

Investigation of Early Mathematical Competence of Child with Autism Spectrum Diataraches: Case Study

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ABSTRACT

In recent years an attempt has been made to outline the cognitive profile of children with Autistic Spectrum Disorders (ASD) in mathematics. The differentiation of the qualitative characteristics of the mathematical performance of the child with the ASD in activities related to Early Mathematical Competence compared to typical development children, the level of performance of the relational tasks, compared with the enumeration tasks and the role of the function of illustration in solving verbal addition and subtraction problems process an area of particular research interest as they are directly linked to the development of educational approaches. The purpose of this research is to investigate the Early Mathematical Competence of a child with ASD with an emphasis on the knowledge and skills that are essentially about creating the concept of number. For the purposes of investigating the above purpose, a qualitative approach was used. More specifically, Utrecht's Early Mathematical Competence Criterion was administered to the child who participated in the research. In addition, the unstructured observation was used to record the difficulties of the student at the completion of the tests, the possible avoidance strategies and the time of completion of the activities, as well as the structured interview with one of the parents of the child in order to delimit the case. The results obtained from the qualitative analysis of the data demonstrate the existence of significant difficulties in relational tasks compared to the enumeration tasks, and in particular, the ability of the serial match was not developed since these abilities are linked to the concept of quantity conservation. The results of the research lead to the conclusion that children with ASD have a particular cognitive profile in mathematics which does not correspond to the typical development of logical-mathematical thinking.

Keywords: Early Mathematical Competence, Autistic Spectrum Disorders, Pre-school Age

INTRODUCTION

Early math proficiency, according to the Van de Rijt, Van Luit & Pennings (1994), "refers to the set of knowledge and skills that are prerequisite for effectively inserted a preschool and primary school age children in school Mathematics of formal education. These knowledge and skills relate mainly to the creation of the concept of number as a key area of school mathematics in the early years of formal education is the elaboration of numerical concepts and relationships".

The purpose of this research is the investigation of early Mathematical Competency of a child with autistic spectrum Diataraches, who attends a special elementary.

Literature review

According to Bogindroyka (2002), around the 19th century in a survey they had done for the recording of mental disorders in childhood "Sancte de Sanctis defines a group of children aged 4 to 10 years, with the term *Dementia precocissima catatonica*». "These children were showing early symptoms of paranoia, as constant lessening of interest in the family environment, reactions without motivation, stereotypies, catatonia syndrome and progression to dementia." (Bogindroykas, 2002).

The Kanner on the other, as stated in Bogindroykas, Kalomiris, Papageorgiou (2007), recorded the language features and communication using children with autism. Pay attention to the ineffectiveness of the language used by children with autism, it seems from the descriptions on the echolalia, the repetition and reversal of pronouns.

The efforts of his investigation has lasted almost half a century to scientifically confirmed case and become clinically accepted (Bogindroykas, Kalomiris, Papageorgiou, 2007).

According to Kakoyro (2005), ' the term, autism, derives from the Greek word, self, and denotes the isolation of an individual in himself ". First of all the term was used by the Swiss psychiatrist Eugen Bleuler, 1911, as stated in Kakoyro (2005), "to classify some people with schizophrenia who had lost touch with reality". "Then, in the early 1940 's, two other psychiatrists, Leo Kanner and Hans Asperger described cases of children who show deficits in social development, quirky language development and limited stereotypes interests". Furthermore as Autism ranks "in the category of Pervasive Developmental Disorders." "These disorders are characterized by severe deficits in many areas of development simultaneously, so I called diffuse" (Koykoyros, 2005).

Also the Alexiou (2004), States that "Autism is certainly a problem of Neuropsychiatry development disorder in other words, is a health problem, but in treating even scientific treatment is a problem deeply social and political that the solution requires polymorfoys, long-term and persistent struggles "(Miller, 2004).

But according to the Tsoyriadoy (2008), there are two theoretical approaches that are associated with creating the concept of a number or numerical concepts ". Originally the first approach in accordance with the Tsoyriadoy (2008), has to do with the Piaget's theory. More specifically, "the first step for the development of the concept of number is the child's ability to distinguish and effectively uses the absolute and the regular numbers." This effect becomes more obvious when the child has the ability of serial matching (Tsoyriadoy, 2008).

In addition the Piaget (1952), says that "the evolutionary growth of the four skills, comparison, classification, and mapping of seiriothetisis, lies at the core of the configuration path of the concept of number" (Piaget, 1952).

While Fuson, Gelman & Gallistel (1978), questioned Piaget's views, "both in terms of age limits, as well as the skills needed for the formulation of the meaning of number". Their view was that children develop from very early age the ability of counting "staple quantities," which used some times when they wanted to compare two sets instead of assigning these sets (Fuson, Gelman & Gallistel, 1978).

