

# The Relationship Between Dialectical Thinking and Emotion Understanding in Senior Preschool Children

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This study aims to clarify the methodological status of the category “activity Theoretical foundations of the relationship between child’s cognitive and emotional development were formulated in the works of Russian and international authors. We consider a child’s dialectical thinking genesis as one of the cognitive development lines. This research aimed to study the relationship between dialectical thinking and emotion understanding in older preschool children. It was assumed that there is a significant relationship between emotion understanding and the success of children in completing three particular dialectical tasks, such as overcoming contradictions, understanding the simplest developmental processes and making a creative product. This study included 148 children, aged 5–6. We evaluated the level of non-verbal intelligence, dialectical thinking and emotion understanding using the following techniques: “Raven’s Coloured Progressive Matrices”, “Drawing an unusual tree”, “Cycles”, “What can be both at the same time?” and the Russian version of the “Test of Emotion Comprehension”. Correlational analysis of the resulting data revealed significant relationships between non-verbal intelligence, indicators of dialectical thinking and the overall level of emotion understanding. When controlling non-verbal intelligence, linear hierarchical regression analysis was used to demonstrate a significant contribution of dialectical thinking to the dispersion of values according to the general level of emotion understanding. The research results are of practical importance and make it possible to use transforming (understanding the simplest developmental processes and making a creative product) and overcoming contradictions as developmental tasks when working with children aged 5–6.

**Keywords:** emotion understanding, cognitive development, non-verbal intelligence, dialectical thinking, cyclical representations, dialectical mental actions.

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## Взаимосвязь диалектического мышления и понимания эмоций у старших дошкольников

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В работах отечественных и зарубежных авторов были сформулированы теоретические положения о связи когнитивного и эмоционального развития ребенка. В качестве одной из линий когнитивного развития нами рассматривается генезис диалектического мышления ребенка. Наше исследование было направлено на изучение связи диалектического мышления и понимания эмоций у детей старшего дошкольного возраста. Мы исходили из предположения, что существует значимая связь понимания эмоций с успешностью выполнения детьми трех базовых диалектических задач: преодоление противоречий, понимание простейших процессов развития, получение творческого продукта. Участниками исследования были 148 детей 5–6 лет. Была проведена диагностика развития невербального интеллекта, диалектического мышления и понимания эмоций с помощью методик «Цветные прогрессивные матрицы Дж. Равена»; «Рисунок необычного дерева», «Циклы», «Что может быть одновременно?»; «Тест на понимание эмоций» (русскоязычная версия методики Test of Emotional Comprehension). Корреляционный анализ полученных данных выявил значимые связи между невербальным интеллектом, показателями диалектического мышления и общим уровнем понимания эмоций. С помощью линейного иерархического регрессионного анализа был установлен значимый вклад диалектического мышления в дисперсию значений по общему уровню понимания эмоций при контроле невербального интеллекта. Полученные результаты имеют практическое значение и позволяют использовать задачи на преобразование и преодоление противоречий в качестве развивающих в работе с детьми в возрасте 5–6 лет.

**Ключевые слова:** понимание эмоций, когнитивное развитие, невербальный интеллект, диалектическое мышление, циклические представления, диалектические мыслительные действия.

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## **Introduction**

There are numerous studies of the connection between thought processes and emotion understanding in preschool children. Researchers have noted the positive impact of understanding emotions on academic success [13; 17] as well as on the ability to decenter [19]. On the other hand, they single out the contribution of non-verbal intelligence to the ability to understand emotions [11]. The aim of this research was to analyze the connection between emotions understanding and dialectical thinking in senior preschool children.

## *Understanding of emotions*

Emotion understanding is defined as the ability to understand the nature, causes and consequences of one's own emotions as well as the emotions of others and is one of the key components of an individual's emotional competence [22]. Emotion understanding is of particular interest in this study, because in addition to experiencing an actual feeling, recognition and description of emotional states, it also includes cognitive aspects, such as explaining the nature and causes of emotions, predicting emotions, knowing and applying strategies for their regulation in everyday life [23].

The most widely used theoretical model for emotion understanding is an empirically derived model by P. Harris and F. Pons [23]. This model describes three stages in the emotion understanding development. It starts at the age of 3–5 years (external stage), when an understanding of the external causes of emotions becomes available to children. Then, at the age of 5–7 years (mental stage), when children begin to understand that ideas, beliefs and memories can cause various emotions and also that some emotions can be hidden. At the age of 7–9 years (reflexive stage), children learn to regulate their emotions using cognitive strategies, learn that moral rules can influence emotions and that some emotional states are mixed or even contradictory [23; 26].

