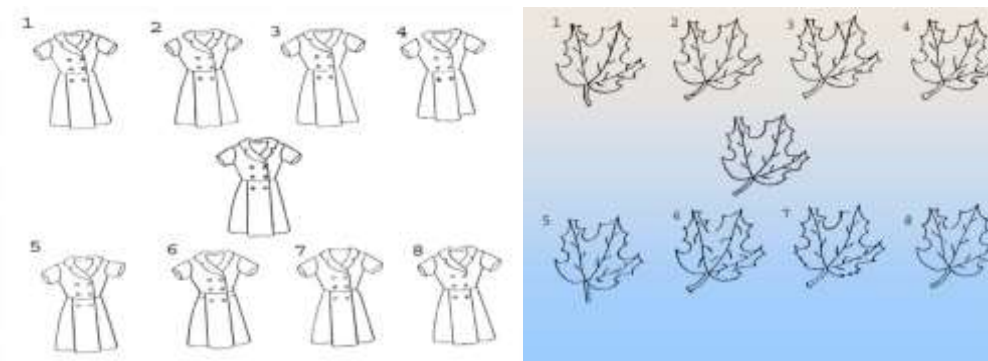
1. Selection of appropriate methods from the "Egoscope" complex for psychological analyzes and testing, experimental application to reveal the cognitive style of learner's objective (EGOSCOPE, 2013).

2 . Analysis of research data results.

In accordance with the objective of the research, "The Matching Familiar Figures Test" (MFFT) method was selected from the "Egoscope" complex of objective psychological analyzes and testing was selected and conducted It is aimed at revealing cognitive styles of impulsivity and reflexivity, which characterize the individual characteristics of a person's tendency to make quick or slow decisions (EGOSCOPE, 2013). During the analysis of the result data, the latent (secret) response time and the total number of errors is calculated. Based on the obtained indicators, a conclusion is made about the cognitive

style of the person, reflective or impulsive, a qualitative analysis of his decision making is given: fast - right, slow - wrong. The participant is presented with 2 experimental, then 12 main cards, in which one standard figure is depicted similar or almost identical 8 pictures, only one of which is identical to the standard figure. The participant should find and mark the image that is completely identical to the standard figure. The duration of the test is 7-20 minutes.

Picture 1 - Kagan "Comparison of similar images" method figure-standards examples



Source: Kagan (1996)

2.4 The scientific data obtained

The results of the analysis of research data are presented below in the form of tables.

Table 2 - School No. 2 after Kh. Abovyan in Yerevan, 3rd grade, the cognitive styles of the subjects

Participant N	High progress	Average progress	Low progress
1	Impulsive style	Impulsive style	Impulsive style
2	Impulsive style	Impulsive style	Cognition is not determined
3	Fast, accurate, cognitive style	Reflexive style	Impulsive style
4	Impulsive style	Impulsive style	Reflexive style
5	Impulsive style	Fast, accurate, cognitive style	Impulsive style

Source: From authors

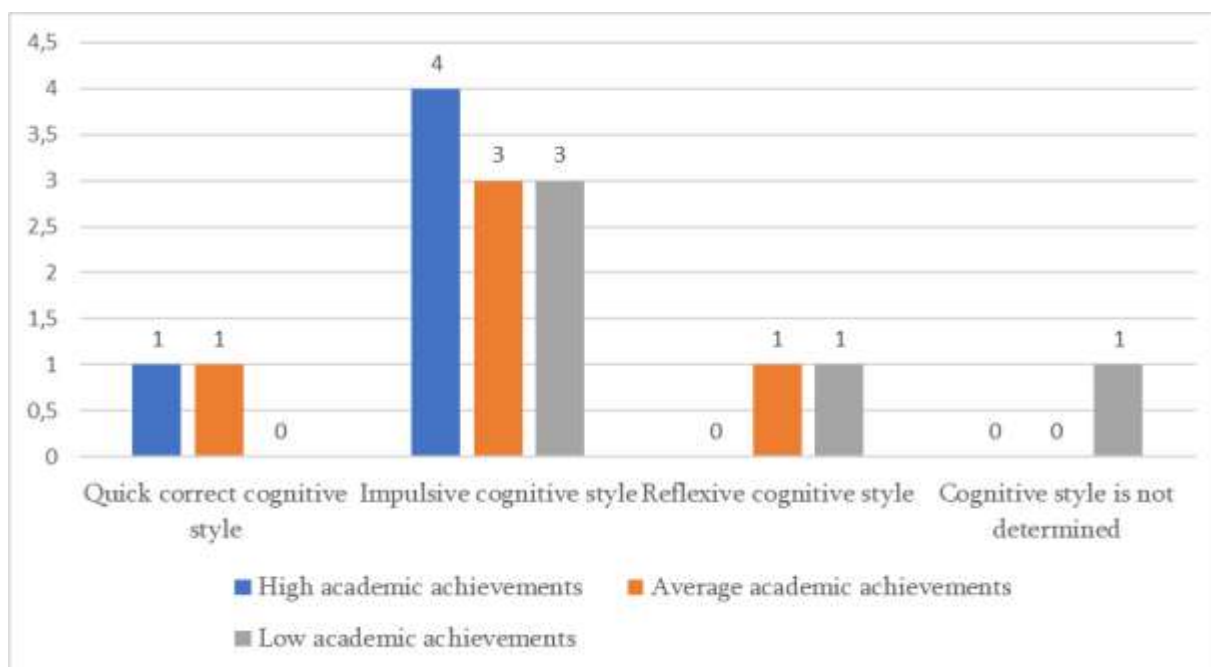
Table 3 - School No. 2 after Kh. Abovyan, Yerevan, 4th grade, the cognitive styles of the subjects