The following task shows the investigation of early mathematical competence in a child with autism. Early proficiency according to the Van de Rijt, Van Luit & Pennings (1994), considered the degree of readiness that has a child to join in school knowledge and can directly be linked to school readiness. Specifically as record "the theoretical framework of applying Early Mathematical Competence of Utrecht, the term early mathematical competence refers to the set of knowledge and skills that are prerequisite for effectively inserted a preschool and primary school age in school mathematics of formal education". Because the basic division of mathematics of the school is the learning of numerical concepts and relationships. (Van de Rijt, Van Luit & Pennings, 1994)

According to Peeters (2000), and since children with autism have the need of a constant and targeted educational intervention, as well as by the address of a configured additional definition of autism. "This includes didactic approaches, learning environment and personalized work. It is an approach that is based, mainly, on the intense personalization, Visual support, the predictability and continuity. There are many kinds of approaches, since there is a great variety of individual learning needs ". (Peeters, 2000)

In addition, the Chitoglou-Antoniadou, Kekes, Chitoglou-Smith, (2000), indicate that autism is considered a Prime and global disorder a exelixis defined by communication disorders, difficulty to create social relationships and of erratic behavior. Yet it is "the result of a neurological disorder that affects brain function and consequently the various areas of development, in an unstable and irregular manner". Also seems a bit before the age of three years and often coexists with other diseases or syndromes, such as Angelman Syndrome, Prader-Willi syndrome, phenylketonuria ". (Chitoglou-Antoniadou, Kekes, Chitoglou-Smith, 2000).

The Genna (2002), in turn, considers that the definition of autism was created from the Greek ' This ' which means 'I myself ' and it is obvious that autism is a form of aytoerwtismoy because he "presupposes a return of momentum to itself. (Genna, 2002).

Yet according to the Grandin & Scariano (1995), the level of intelligence of a child with autism is ranked from the highest levels of intelligence as and the severe forms of mental retardation. More specifically, the common characteristics of children with autism are to "resist any change, we use words but moves, become aggressive with score to hit others or being injured themselves, we use it almost 13 never eye contact and linked too, with some objects or movements ". (Grandin & Scariano, 1995).

In addition, the Wing (2000), does not believe that there is any particular definition clearly speaks for autism. Why which presents many differences and by the percentage of the source where it originated but also by various specialists or business related but also by their own parents of children with autism. "For the definition of autism and its affinity with various wheel situations of childhood there were many disagreements but also questions" (Wing, 2000)

The Gonela (2006), states that there are a lot of definitions, one of them is the medical definition which according to him defines autism as a characteristic behaviour, but not recorded behaviors to show their own "uniquely indication of Autism ". In short, the behavior of a child with autism is recognizable, but it is difficult to understand everyone by himself "this condition or to decide on how to approach". Medical science for the spectrum of autism marked some criteria (DSM-IV, ICD-10), through which each person must show "Symptoms" list for autistic. (Gonela, 2006)

On the other hand the educational definition, in accordance with the Gonela (2006), believes that autism contains "didactical approaches, learning environment and personalized work '. More detail is an approach which is based, "the intense personalization, Visual support, the predictability and then. There are many kinds of approaches, since there is a great variety of individual learning needs ". (Gkonela, 2006)

Early math competence, according to the Van de Rijt, Van Luit & Pennings (1994), "refers to the set of knowledge and skills that are prerequisite for effectively inserted a preschool and primary school age children in school Mathematics of formal education. These knowledge and skills relate mainly to the creation of the concept of number as a key area of school mathematics in the early years of formal education is the elaboration of numerical concepts and relationships "(Van de Rijt, Van Luit & Pennings, 1994). In Greece only few recent data exist in

the field of mathematical competence in intellectual disability (Charitaki, Baralis, Polychronopoulou, Lappas, & Soulis, 2015b).

It is observed that researchers and teachers give more basis in numerical particularly in the cultivation of mathematical skills, such as the ease of execution of mathematical operations on speed, problem solving and memory (Charitaki, Baralis, Polychronopoulou, Lappas, & Soulis, 2015a). The Woodward (2006), this tendency of teachers and researchers in the warrant as a "convenient", observed "a hierarchical doctrine, under which the practice of students in performing specific steps leading to results" (Woodward, 2006). There are no specific surveys for mathematics early childhood education for children with autism and as many surveys have taken place at present is with math for children with special needs, and those are minimal.

METHODOLOGY

Method

The method used is qualitative, to explore in depth the specific features associated with the early mathematical competence of the child. To ensure the validity and reliability of research used the data triangulation, which relates to the consistency and control of data collected through the combination of different tools (Papaioannou, Theodorakis, & Goudas, 1999). The collection of research data through lasted 2 years.

