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ЭМПИРИЧЕСКИЕ ИССЛЕДОВАНИЯ
EMPIRICAL RESEARCH

Intellectual Development of Elementary Schoolchildren and Their Performance on the Vygotsky—Sakharov Method

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An attempt was made to reproduce L.S. Vygotsky's study on development of concepts, in order to identify ways that contemporary 7- and 9-year-olds use to solve the task of the Vygotsky's cubes (double stimulation technique). The assumption about the relationship between the dominant method of abstraction used by elementary schoolchildren and their level of intellectual development was tested. For the purposes of the study 197 children enrolled in 1st (n = 102) and 3rd classes (n = 95) were tested. Our results partially coincide with those obtained by other authors, and the differences and similarities are discussed. Qualitative differences in performance on the double stimulation technique were also found between the children scoring high versus low scores on the Raven's SPM test, showing different thinking processes between those groups. We discuss the significance for further research of obtained relationship between the elementary schoolchildren approach to the double stimulation technique and the level of their intellectual development.

Keywords: Vygotsky-Sakharov method, elementary schoolchildren, concept development, intelligence, Standard Progressive Matrices.

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Интеллектуальное развитие младших школьников и способы выполнения задания методики Выготского—Сахарова

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В работе предпринята попытка воспроизвести исследование Л.С. Выготского, посвященное изучению развития понятий с целью выявления способов выполнения задачи методики двойной стимуляции, характерных для современных младших школьников 7-летнего и 9-летнего возраста, и проверки предположения о связи доминирующего способа абстрагирования младших школьников с уровнем их интеллектуального развития. В исследовании участвовали 197 учащихся 1-х (n=102) и 3-х классов (n=95) московских школ. Результаты исследования способов выполнения задачи частично совпадают с результатами, полученными другими авторами, но имеют также отличия, которые обсуждаются в работе. Обнаружены качественные различия между мышлением детей, которые получают высокие и низкие баллы по тесту СПМ Равена. Обсуждается значимость данных о связи способа выполнения методики двойной стимуляции с уровнем интеллектуального развития младших школьников для дальнейших исследований.

Ключевые слова: методика Выготского—Сахарова, младшие школьники, развитие понятий, интеллект, Стандартные Прогрессивные Матрицы.

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Introduction

In the 20s an experimental study of the process of the concept formation was undertaken by L.S. Vygotsky. For this work, extremely important for the developmental psychology, L.S. Vygotsky and his student L.S. Sakharov used a special method — a double stimulation technique [1; 6]. This technique is currently called the Vygotsky-Sakharov method or Vygotsky's cubes (or test), which is the name that is mostly found in foreign studies [7; 16; 18] but it is worldwide known that first versions of the technique belong to the German psychologist N. Ach. The main purpose for using this technique is to understand the role of the word in the concept formation, and the nature of its functional use during this process [1]. From the moment of its development to the present day, the main idea of the method itself has certainly not changed, but in some studies the purpose of its use has changed. In foreign ϕliterature, cubes are used for studying the differences in thinking (in the ability to abstract) of patients with schizophrenia [16]. Also, foreign psychologists use it in differential psychology, to identify the level of concept development, that is, the dominant method of abstraction as a characteristic of a certain stage described by L.S. Vygotsky [18]. In some studies the basic procedure for conducting the methodology is followed by questions, which are supposed to help researcher to fully clarify the qualitative features of children's thinking [7; 18]. Following this approach, some researchers tried to use this technique for obtaining an additional, qualitative information to the score of intelligence measured with the J.K. Raven's Standard Progressive Matrices [23].

In Russia, of course, the emphasis in using the double stimulation technique remained within the framework of developmental psychology. But the results of studies carried out in this field, traditional scientific field for Russian psychology, in the 80s and 90s [3; 4; 9] showed that the theoretical premises of the authors of the technique need serious verification. Research conducted by L.S. Vygotsky, although it is already almost a hundred years old, is still the classic example of research that deserves, in our opinion, much more attention than the one it is currently getting.