Based on this theoretical model [23], F. Pons and P. Harris developed a comprehensive diagnostic tool for assessing the emotion understanding in children of preschool and primary school age, which is used in this study (Test of Emotion Comprehension) [22]. This tool was selected to evaluate children's ability to understand emotions as it allows us to estimate and analyze the aspects described above separately and has shown a high level of empirical data correspondence to the tool's theoretical basis ( $\chi^2/df = 22,702 / 24$  ( $p = 0,53$ ); CFI = 1.000 > 0.90; RMSEA = ,000, N = 596 children of senior preschool age).

Another diagnostic tool suitable for the purposes of this study (to assess the emotion understanding in preschool children) is a set of techniques presented in the dissertation by O. Prusakova "The Genesis of Understanding Emotions" [10]. However, it was designed to diagnose only 3 to 7 years old children while the particular purpose of this research is to monitor the long-term development of emotion understanding in the participants of the study, which goes further than preschool age.

#### *Formal and dialectical thinking*

Two types of thinking are distinguished in the cognitive development of children and adults: such as formal-logical and dialectical thinking [2; 6; 7; 25]. In international psychology, the development of thinking is presented linearly moving from formal to post-formal (or dialectical) thinking [12; 25]. This approach was influenced by the work of J. Piaget. He emphasized that dialectics characterizes those processes where systems at first functioned independently, and then, once they were united into a single whole, significantly increased their capabilities [21]. Critically analyzing the works of J. Piaget, Riegel concluded that Piaget's theory was "based on dialectical thinking" [25, p. 366].

However, the intellect's phasic development according to J. Piaget, where at each subsequent stage the contradictions of the previous stage are resolved and a state of equilibrium is reached, weakens the dialectic of the

child's thought. According to K.F. Riegel, the dialectical process is important: "As for a child puzzled by an ambiguous element with multiple choice, it does not matter for understanding his/her thinking whether he/she finally finds the "correct" answer; what matters are the ambiguity and contradictions that he/she experiences" [25, p. 357]. Thus, there are prerequisites for dialectical thinking analysis in children, but at present, research is devoted to the thinking in adults.

In Russia in the second half of the 20th century, the issues of dialectical thinking were considered in the context of the relationship between formal and dialectical logic [7]. Within the framework of meaningful interpretation, dialectical thinking was associated with the solution of three types of problems such as: 1) overcoming contradictions [7, p. 311]; 2) understanding of development processes [7, p. 96]; 3) making a creative product [7, p. 91]. In this regard, the possibilities of solving such problems were investigated.

V. Maltsev [9] proposed to define dialectical logic as a special form of logic with its own formal structures that are different from the structures of traditional logic. This theoretical hypothesis began to be concretized within the framework of structural-dialectical psychology [2; 29]. The formation of dialectical thinking within the structural-dialectical approach began to be considered as an independent line of cognitive genesis, as well as a system of dialectical mental actions that allow preschoolers to deal with the opposites [3].

Dialectical thinking within the framework of the structural-dialectical approach includes both structural and substantive components [3], and represents a system of mental actions aimed at solving dialectical problems. The dialectical thought action of *transformation (T)* occurs when an object is transformed into its opposite in the course of solving problems in order to produce a creative product. The dialectical mental action of *mediation (M)* is the transformation of a contradictory situation by combining two opposites into an indivisible whole, overcoming the contradiction of its parts. Dialectical action of *seriation (S)* occurs when a subject mentally imagines one object gradually changing into its opposite: not immediately, but through an intermediate state. Dialectical action of *reversal (R)* is seriation performed in the reverse direction. Events start from the opposite **B** and are worked backwards towards opposite **A**. Reversal represents the "movement" of thoughts from an object to its opposite and then back to the original object allowing you to solve problems where the situation is developing.

Studies by N. Veraksa et al. [5; 29], show that skills develop *heterochronously* throughout the entire preschool period. The unity of a dialectical structure and its dynamic changes are also described by mathematical

categories [3]. The problem of how the creative abilities of preschooler develop is emphasized in studies working within the framework of this approach [2].