Participant N	High progress	Average progress	Low progress
1	Reflexive style	Fast, accurate, cognitive style	Impulsive style
2	Reflexive style	Fast, accurate, cognitive style	Slow, unclear cognitive style
3	Reflexive style	Fast, accurate, cognitive style	Reflexive style
4	Reflexive style	Fast, accurate, cognitive style	Reflexive style
5	Reflexive style	Fast, accurate, cognitive style	Reflexive style

Source: From authors

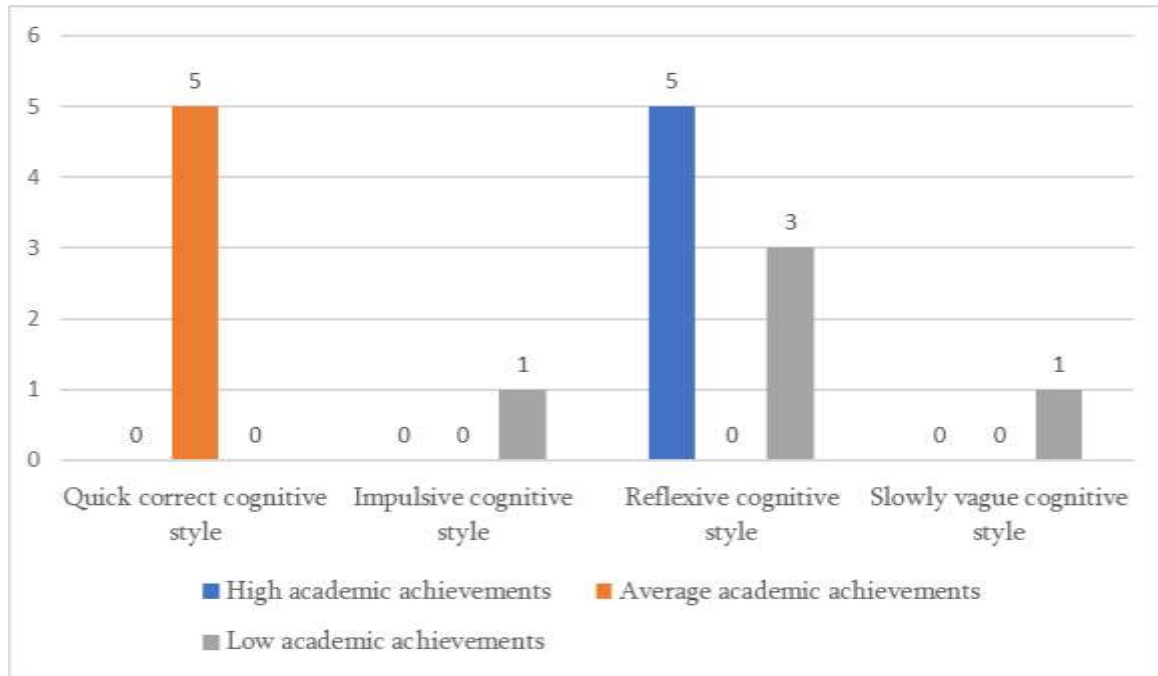
Quantitative analysis of the results of Kagan "Comparison of such images" method is presented below in the form of diagrams (see Figure 1 and Figure 2).

Figure 1 - School No. 2 after Kh. Abovyan in Yerevan, 3rd grade, the cognitive styles of the students



Source: From authors

Figure 2 - School No. 2 after Kh. Abovyan in Yerevan, 4th grade, the cognitive styles of the students



Source: From authors

3 CONCLUSIONS

Thus, the analysis of outcome data reveals that in the conditions of teaching and mastering the "Chess" subject:

- □ The 3rd grade students, regardless of the academic progress made in the given academic year, mostly perform an impulsive cognitive style. It should be noted that people who perform this cognitive style quickly put forward hypotheses when they have to make a choice, but at the same time make many mistakes.
- □ The 4th grade junior students with high academic achievements perform a reflexive cognitive style, which is characterized by a slow pace of decision-making, respectively, students make fewer mistakes, as they analyze in detail the hypotheses they put forward.

- □ It is an interesting fact that in contrast to high-achieving students, junior high school students with average academic achievements also perform a fast and accurate cognitive style, which is characterized by a short period of time given to information analysis, decision-making, in which the person generally makes the right decisions.
- □ And the students with low academic achievement in the 4th grade perform mainly reflexive cognitive style, which is characterized by a slow pace of decision-making, respectively the students make fewer mistakes, as they analyze in detail the hypotheses they put forward.

Thus, taking into account the analysis of the research data, the movement of the research results shown by the students in the 3rd and 4th grades is noticeable in the conditions of effective teaching and mastery of the “Chess” subject of. In particular, the impulsiveness of the cognitive style is transformed and regardless of academic progress in the 4th grade is expressed in a stable way by the manifestation of reflexivity. This shows that the students who have been studying the “Chess” subject for 3 years at the school, regardless of their academic progress, manage not only to thoroughly analyze the received information, to put forward hypotheses in the short period of time provided for decision-making, but also to make as few mistakes as possible.

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