The results of the already mentioned more recent studies with Vygotsky's cubes bring new questions that need to be addressed. One of them is the question of what exactly contributes to the functional genesis of concepts, since there are researchers [4] who believe that the emphasis in the study should not be placed on the role of the word in the development of concepts, but on the role of objective action of the subject. In line with this question is the problem of the nature of the task that subject are solving when given the Vygotsky's cubes because those researchers doubt the main idea of L.S. Vygotsky and L.S. Sakharov that this technique shows precisely the role of the word in the process of concept development. As it turned out, the task that children solve when completing the task is not the one that its authors had in mind. The results of different studies show that most children approach the task differently than what had been assumed having in mind the theoretical conditions of the double stimulation method [9], i.e. instead of forming concepts, children restore and determine the basis for the distribution of figures in a given number of groups [3]. In the already mentioned work of Semeonoff and Lair) it can be seen that not only the answers of the children do not coincide with those given by L.S. Vygotsky and L.S. Sakharov, but also the responses of adults differ significantly [23]. Therefore, a question arises about the stages of development of concepts as seen by the great Russian psychologist, since in all these studies they are either not found in their pure form or not found at all [3; 9; 23].

Another problem that researchers are yet to face lies in the intersection of developmental and differential psychology. It is the possibility of using the double stimulation technique to obtain information about the development of a particular child. This study focuses on this approach in particular.

One of the drawbacks of all the studies we mentioned that used the double stimulation technique are too small

and heterogeneous samples, as well as ignoring the individual differences between the subjects. These drawbacks are also relevant to the works of L.S. Vygotsky. Despite the fact that more than 300 people were examined in his studies, we need to take into account the heterogeneity of his sample: there were children, adolescents, and adults, as well as people with language disorders and intellectual disability [1]. About 35 years after the work of L.S. Vygotsky, there was a study conducted in England [18] that showed that numbers of elementary schoolchildren that use a certain method to sort the cubes is different in different ages — from 6;6 to 11;6 years. The result of this study in general confirms the words of L.S. Vygotsky about complexes as dominant in thinking processes of elementary schoolchildren, but at the same time, the authors also noted distinguished individual differences between children within the same age period. For example, there are children at the age of 8;6 that think in concepts, but there are also those at the age of 11;6 that still think in syncretes. Having in mind that, according to L.S. Vygotsky, those intellectual functions, whose peculiar combination forms the psychological basis of the process of concept formation, rise, mature and develop only at a transitional age of a child — somewhere around 12 years [1], we cannot ignore the question about of the reason for those individual differences. Finally, in one of the most recent studies that used the double stimulation technique and that we were able to find, conducted in 2007 in South Africa [7], collected data were very similar to those described by L.S. Vygotsky and L.S. Sakharov. They confirmed the assumptions of L.S. Vygotsky about different types of complexes, about the existence of a certain tendency in the transition from one type of logical reasoning to another, and also about the biggest leap in the concept development being noticeable in the age interval between 11 and 15 years. But in thas study, the sample was also insignificant and consisted of only 60 subjects, ten people in each age group — 3, 5, 8, 11, 15 years, and adults.