*The connection between thinking and emotion understanding*

One of the pioneers in the study of emotional development in children was the outstanding Russian scientist A. Zaporozhets. He noted that the coordinated functioning of both emotional and cognitive spheres is required for a child to successfully perform any activity [8]. L. Vygotsky also pointed out the unity of affect and intellect, emphasizing that “there is a dynamic semantic system which is demonstrated by the unity of affective and intellectual processes. [...] in every idea there is a revised form of the affective relationship of the person to reality, presented in this idea” [6, p. 22]. On the contrary, J. Piaget [1] believed that emotions do not affect the structure of the thought process, but can stimulate or inhibit it. Despite numerous studies of the connection between emotional development and formal logic [17; 19; 20; 28], the question of the connection between the understanding of emotions and dialectical thinking has not yet been studied. While it opens up the opportunity for an individual to solve several types of tasks at once, which can greatly help in understanding, explaining, predicting and regulating emotions. This study was intended to contribute to filling this gap in psychological processes research in childhood, which probably arose as a result of considering dialectical thinking as postformal [1; 12; 18].

The main hypothesis of this research was the assumption that there are links not only between the emotion understanding components and between non-verbal intelligence (which has already been shown in previous studies) but also between emotion understanding components and dialectical thinking. At the same time, it was assumed that the success in performing basic dialectical tasks is not only related to the emotion understanding, but also makes a significant contribution to the development of children’s ability to understand the nature and causes of emotions while controlling non-verbal intelligence.

### Sample

The study involved 148 children aged 5–6 years ( $M=5.4$ ), of which 56% were girls. All children attended preschool educational institutions in Moscow. Each child was examined individually in a bright, quiet room of the kindergartens which he/she attended. The results were obtained in the first half of the 2019–2020 academic year.

### Methods

Russian version of the “Test of Emotion Comprehension” (TEC) [4; 22] was used to evaluate children’s emotion understanding. The test assesses three components of emotion understanding: External, Mental and Meta components. The External components evaluate the ability to recognize emotions, understand the external causes of emotions, and understand the influence of desires on emotions. The Mental components evaluate the child’s understanding of the role of beliefs and memories in relation to emotions, as well as understanding of hidden emotions. The Reflexive components evaluate the child’s ability to understand mixed feelings, their ability to regulate emotions with cognitive strategies, and the impact of moral rules on the self-regulation of emotions. Each of the components is scored from 0 to 3. The overall level of emotion understanding is calculated as a total sum of points from 0 to 9.

*Formal and dialectical thinking*

Non-verbal intelligence was assessed using J. Raven’s “Coloured Progressive Matrices” [24]. Each child was shown tasks in which he/she had to identify missing elements. The test contained 3 samples each made up of 12 tasks. The minimum possible score was 0, and the maximum was 36.

The “*Drawing an unusual tree*” [2] was used to evaluate the child’s ability to produce a creative product. The solution involved the application of both dialectical and non-dialectical transformations in order to transform an object into its opposite. Each child was given the instruction to “draw an unusual tree.” Tree drawings were divided into three types. Normative images of trees, where transformations were represented by minor changes, were given 0 points. Symbolic images of trees which demonstrated an understanding of “unusual” in opposition to “ordinary” but did so unrealistically, were assigned 1 point. Dialectical trees, which depicted the transformation of the structure and presented the relationship of opposites, were given 2 points.

The “*What can be both at the same time?*” [2] allowed to assess the child’s ability to solve problems that require overcoming contradictions. The tasks involved mediating two opposites. Children had to come up with or find situations that are characterized by having opposite properties as required by the tasks. The solutions required the application of the dialectical mental action mediation, that allowed two opposites to be combined into an indivisible whole. The evaluation process consists of five questions. For example, children were asked to answer the question: “What can be black and white at the same time?” If the child could not find an answer, he/she was awarded 0 points. If the child’s answer relat-

ed both opposites to the same object, but only for parts of the object (e.g. a penguin is black on its back and its belly is white) or required a process of transition to its opposite (the tree is alive, and when it's cut it is dead) they were given 1 point. If the answer involved both opposites characterizing the object as a whole, (for example, the reflection of a person in a mirror, which is both the person themselves, and another at the same time) they received 2 points. The minimum score was 0, and the maximum was 10 points.