Research Questions

Individual research questions that seeks to answer this survey are as follows:

1. What are the qualitative characteristics of mathematics performance child with autistic spectrum disorders, low functionality, in activities related to early Math Proficiency?
2. There is a differentiation in the level of student performance with autistic spectrum disorders in relational activities (Piaget projects) in relation to the activities counting (Gelman projects)?
3. There is an effect of images in the process of solving addition and subtraction word problems?

Sampling

The method of sampling selected as optimal for the purposes of this research, is the purposive sampling. Basic explanatory factor is choosing population units which must meet predetermined profile (Diamantopoulos, 2012). Therefore, the attendee is a boy with ACD, low functionality, chronological age 5:05 (years: months), which attends to special elementary.

Data Collection Tools

Early Mathematical Competence Criterion

Initially the tools used for this case study is the Early Mathematical Competence Criterion of Utrecht. The criterion used is made up of the following eight sections: the comparison, classification, mapping, seriation, using words, structured numbering enumeration, the efficient counting and general knowledge of numbers. Each section consists

of 5 projects. This research tool is weighted criterion and thus has been tested both in terms of reliability, and validity.

Unstructured observation

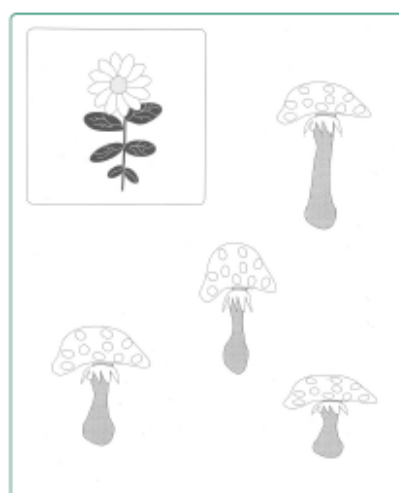
According to the Kedraka (2010), with the remark we mean a process which enables the researcher to draw on information and data through direct, his own observation of individuals, groups, institutions, behaviors, conditions, premises, or organisms. For the purposes of delineating the level of math skills of child under study, took place facing difficulties recording the child upon completion of activities.

Structured interview

Finally, used the methodology of structured interview technique to the mother of the child in order to record the personal characteristics of the child and thus be fully outlined in the case study.

Results and discussion the findings

Initially it is important to set out the history of the child, as it developed from data collected from the interview with the child's mother. The child is a boy, chronological age 5:05 (years: months) and attends a special kindergarten. Has three other brothers, two older and one smaller than this. Also, the child on a weekly basis makes speech therapy sessions, as well as meetings with a psychologist. Still, major involvement with the sport is athletics. Participate in housework, however, most of the time, can in principle or grumble and be pissed but after doing that he asked his mother. Namely, picks up his toys and places them in appropriate boxes each, helps with the running of beds, in the kitchen or in cooking, either in the table's run-in. More generally with the housework helps his mother, but always as he: "in its own way" as his mother says. With reference to the level of self-service, it could be noted that is a middle status which seek his parents to gradually improve.



Picture 1: Project criterion 1

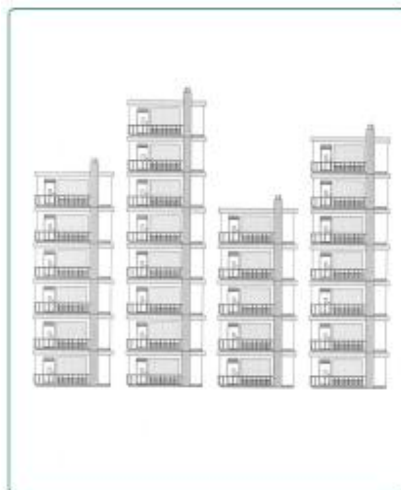
Finally, the use of money makes him very much to the point that it cannot handle money almost at all. With regard to the performance of the child, the qualitative analysis of research data demonstrates a unique learning profile with better performance in counting activities. Significantly lower performance marked on relational activities. Already

from the 1st section of the criterion, this comparison are noted several faults on the child's responses, however does not seem to be experiencing particular difficulty. More specifically, the proportion of correct responses overall was 60%. More specifically, in the first question (Figure 1), in which it is detected that the mushroom that is taller than the flower, the student gave the right answer pretty quickly, almost instantly. Also, in a series of similar activities of this kind, the student was able to directly detect the "tallest/shortest" object compared to given object. Fact, which allows us to assume that the student has conquered the above-mentioned meaning of the comparison.



