ISSN 2078 6999. Вісник Львівського університету. Серія філософські науки. 2013. Випуск 16. С. 183–191
Visnyk of the Lviv University. Series philosophical science. Issue 16. P. 183–191

PSYHOLOGY

USC: 159.973

DIFFERENTIAL DIAGNOSTIC OF CHILDREN WITH AUTISTIC: PSYCHOLOGICAL ASPECT

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Children of school age with autistic spectrum disorder (ASD) and mental retardation were investigated by use of standard Childhood Autism Rating Scale (CARS) as well as neuropsychological research by A. Luria. The unexpected result was a presence of a certain level of autism in children who are officially diagnosed as mental retardation, which allows to support that autistic symptoms can occur in children with various mental disorders. Using discriminant analysis of the experimental results obtained by A. Luria and CARS methods, we identified the most important indeces for diagnosing ASD in children. For adequate differentiation of ASD it is necessary high values of such indexes as criticality, overall impression, emotional reaction, adaptation to changes in activity level, relationships with people, nonverbal communication, verbal communication and low values of such indexes as test for objective gnosis, proof test, adequacy, using objects, imitation, intellectual development and timidity.

Keywords: autistic spectrum disorder, mental retardation, children, diagnostics.

Introduction

The autistic spectrum disorder is not rare disorder in pediatric practice [3]. The earliest epidemiology studies noted a prevalence of Infantile Autism of 4-5 per 10 000, which is approximately 1 in every 2000 people [7]. With the broader clinical phenotyp and improved clinical recognition, the prevalence estimates have increased to 10-20 per 10 000, or one for every 500 to 1000 people [2]. So, in general a tendency to broadening of ASD is observed in clinical practice. This is connected with improvement of diagnostic criteria of autism as well as correct distinquishing of autism from others diseases.

Diagnosis of autism is based on the diagnostic criteria of ICD-10 and DSM-IV, which are similar in many respects. As in the DSM-IV, and in ICD-10 autism is not seen as a disease with a defined etiology and pathogenesis, but as a syndrome with atypical behavioral disorders and symptoms deformed overall development, leading to profound disability and inability to function independently.

To the 80-ies of last century diagnos ASD was absent in Ukrainian clinic practice. All people with ASD features were reffered to parergasia or others clinical diagnosises. So question of distinguishing of ASD from others deseases is very important for Ukraine. This topic call great interest at other ASD researches [9; 11–13]. The papers deal with differential diagnostic of ASD

from mental retardation. These questions were under attention of many investigatons. Ingram with co-workers assessed people wth ASD and mental retardation using the Playground Observation Checklist [4; 9]. The main distinguishing feature of these diagnosises in Ingram opinion is social competences [4]. The children with ASD have substantial impairment in this area, while children with mental retardation are similar to healthy children [9]. However, it is not so clear, when we work with children with deep mental retardation and high level of ASD. They have not social competence too and there is a problem in correct differentiation.

Mental retardation is general intellectual functioning below average, which is accompanied by significant limitations in adapting to certain areas, such as self-service, job, maintaining health and safety. Thus, mental retardation defined through the notion of behavior and intelligence (as defined in DSM-IV) [5].

In ICD-10 for mental retardation referred to in section F7, where mental retardation is defined as a state of arrested or incomplete development of mind, which is primarily characterized by impaired abilities that occur during maturation and provide a general level of intelligence, ie cognitive, language, motor and social abilities. Backwardness can develop with any other mental or somatic disorder or occur without it.

The aim of our study is to determine the differences in the levels of the tasks fulfillment according to the methods of neuropsychological research by A. Luria and A. Bine – T. Simon scale test of mental development for children with autism and children with mental retardation. We believe that the results will give us the opportunity to further diagnostic differentiation of children with autism from those with mental retardation by proper consideration of the scale, we see significant differences. Also, this study will enable us to define the features of cognitive development of children with autism, which in turn will improve compilation correctional and rehabilitation programs for children with autism.

Experimental methods

The investigations were carried out on school children of first Ukrainian experimental school for learning of children with ASD. Besides at the school children with mental retardation as well as language problems learn. So, for investitation 50 persons with ASD as well as 56 persons with mental retardation were choosen. The age of children ranges from 8 to 16 years.

The following methods were used in the investigations:

1) A. Bine – T. Simon scale test for mental development level determination;
2) methods of neuropsychological research by A. Luria for psychical development level determination;
3) method CARS (Childhood Autism Rating Scale (Scale of assessment of children's autism by E.Shopler) for level of ASD determination

Among the applied methods require a separate explaining neuropsychological study by A. Luria[1; 8]. In our work, we conducted a study using techniques such parts: orientation, adequacy, criticality, proof test, test for reciprocal coordination, test for conditional response selection test for dynamic praxis, a test for copying simple figures, standard on finger posture and oral praxis , test for objective and acoustic gnosis, a test for identification of spatially simple shapes and fineness on the recognition of emotions. It was expected that this study will enable us to define the features of cognitive development of children with autism, which in turn will improve compilation correctional and rehabilitation programs.

The obtained results were treated by statistical techniques. So, comparative, factor and discriminant analyses were conducted to correct distinguishing of diagnostic criteria of ASD and to make certain conclusions.

Results and their discussion

Comparative analys

The use of A.Bine – T. Simon method gave us the following results. For most children with autism average mental development indices were lower than those corresponding to biological age and were ranging from 4 months to 12 years and 10 months. It should be taken into account that main feature of impairment at autism is distorted mental development (accorsing to classification of Lebedinskaya [6]. This means that in some areas the development of children with autism has as accelerated development zones and zones of retardation.