None of the studies mentioned above provide detailed descriptions of the responses of children of different ages. Unfortunately, the protocols of L.S. Vygotsky and L.S. Sakharov are not saved [8], but at the same time, in the article written by L.S. Sakharov a note that shows that significant individual differences were observed in his study can be found. In the last paragraph of the article, he notes that, when completing the assignment, «some children go through all the stages, and some stop in the middle» [6, p. 47]. Unfortunately, neither L.S. Vygotsky, nor L.S. Sakharov had time to address the question of why, in the formative experiment, not all children developed a concept and what are the characteristics of those children. Even the authors of those studies that had more uniform samples [3, 9], and that didn't show the stages of concept development described by L.S. Vygotsky, did not pay attention to the individual differences between children. For example, E.G. Yudina [9] conducted a study with preschoolers and on the basis of children's explanations of their choice of figures, she identified 4 groups of children's explanations. Some children give substantive explanations (those that are related to the characteristics of the cubes); others give pseudo-subjective ones (those that are related to a random set of letters); some give pseudo-reflexive ones (those that are related to their motives or internal processes); and there are those that give explanations not connected to the task but to their life situation. Also, among her subjects were children who refused to complete the task, those who avoided the instruction, and those who used cubes as building material. Despite the fact that E.G. Yudina found differences in children's approach to the task as well as in the levels of substantiating answers of children, the sources of these differences were not analyzed. Even more illustrative the importance of studying the individual differences of children can be found in the study of Yu.V. Gromyko [3]. First, using the double stimulation technique, Yu.V. Gromyko saw that some children could not complete the task. Second, when those («unsuccessful») children were shown samples of all groups, some were able to solve the task, but for others even this was not helpful enough. Finally, using a modified double stimulation technique (which consisted of providing children with samples and special hints), his 33 subjects — elementary schoolchildren in grades 1—3, completed the task in 4 different ways. Children were grouped as follows: those who, in principle, solved the task; those who paid attention to understood differences between groups; those who were able to voice the differences, but could not sort the figures accordingly; and those who could not at all compare the shown samples and see significant features of the figures. But, as well as in the study of E.G. Yudina, the sources of differences between the children remained unrecognized by Yu.V. Gromyko.

The significance of understanding the nature of these individual differences for developmental psychology is emphasized by the already mentioned study by Semeonoff and Laird [23]. They showed that adults, as well as children, differ in the way they complete the task of the double stimulation technique. They identified even 6 groups: those that are solving the task; those that are solving the task when using some provided hints; those who have an intuitive understanding of groups; those that constantly mention irrelevant characteristics of the figures; those who cannot understand the sorting principle on their own; and finally, those who cannot see the difference between groups even after the distribution of figures. Having divided their subjects into groups depending on their approach to the problem, following the western scientific tradition, the authors tried to find the mathematical description that would allow us to evaluate people's achievements on the double stimulation technique with a single number (quantitative characteristic, score). The correlation of the total score, composed of the time taken to complete the task, the method for completing the task, and the number of hints needed to complete the task, with the score their participants showed on the SPM test was 0.54. This approach seems important to us because it is an attempt to find individual differences in the intellectual abilities of people solving tasks of the double stimulation technique differently, and it is as well an attempt to eliminate one of the most

frequent critics of intelligence tests — ignoring the qualitative characteristics of human thinking [24]. Moreover, modern studies of the development of children's logic extend their boundaries and are already being carried out even with infants [20]. The test that Semeonoff and Laird chose, Standard Progressive Matrices, also exists for almost a hundred years. Since its construction in 1938 to the present day, the Matrices have been used in a huge number of studies. At the moment, this is the most famous and most popular intelligence test in the world. The test was created by J.K. Raven to determine the level of eductive ability, i.e. the ability to form a meaning [12], or "the ability to make sense out of confusion, to generate high-level, usually non-verbal schemes that simplify the processing of complexity" [10, p. 2]. Contemporary researchers also note that the Raven Matrices measure the ability to abstract [15], and the results of psychometric studies show that matrices are the best tasks that measure the perception and reproduction of logical relationships [10; 21], that is, that they are a test measuring analytical [14] or fluid intelligence [11; 13; 22; 25], which was described by Cattel and Horn [for example 17]. Also, the alleged ability to abstract, which matrices measure, is the base of the concept development and language development in general [5; 17].