Picture 2: Project criterion 2

The 2nd project was requested to identify the man who is fatter than that of the image. In this project the answer given was incorrect. The student threw a fleeting glance and replied very quickly. However, and in other activities of comparison which entail the notion "fatter/slimmer" were incorrect answers demonstrating an inability to handle the concept.

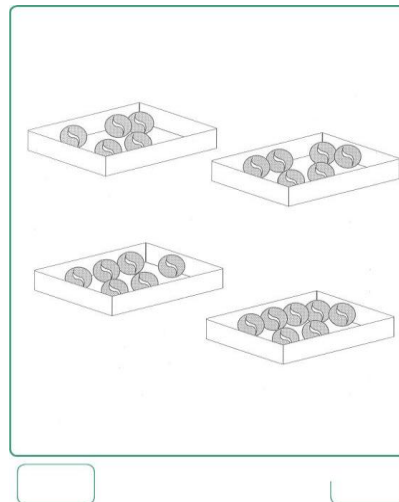


Picture 3: Project criterion 3

Then the student responded correctly to the 3rd question I was requested to identify the lowest apartment block and the 4th which was requested to identify the Indian who has fewer feathers than the one holding the bow. And in these projects the student's answers were immediate. Also, it would be good to remember that the student do not count in any of the two projects to give his reply.

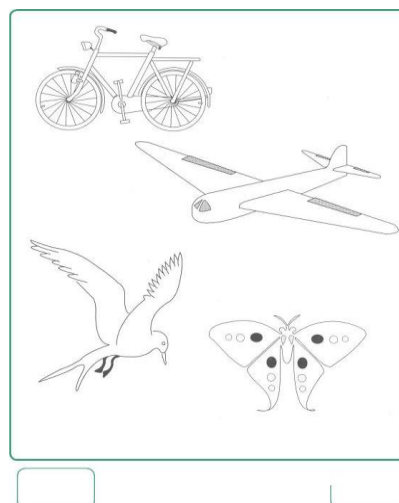


Picture 4: Project criterion 4



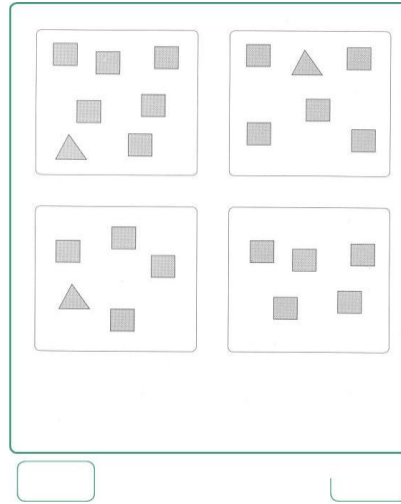
Picture 5: Project criterion 5

In the next section the sort the 1st had requested the learner to show which of the images showed no flies and the trainer showed him the wrong image.



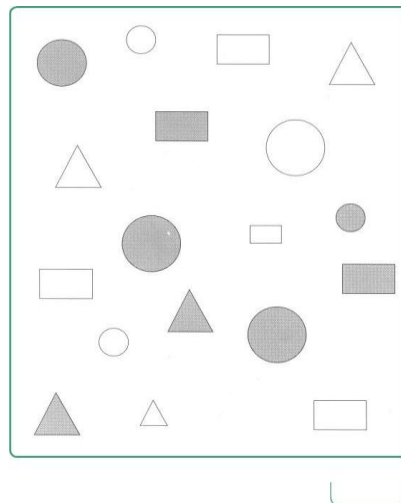
Picture 6: Project criterion 6

In the 2nd section classification requested the respondent which image had five blocks and no triangles, the answer given by the examinee was flawed, because it showed the image that has 5 (five) squares had 1 (one) triangle.



Picture 7: Project criterion 7

The 3rd question where I had to show the child all the grey circle, the response of the test was a grey and a white circle that was wrong.



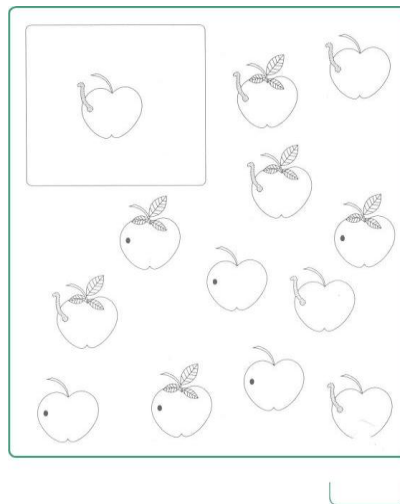
Picture 8: Project criterion 8

Also the next question the examinee has to show the examiner all people holding the bag and did not wear glasses, the answer given by the respondent was flawed because it only showed one of them and not all those who had specific features.