The "Cycles" [2] was used to evaluate the children's understanding of simple developmental processes. Tasks were connected to the use of the dialectical mental actions of seriation and reversal, which revealed the child's understanding of cyclical representations. Cycles represent the unfolding of an event that begins and ends in the same state. In order to understand this, the child needed to imagine the structure as a whole, and perform two consecutive dialectical mental actions in the course of seriation, i.e. transformation and reversal. For example: the weather was sunny, then it turned bad, and a thunderstorm began (transformation), and then clouds dispersed, and the sun came out again (reversal). Each child was invited to arrange five cards with images to create a sequential story. In total, three stories were used such as: tea with sugar, a kettle with water, and the weather. If the child placed the five cards correctly during his/her first try, he/she was awarded 15 points. If the child had trouble with the task, he/she was presented with two half-cycles, and if he/she could complete those, he/she was awarded 12 points. If the child couldn't complete the task, the experimenter moved to the next one. For the fourth and fifth tasks, the child was presented with a series of pictures where the first and the last cards of the half-cycle were already in the correct position, and children needed to find a card that corresponded with the transformation process. Each correctly completed

task was worth 3 points. The minimum score was 0 and the maximum was 45.

## Results

The research data obtained were analyzed in three stages. At the first stage, descriptive statistics on how the children performed working with the evaluation tasks were calculated. At the second stage, a correlation analysis of the relationships between indicators of dialectical thinking and emotion understanding was carried out. And at the third stage, using a linear hierarchical regression analysis, a regression model was built, which made it possible to determine the uniqueness of the contribution of dialectical thinking indicators to the dispersion of values according to the general level of emotion understanding when controlling non-verbal intelligence.

The results of children's evaluation are presented in Table 1. The distribution of scores for all components of the "Test of Emotion Comprehension" (TEC) indicates that the average value for the study sample corresponds to the age norm that was previously obtained on a sample of 596 children [2]. This indicates the normative development of emotion understanding by the participants in this research. The distribution of scores according to the "What can be both at the same time?" compared with the maximum possible values were shifted below the average, i.e. mental action mediation (M) is in the process of formation.

The results of the correlation analysis between indicators of dialectical thinking and indicators of understanding emotions are presented in Table 2.

Correlation analysis showed that children's results of the "Cycles" and "Raven's Progressive Color Matrices" are associated with all three components as well as the overall level of emotion understanding. Children's results in the "Drawing an unusual tree" are associated

Table 1  
**Mean Scores and Standard Deviations according to the Results of Children's Evaluation (N=148)**

Indicators	Average	Standard Deviation	Range of Possible Scores
Emotion Understanding			
External component	2,50	0,75	0–3
Mental component	0,42	0,54	0–3
Reflexive component	1,22	1,00	0–3
Overall level	4,14	1,59	0–9
Thinking			
Raven's Coloured Progressive Matrices	14,91	7,925	0–36
What can be both at the same time? (As a criterion of the dialectical action of mediation)	1,05	1,52	0–10
What can be both at the same time? (total score)	2,49	2,019	0–10
Cycles	22,84	10,24	0–45
Drawing an unusual tree	0,52	0,634	0–2

Table 2

**Relationships Between Emotion Understanding Components and Indicators of Dialectical Thinking and Level of Non-verbal Intelligence (N=148)**

	External	Mental	Reflexive	TEC (overall level)
Cycles	0.274**	0.164*	0.172*	0.276**
Drawing an unusual tree			0.242**	0.232**
Raven's Coloured Progressive Matrices	0.183*	0.193*	0.325**	0.346*

with the reflexive components as well as the overall level of emotion understanding. The analysis did not reveal significant relationships between the children's success in the performance of "What can be both at the same time?" and any of the TEC components.

To analyze the contribution of dialectical thinking indicators and non-verbal intelligence to the emotion understanding development, a linear hierarchical regression analysis was carried out. The regression model showed that 12,9% of the values dispersion of the general level of emotion understanding is explained by non-verbal intelligence ( $\beta=0,71$ ;  $p<0,01$ ), which corresponds to the results of earlier studies. However, when the predictors associated with dialectical thinking were included in the model (total score according to the "Cycles" and "Unusual Tree Drawing" ), the explanatory power of the model increased to 22,2%, while remaining significant ( $\beta=0,37$ ;  $p < 0,02$  and  $\beta=0,42$ ,  $p < 0,025$ ). This result confirms the significance of the dialectical thinking contribution to the dispersion of values in terms of the overall level of emotion understanding when controlling non-verbal intelligence.