Taking into account the recent data of the positive relationship of the latent factor of linguistic abilities with latent factors and fluid and crystallized intelligence [2], and also having in mind the work of Semeonoff and Laird, we assumed that the strategy that children use when sorting the Vygotsky's cubes, they will also use to solve the SPM, and that this strategy will affect their final result. We also wanted to examine whether there are differences in the way children with different levels of intelligence, measured with SPM, are solving the sorting task. Following the tradition of developmental psychology, we wanted to see how seven-year-olds and nine-year-olds perform on the sorting task, that is, we wanted to know if between these two groups of children it is possible to see that qualitative difference in thinking, that should occur in the eighth year of children's life, as is suggested in the studies on the development of intelligence [3].

Thus, in our study, the following tasks were set: 1) to identify ways to accomplish the task of the double stimulation technique that typical for contemporary elementary schoolchildren of 7 years and 9 years of age and compare them with the results obtained by other authors; 2) to establish a connection between the dominant method of abstracting that elementary schoolchildren use and the level of their intellectual development. We assumed that the dominant method of abstraction, understood as a specific way of solving the task with Vygotsky cubes, differs not only in children of different ages, but also in children with different levels of intelligence.

Method

In total 197 children from two primary schools in Moscow participated in the study: 102 were in 1st grade (age 6;7 — 8;1) and 95 were in the 3rd grade (age 8; 8 — 10; 2).

In the group part of the study, all subjects completed the Standard Progressive Matrices. At the next stage — the individual part, the subjects performed the task of the modified double stimulation technique.

Modification implies two things. Firstly, after each selected figure the child is shown whether he made the right choice or not. Secondly, after the distribution of the figures is completed, the subjects have additional tasks: to answer the question about the basis for the grouping of figures (their merged characteristic), describe a new figure that would fit into one of the groups and distribute all the figures again using the (formed) concept. This modification that includes providing a feedback, is a traditional approach in western studies on the development of classification principles (concept formation approach) [9; 19]. However, this method has its drawbacks. As Yu.V. Gromyko [3] and E.G. Yudina [9] rightly stated in their works, on the one hand, the process itself becomes less developed, and on the other hand, the choice of the first figure and the sequential choice of all the others take place under different conditions, that is, only when 2 figures are presented, we can talk about solving classification tasks with hidden standard. But, this particular study has an explorative nature and it relies on the approach of Semeonoff and Laird [23], who used a variant of this modification (giving a feedback only when the figure was incorrectly chosen).

Results

For comparing the results of 7 and 9 year olds, we used only data from 143 children, 83 first-graders (aged 6; 11 — 7; 11) and 60 third-graders (aged 8; 11 — 9; 11).

As we expected, the analysis of children's responses and their performance on the double stimulation technique, as described by L.S. Vygotsky and L.S. Sakharov, was not possible. In majority of answers that we received from children in this study, we were not able to see even the general configuration of the structure of preconceptual forms that E.G. Yudina described in her theoretical analysis of the syncretes and complexes from L.S. Vygotsky's theory [9]. The instruction for double stimulation technique data analysis, proposed by Hanffman and Kasanin [16], also could not be applied in all the cases of our study, although the categories proposed by the authors are quite wide. Nevertheless, the analysis of the ways children were performing on the task in our research allowed us to divide them into several groups. Those groups are presented in the following table.

Our results show, first, that majority of the children in both age groups could not understand the sorting principle, how are the figures divided into groups. Even at the end of the task, when the figures are already sorted into groups, most of the children were not able see those exact characteristics of the figures used as a criterion of a certain group indicated by a certain meaningless word. Second, the majority of the children from both groups followed the instructions to the end. In this group there

Table

The frequency of children's responses based on the direction they had towards the instruction and the its success in completing the task

Direction	First grade (n)			Third grade (n)		
	understood	did not understand	N	understood	did not understand	N
Followed the instruction	14	42	56	18	35	53
Stopped following the instruction	1	22	23	1	3	4
Created a picture	0	4	4	0	3	3
Overall	15 (18,1%)*	68 (81,9%)	83 (100%)	19 (31,7%)*	41 (68,3%)	60 (100%)