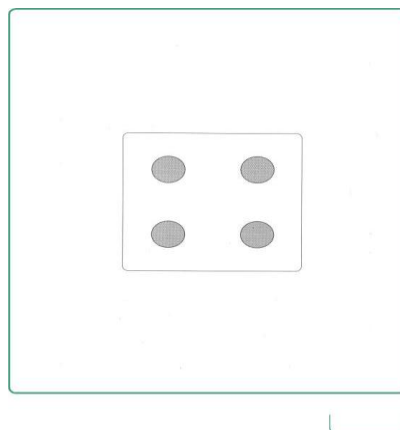
Picture 9: Project criterion 9

The last question in this section the examiner asks the child to show him apples that have a worm, a stalk and has no leaves, the answer was wrong because it showed him an Apple that had a worm, a stalk and pals.



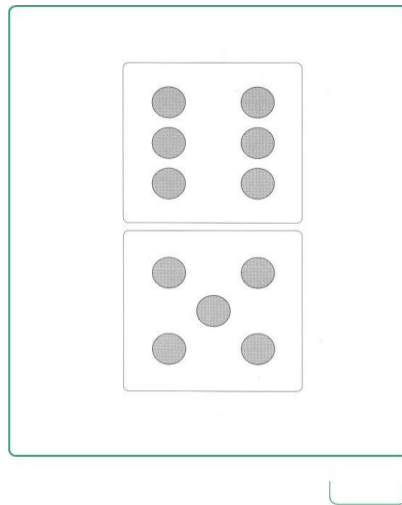
Picture 10: Project criterion 10

The piece of matching the first question you have to answer the examinee was to put as many cubes as the dots depicting the dice and the child took the cubes and tachtopoiise just as were the dots on the dice.



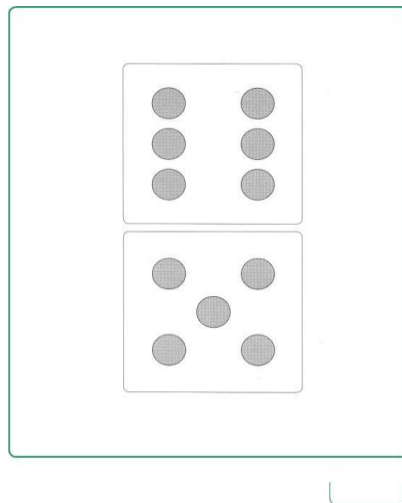
Picture 11a: Project criterion 11

In the second question the examiner gave correct answer again put so as many cubes they were dots from the dice.



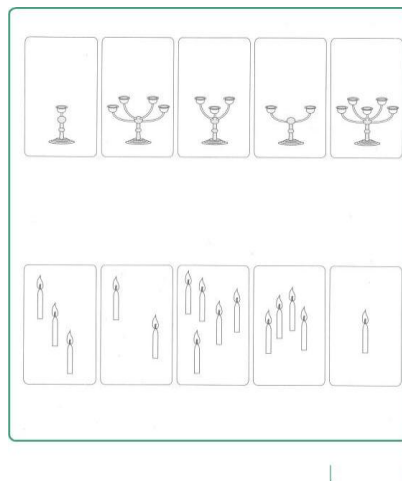
Picture 11b: Project criterion 11

The next question I had to match the candlesticks with the candles and made very correctly.



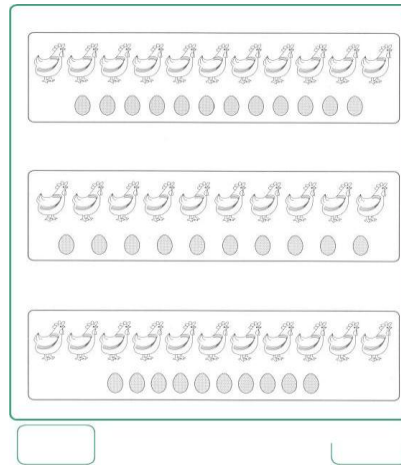
Picture 12: Project criterion 12

The next question I had to match the candlesticks with the candles and made very correctly.



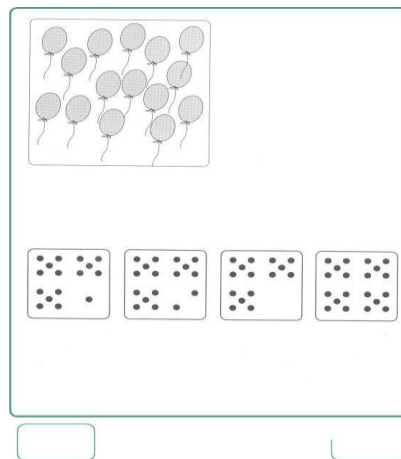
Picture 13: Project criterion 13

The next question that seemed that made him say to find the image that each hen has an egg and what I did was to assign the hens with the eggs.