### Discussion

Further supporting the results of previous studies [11; 16; 17;32], this research found a connection between formal thinking and the ability of children to understand the nature and causes of emotional states. However, the question of the relationship between emotion understanding and dialectical thinking had not yet been studied. The main research hypothesis was the assumption of the existence of significant relationships between the emotion understanding components with non-verbal intelligence (which has already been shown in previous studies), but also with dialectical mental actions.

The results of the analysis confirmed the hypothesis that there are links between dialectical thinking indicators and the ability of children to understand emotions. The children's successful use of the dialectical mental action *transformation (T)* was associated with their overall level of emotion understanding. The existence of such a connection can be explained by the nature of dialectical transformations. Understanding emotions, includ-

ing hidden and mixed emotions, is associated with the ability to identify contradictions and operate with the opposites inherent in them. Probably, it is the ability to operate with opposites, available to preschoolers as early as 5–6 years old, that acts as a general basis for the connection between the dialectical thinking development and emotion understanding in childhood.

The assumption about the connection between the understanding of the simplest developmental processes and all components of the emotion understanding has also been confirmed. The ability of children to formulate ideas about cyclical representations of everyday and natural processes correlates with the successful recognition of emotions (including hidden and mixed feelings), as well as with the awareness of being able to regulate emotions using cognitive strategies and moral rules. We believe an explanation for this relationship is the parallel structures that reflect the process of dialectical thinking [5] and the dynamics of emotional states [27]. Probably, it is the ability to combine cognizable processes into a single structure, which is available to preschoolers already at the age of 5-6, acts as a general basis for the connection between the dialectical thinking development and emotion understanding in childhood.

As a result of the regression analysis, it was revealed that such dialectical thinking indicators as cyclic representations and the dialectical thinking action of transformation, along with non-verbal intelligence, are predictors of children's emotion understanding. These results confirm the previously described origin of the development of dialectical mental actions, as well as its statistical independence from the influence of non-verbal intelligence on the emotion understanding [2].

The research results analysis did not confirm the assumption about the connection between the success of overcoming contradictions with the help of the dialectical mental action of mediation and emotion understanding. We explain the lack of expression of such a connection by the age-related features of emotion understanding development. A consistent understanding of mixed and conflicting emotions, as well as the ability to regulate emotions via cognitive strategies, as mentioned above [26], form in primary school age. At the same time, the dialectical mental action mediation at 5-6 years old creates the prerequisites for understanding contradicto-

ry situations in which opposites can be represented not only in the form of a situation's objective properties, but also as subjective emotional experiences [6, p. 22]. This result confirms the complexity of mixed and conflicting emotions understanding and the importance of the older preschool age in the formation of the prerequisites for building this concept. This result confirms the difficulty in understanding mixed and conflicting emotions and the importance of the older preschool age for the fundamental prerequisites to be in place to support such a difficult concept.

This study shows the role of dialectical thinking in the emotion understanding development in preschool children. The results are consistent with K. Riegel's previously expressed ideas on the significance of dialectical operations in the children's thinking development. Looking at dialectical actions in a cultural-historical context supports the validity of L. Vygotsky's proposal that affect and intellect are an indivisible whole.

Concluding results discussion, we would like to describe the limitations of this study. Some of them are associated with a sample of children aged 5–6 years, which reduces the possibility of analyzing age differences in the relationship between dialectical mental actions and emotion understanding. In particular, the sample diversification will help to clarify the assumption (that arose based on the analysis of the data obtained) about the possible significance of the dialectical mental action of mediation in creating prerequisites for the development of understanding of situations in which contradictory and mixed emotions arise in older preschool age. One of the prob-

lems that is of interest for future research relates to the study of the impact of an intervention that activates the dialectical thinking of preschoolers on their emotional development.

## Conclusion

The conducted research showed the connection between dialectical thinking and emotion understanding in senior preschool children. It was determined that genetically early forms of dialectical mental actions, such as the ability to perform the dialectical thought action of transformation and the action of dialectical seriation (i.e., the ability to operate with the simplest cyclic representations) are associated with the emotion understanding. At the same time, when controlling non-verbal intelligence, these mental actions make a significant contribution to the overall level of understanding of emotions in children aged 5–6 years. There was no connection found between the ability to solve problems to overcome contradictions with the help of the mental action of mediation and the emotion understanding in children of older preschool age. This result is of interest for future studies, including those on relationships with other forms of emotional manifestations in preschool age.

The research results are of practical importance and allow the use of tasks aimed at transforming and developing conflicting situations as developing ones while working with senior preschool children.

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