Note. The difference between the groups of first-graders and third-graders in % of children who understood the task is in the zone of uncertainty (φ * emp = 1.871, $0.05 \leq p \leq 0.01$).

is, however, the difference between children of different age. There is more third-graders that were solving the task having in mind that a random group of letters has to do something with the characteristics of the figures in a way that showed that they have developed a concept (14 third-graders compared to 4 first-graders). First-graders, who were able to distribute the figures correctly, again at the end, basically understood how to do this when they were answering additional questions. Throughout the task they were simply testing their own hypotheses about the sorting principle. They did not pay any attention to the random group of letters. But after all the figures have been sorted, they were able to tell the differences in obtained four groups. It is interesting to mention that the same pattern was seen in the protocols of the children who did not follow the instructions, but at the end were able to identify the sorting principle (one child in both groups). Results show that in the group of those children who "refused" to follow the instruction prevail first-graders. Finally, as can be seen in the last row of the table, not a single child, neither in the first nor in the third grade, who created the picture instead of following the instruction, was not able to understand the sorting principle at the end of the task.

To be able to test the assumption about relation between dominant principle of abstraction used by elementary schoolchildren and their level of intelligence, we formed a new sample from the general sample. From both age groups we selected those children whose intelligence was above the 90th percentile according to the results of the SPM test (top 10) and those whose intelligence was below the 10th percentile (bottom 10). Thus, a total of 34 subjects were selected, 8 in each group, except for the group of top 10 first-graders, which included 10 children.

A comparative analysis of the protocols, collected from the children from different age and intellectual groups while they were solving the Vygotsky-Sakharov task, showed the following.

1. At the end of the task, all third-graders from the "top 10" group (M=52.75, SD=2.121) understood the sorting principle, that is, what type of figures different groups consists of. They were able to give answers to all additional questions, and they were also able to sort the figures again, using the formed concept. In the remaining groups, we detected only two such cases: one in the group of "top 10" first-graders (M=47.50, SD=2.506) and one in the group of "bottom 10" third-graders (M=25.75, SD=6.274).

2. More than a half of the "top 10" third-graders (5 out of 8 children), according to the descriptions of L.S. Vygotsky, showed that their thinking is at the stage of a concept, although they use the word "size" to explain the sorting principle. In their opinion, the groups are formed of "small, medium, larger and the largest" figures. The answers of these children correspond to the answers of two "successful" groups of children from the study of Yu.V. Gromyko — to those who were able to solve the task with Vygotsky's cubes. These are the most successful group (that was able to understand the principle of distribution of all objects) and the group that was focused on the differences between the groups (instead of similarities of the figures) and on this basis formed a series, as in our example. The remaining 3 third-graders from the group "top 10" we were not able to classify. Their answers were not similar to any group described by researchers.

3. Children from all other groups did not show such uniformity in their answers. In the group of "top 10" first-graders, 4 children also used one word to indicate the essential difference between groups, but they could neither explain how the groups differed, nor sort all 4 groups again without turning over the figures. Also, in this group, 3 children showed the pattern described as the stage of the complex — collection; they sorted figures in the groups using the principle «there is no such figure» or «there is no such color». We could not classify the answers of the remaining 3 children. One of them, for example, was not able to grasp the sorting principle while sorting the figures, but once he saw them all sorted, he understood it. The answers of these children correspond to the answers of the children in the third group in the study of Yu.V. Gromyko — children who assumed that the groups are sets of unrelated elements.