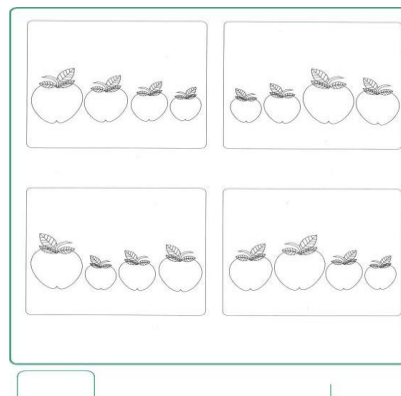
Picture 14: Project criterion 14

The last question on the piece of matching the examiner wants to show the child the square which has as many dots as there are balloons, his answer was correct since first measured the dots each square.



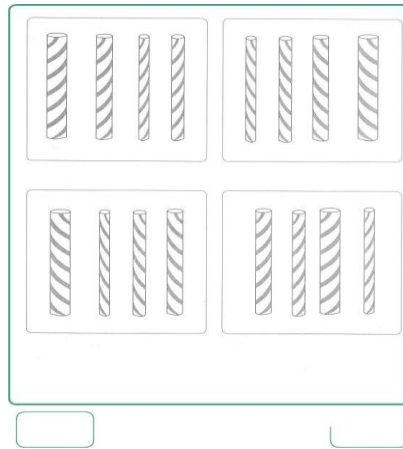
Picture 15: Project criterion 15

The next section is the seiriothetisi where the intern in question said to show him the picture where apples are in order from largest to smallest his response was correct, though responded quickly.



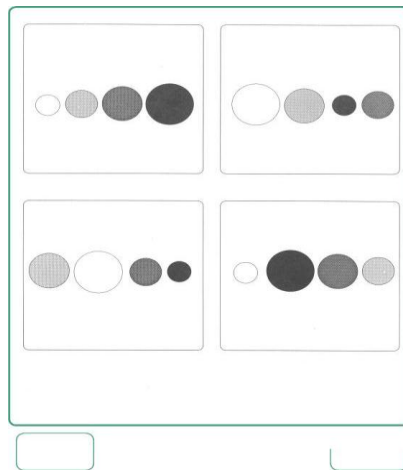
Picture 16: Project criterion 16

The 2nd question answered correctly, the investigator wanted to show him the picture where the candles were in sequence from the most delicate to the most coarse.



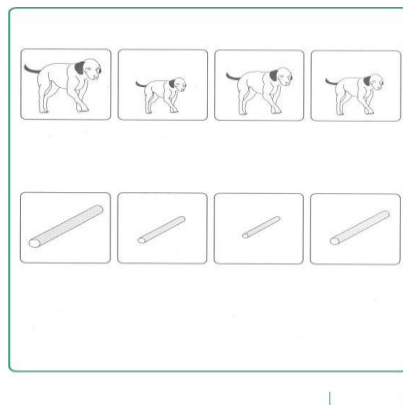
Picture 17: Project criterion 17

The next question was to show to examine the image in which the designs are in the range from the smallest and lightest in the larger and darker and the answer I gave was wrong.



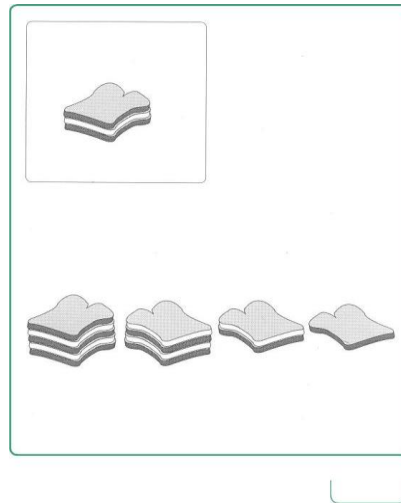
Picture 18: Project criterion 18

Then the examiner wanted the child to join in every dog with the wood of corresponding and the mixed up big with the next dog.



Picture 19: Project criterion 19

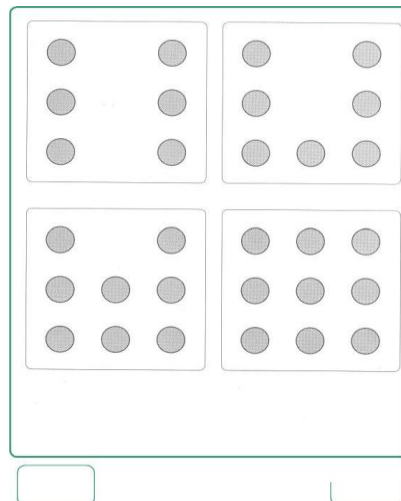
The last question made him a little and it seemed because it was slow to respond and not given and the correct answer.