4. The biggest differences in the responses were found in the "bottom 10" groups. In both groups, it was impossible to find at least two subjects in a group that responded by using a similar principle. But even between these groups we found an important difference. In a group of third-graders, children's answers mention the properties

of the figures: despite the fact that they could not solve the task, they tried to understand how the shape and color or height of the figures are related to a meaningless set of letters written on them. On the other hand, in the group of "bottom 10" first-graders (M=17.50, SD=4.276) we found answers like "it seems to me", "I guessed it", "it was pointing to me", as well as explanations regarding completely unimportant elements — counting of all the sides and corners of the figures, and finally, one picture-creating — "snowman, doll". The answers of these children corresponded to the last, fourth group from the study of Yu.V. Gromyko — a group that did not determine and did not try to determine the principle of distribution of figures.

Discussion

The results obtained show that the questions raised by contemporary authors about L.S. Vygotsky's theory are relevant for further research. While they were sorting the figures, the majority of our children, 125 out of 143, did not pay much attention to the meaningless words written on them. For them it was important to understand the principle by which the figures are divided into groups. Many did not even remember any of the meaningless words, that is, for them, the words did not play any role other than a simple designation of the group — to get four groups. Answering additional questions, some first-graders even said that "you can add any figure, just write that word on it" or "those figures are in the same group, because the same word is written on their back; we sorted them out according to the words". Even after analyzing the protocols of those children that identified the sorting principle and that seemed to understand the differences between the groups of figures, we cannot say with certainty that they did not rely solely on the objective characteristics of the cubes while completing the task. For many of them, the criterion "size" was significant, although different children understood it differently: for some children, size denoted only height, for others it was only width, and for others it was a word meaning both height and width (which is actually a sorting principle, an essential characteristic of the figures in the double stimulation technique). Analyzing children's answers to additional questions, we can say that out of 143 children, only 34 (15 seven-year-olds and 19-nine-year-olds) after finishing the task showed that they understood the sorting principle. However, this does not mean that they all reached the stage of the concept, because not all children were following the instruction, and not all of them were able to sort again all the figures into 4 groups using the concept.

Nevertheless, relying on the theory of L.S. Vygotsky, we can say that in our study we can see one interesting result, which concerns the complex-collection, but which undoubtedly needs further research. E.G. Yudina, on the basis of her research, clearly emphasized that this type of complex in its pure form is rarely found in thinking of preschool children, but in study Yu.V. Gromyko with elementary schoolchildren this was the only complex that could have been found. We can also say that the only children's answers that at least somehow resembled what L.S. Vygotsky wrote in his work, are showing the traits of exactly this type of complex. Unfortunately, despite the fact that we could clearly identify those children who chose a certain figure because "there is none like this", children's understanding of the differences between the figures does not quite correspond to those described by L.S. Vygotsky. In our study, the different figure that complements the group was understood by children differently — it was not only figures that differ in colors or shapes, but also figures that differ in height or size. Often the selection criterion was not completely clear, for example, the justification "there is no such figure" was applied to the figure as a whole. This is especially interesting if we keep in mind that in the set of 36 figures, there are no two completely identical figures. But the children, by some principle, determined that some "not at all like this" belong to one group, and some to another.

Comparing our data as a whole with the results of E.G. Yudina, Yu.V. Gromyko and Semeonoff and Lairda, we can say that our categories of children's answers do not fully correspond to any of the "classifications" described by them, although they have some similarities. Although our subjects were of the same age as those in the study of Yu.V. Gromyko, the difference in the answers received is probably due to the use of different versions of the modification of the double stimulation technique. Therefore, in the answers of our children we could not see all the groups he described in their pure form. In addition, in the work of Yu.V. Gromyko, the responses of all students were processed together, and our analysis, taking into account the age and level of intellectual development, shows that the differences in children's answers are associated with both of these variables.

The discrepancy between our data and the results of E.G. Yudina and Semeonoff and Laird, are not only due to differences in approaches, but also to differences in the ages of subjects. Like E.G. Yudina, we also encountered those children who, when completing the task, did not follow the instructions. Some of them did follow the instruction from the beginning of the task to its end, regardless of whether they understood the sorting principle or not. Some of them stopped following the instruction at some point, but continued to carry out the task, as if they were doing what was required from them. In those cases, they were usually saying that they choose the figure "by chance", "because I wanted to", "I got this one", "it seems to me that the word will fit into this", "God said so to me", or simply "I don't know". This group also includes those children who, at some point, simply started to turn over the figures and did not give any explanation for choosing a particular figure.

Also, in the study, we found another group of children, a group that was not described in any of the previous studies. This group consists of children who build a picture from the figures. They pick up the figures to complete the picture they imagined themselves. They explain their choice with words, for example: "this is a little man, he needs a head ... then I need some round

one". When answering to the additional questions, they continue to think about their pictures and say that "these figures are in one group, because you can build something with them, for example, a shark" and "if you add these to them, you get a beautiful Christmas tree". The answers of these children resemble those described by E.G. Yudina. Just as her children went over to the play and used cubes as building material, (building, for example, a house in three dimensions) our children collected a group of figures in order to create a painting they imagined. For such children, in fact, different groups consisted of figures representing parts of their invented paintings.

Finally, a comparison of our results with those of Semeonoff and Laird confirms the assumption that the double stimulation technique can be used as additional to intelligence tests, i.e., to the SPM test. Despite the fact that the studies had different approaches, samples, response categories, and a method of comparing the data obtained by the two "tests", the results lead to the same conclusion. The work of Semeonoff and Laird, performed in the tradition of Western psychology, showed how you can quantify the process of solving the task in the double stimulation technique and how the points obtained that way are related to the result of the SMP test. Our work, based on the Russian psychological tradition, reveals the qualitative differences in thinking between the children who score high versus low scores on the SPM test, while taking into account the age of the children. We can assume that this study belongs to those that open up the possibility of approach to the intelligence tests not only from a quantitative, but also from a qualitative point of view — the view of understanding the differences in children's thinking that may be hidden behind the quantitative test result. The nature of this study is explorative, so we compared only 2 groups, consisting of subjects with the highest and lowest scores. Nevertheless, in our opinion, there is a future for this kind of research, especially if we bear in mind 2 things. First, the SPM test as a test with proposed answers to choose from, makes it possible not only to calculate the score based on the correct answers, but to also do an analysis of the wrong answers. Second, this particular modification of the double stimulation technique, when children are provided with a feedback, actually represents the form of learning how to solve classification problems, the same as the process of completing the SMP test involves learning (in latent form).

Conclusion

To conclude, we can say that the double stimulation technique has a great potential that is yet to be used for studying the development of thinking in contemporary children, in order to understand the nature of individual differences.

The analysis of the performance on the task of the double stimulation technique of contemporary elementary schoolchildren, aged 7 and 9 years, in comparison with the results, obtained by other authors, allowed us to show that different presentation of the double stimulation technique provoke different answers in children although they were in general performing the same task. However, this finding cannot explain significant individual differences in the ways both the 1st and 3rd graders perform on the Vygotsky's cubes. The results of our study, as well as those of other researchers applying different modifications of the technique, revealed several heterogeneous groups of children's responses. The data obtained only partially coincide with the children's performance strategies on the double stimulation technique and their explanatory answers, described in the literature. At the same time, new strategies were discovered (for example, the actual ignoring the instruction and the construction of the drawing according to one's own plan). Along with the insignificant proportion of children who operate at the concept level, both among 7 and 9 year olds, this finding shows the necessity to conduct additional research on the characteristics of the concept development in contemporary children.

The results of the study support the hypothesis that the dominant method of abstraction, which lies at the basis of a certain stage of the concept development, is associated with the level of intellectual development, and that this development determines significant individual differences in the ways elementary schoolchildren, aged 7 and 9, complete the task of Vygotsky's cubes. Qualitative differences in thinking processes were found between children who score high and low scores on the SPM test. However, the exploratory nature of our study allows us only to identify promising research tasks, but has limitations regarding the interpretation of the data obtained.

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