Picture 20: Project criterion 20

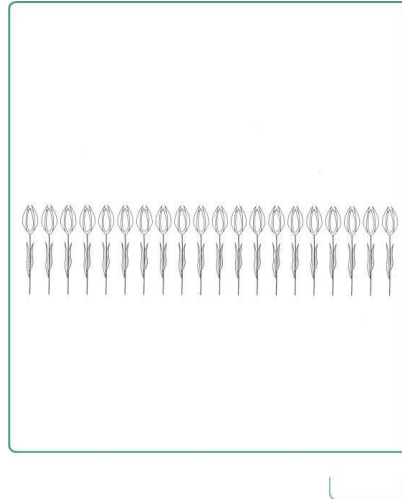
Seeing the above answers that gave the rate they did in the first four sections of the criterion, the comparison, classification, mapping and seriation, in short they referred to the Piaget's theory is the 40 %.

In the section using words in the number 1 question that ought to count up to 20 (twenty) replied very correctly. The 2nd question in which the child had to show the picture that has 7 (seven) bullets responded correctly and without error in the process of the count, (Picture 21). In question 3 you say to count from 9 (nine) as the 15 (fifteen) the child without the help of examiner measured very correctly.



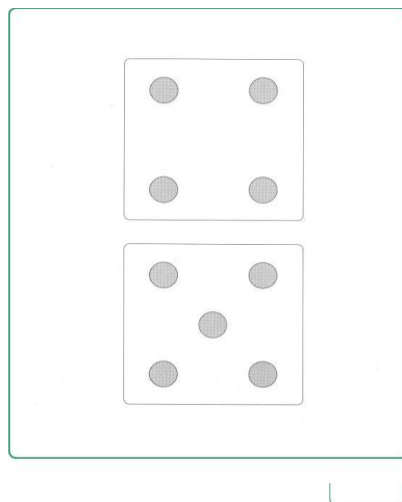
Picture 21: Project criterion 21

Yet in the very next question there was an image that showed a 20 (twenty) flowers and the examiner requested by 18 (18th), the interviewee, however, what he did was to start counting the flowers and not really well because it was too close to the another, (Picture 22). The last question he wanted the child to start counting until 14 (fourteen) going up two – two, with the help of examined Authority continued to run normally after.



Picture 22: Project criterion 22

In structured counting the examinee fared quite well, with the 1st question was supposed to measure 16 (sixteen) cubes in 4 (four) different sets of four and measured without confusing anyone. In the 2nd question the examiner put 9 (nine) cubes in the shape of a circle and the child measured without being confused. Then the examiner puts 20 (twenty) cubes mixed at the table and the child counts showing the so as not to confuse anyone. The 4th question shows a picture for 2 seconds on the test and tells him to look carefully, takes the picture and asks the boy how many dots were the dice and the response of the test was correct, (Picture 23). The last question the examiner places 17 (seventeen) cubes on the table leaving a distance between them and have the child to start counting going down and began counting correctly.

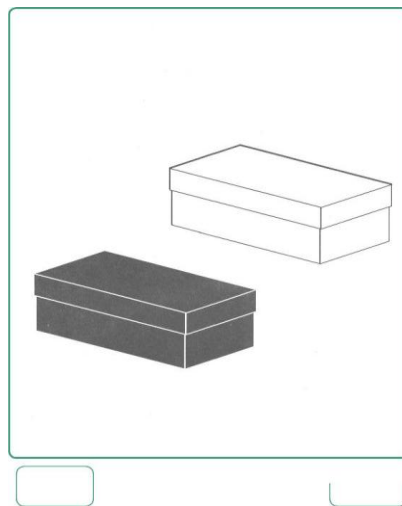


Picture 23: Project criterion 23

Effective 1st count question the examiner gives 15 (fifteen) cubes to the examinee and asks him to put the 15 (fifteen) 11 (eleven), the child put the 15 (fifteen) cubes and not only the 11 (eleven). In the 2nd question placed on the table 20 (twenty) cubes in a row having a distance of one another and asks him to count but without the shows, the kid did exactly what you told the examiner. Then he put on the table 15 (fifteen) cubes in three rows of 5 (five)

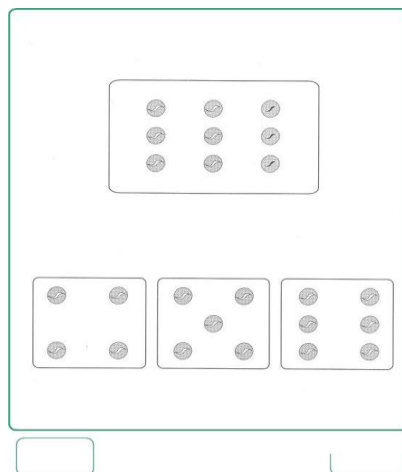
leaving again spaced, the respondent the count again but this time showing. The examiner puts the next question 19 (nineteen) mixed cubes and asks the child to count, that began the counts showing and some be counted twice.

Finally the examiner puts 5 (five) cubes on the table the shows in question and then immediately puts them under his arm. Immediately after putting other 7 (seven) cubes under his arm and asks him how many cubes has the interviewee gave the correct answer. In these sections, that is, to use the words of numbering, structured and effective count enumeration, the percentage of correct answers given by the examinee is 67%. Automatically answered the second research question "are there any differences in the level of student performance with pervasive developmental disorders-Autism spectrum on relational activities (Paget) compared with counting activities (projects Gelman)? ", where it is clear there is a diversification of the results given by the examinee. The section General knowledge of numbers, in question 1 the exetasteis asks the child to tell which of the two boxes have more candies in black has 9 (nine) and white 13 (thirteen) and the interviewee gave the wrong answer the black.



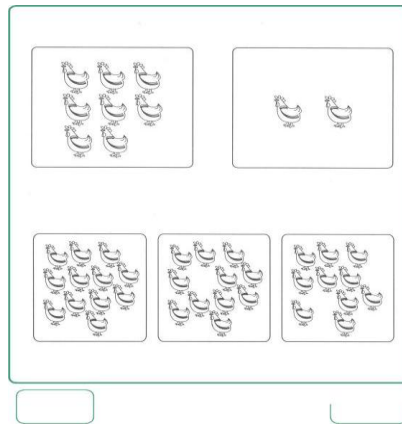
Picture 24: Project criterion 24

In the 2nd question the examiner shows a picture with 9 (nine) ball and asks the patient if he loses all three balls how much will be the ones who will stay and gave correct answer 6 (six) balls.



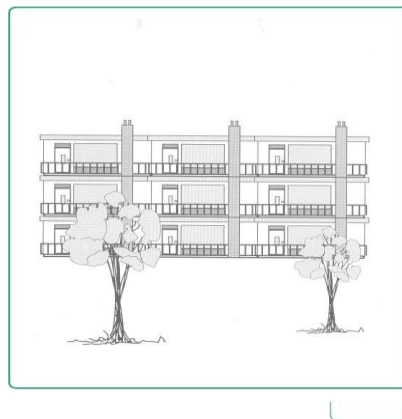
Picture 25: Project criterion 25

The next question the examiner showed two pictures one had 8 (eight) chickens and the other image was 2 (two) and ask the child how many has overall and gave the correct answer 10 (ten).



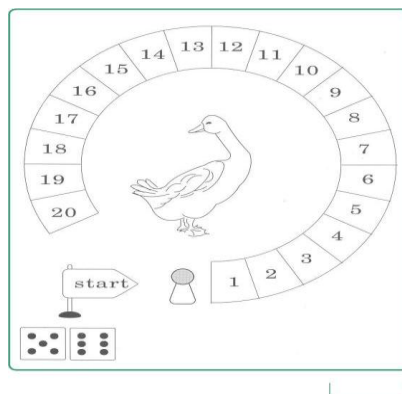
Picture 26: Project criterion 26

The examiner to this question showed the child an apartment building and asked him how many windows it has that gave the wrong answer, because metrage and doors outside of windows.



Picture 27: Project criterion 27

Finally this question the child doesn't understand and started instead of counting the dots from the dice and put his pawn metrage the boxes with numbers.



Picture 28: Project criterion 28

CONCLUSIONS

Summarizing the findings of the present investigation, it could be noted that relational skills are an area of particular difficulty for children with autistic spectrum disorders. Unlike typically developing children and children with mental retardation (Charitaki, Baralis, Polychronopoulou, Lappas, & Soulis, 2014a; Charitaki, Baralis, Polychronopoulou, Lappas, & Soulis, 2014b), logikomathimatiki thought of children with autistic spectrum disorders seem to have different development course, whose questions at its core the procedural math. Due to this fact effective interventions can be applied with the use of ICT (Charitaki, 2015), which can be designed in order to take advantage of opportunities related to real life (Baralis, Soulis, Lappas, & Charitaki, 2012).

Limitations of the research

The present investigation is an individual case study. Its value is that given preliminary guidelines for mapping of the area. However, it appears directly in the need to carry out more studies with larger samples for carrying out generalizations.

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