For children with mental retardation averages incices of mental development were lower than those of biological age within 2 years 9 months to 6 years 9 months. According to classification of Lebedynskaya for this category of disabled children prevail retardation processes in all parameters of mental development [6].

An interesting fact was on indicators of autism. We investigated the level of autism by a technique CARS as in children with autism and children with mental retardation. As a result of the study, we received the following results: 53% of studied children showed low levels of autism, 42% – average and 5% – high (see Figure 1).

Among children with mental retardation were found 91% of those with low levels of autism, 9% of children with average level of autism (see Figure 2).

These results give reason to assume two key moments in the practical application of our work:

1. The diagnosis of autism spectrum is not a straightforward task to end developed.

2. The level of autism (autistic set of symptoms) can occur in children with various mental disorders. The letter conclusion is confirmed by V. Nordin results [10], who also observed ASD symptoms for children with mental retardation and motor disabilities.

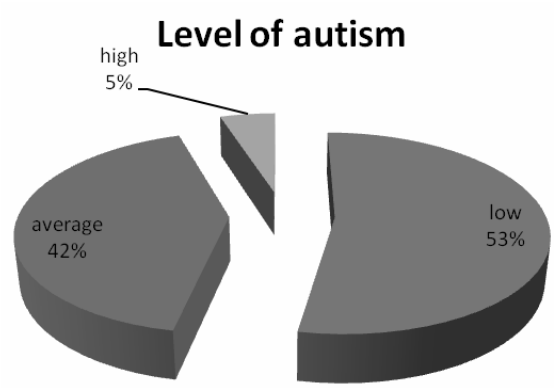
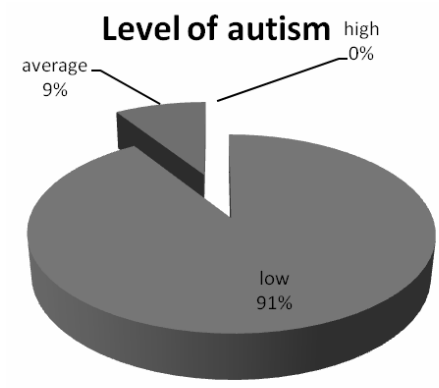


Fig. 1. Level of autism for children with ASD diagnosis



Fig, 2. Level of autism in children with mental retardation

We also conducted a neuropsychological study method by A.R. Luria and got the following results:

1. 80% of children diagnosed with autism showed a high level of overall development, and 20% – average.

2. 60% of children with autism showed a high level on a scale studies of movements and actions, and 40% – average.

3. 50% of children with autism showed a high level in the study of Gnosis, 10% – average, 40% – low.

4. 64% of children with mental retardation showed a high level of overall development, 9% – average and 27% – the low level of development.

5. 27% of children with mental retardation showed a high level on a scale studies of movements and actions, 37% – average and 36% – low.

6. 27% of children with mental retardation showed a high level of development in the study of Gnosis, 18% – average and 55% – low.

These findings give us reason to believe that the cognitive development of children with autism is higher than that in children with mental retardation.

Comparative analysis of the study (by CARS method) shows that compared with mentally retarded children in children with autism the following areas were worse developed: relationships with people, emotional reaction, use of objects, adaptation to change, visual and auditory reaction, shyness, verbal communication, the level of activity. These criteria indicate the presence in children with autism so-called autism triad. They touched an emotional reaction, establishing social contacts and available stereotyped action. We also observe a bad adaptation of children with autism to changes and increased levels of shyness and nervousness compared with children with mental retardation (see Table 1).

According to the comparative analysis for two investigated groups the total score for the CARS technique in children with autism is higher than that in children with mental retardation. However, it is unexpected result that the children with mental retardation have a certain score level of autism. This suggests that although children with mental retardation do not have a diagnosis of autism, yet they can determine a certain level displays deviations autism spectrum. These data make it possible to differentiate the diagnosis of autism and autism level as the level of autism can be present in children who are not diagnosed with autism spectrum disorders.

Factor analysis

Factor analysis shows that the study highlighted three significant latent factors. The first factor combines the criteria of neuropsychological research by A.Luria and test intellectual development by Bine-Simon, respectively. We can conclude that this latent factor indicates a dependence of neuropsychological indicators on intellectual development of the child (see Table 2). Thus, you can see that such indicateors of neuropsychological research as proof test, reciprocal test, conditional response selection, dynamic praxis, copy simple shapes, praxis, poses fingers, oral praxis, subject and acoustic gnosis, recognition of spatially oriented shapes, recognition of emotions and final points areas (general characteristics, the study of movement and action and research gnosis) is directly dependent on the intellectual development of the child. And accordingly, trace feedback, where all these indicators form their own intellectual development of the child. Therefore, the

higher the rate of this factor in the child, the greater the likelihood that the child belongs to a group of autistic.

The second latent factor is based on the method of CARS and points us to belonging to a group. Consequently, we see that the higher rate by indicators such as emotional reaction, use objects, adaptation to change, visual and auditory reaction, perception of taste and smell, shyness, verbal communication and activity level, the greater the likelihood that a child has autism spectrum disorder.

Table 1

A comparison of indeces for two groups (ASD – autistic spectrum disorder, MR – mental retardation. Std. Dev.– standard deviation.

	ASD group		**MR group**	
	Mean	**Std.Dev.**	**Mean**	**Std.Dev.**
orientation	1.10	0.10	0.63	0.09
adequacy	1.30	0.17	0.86	0.1
criticality	1.45	0.17	0.81	0.08
proof test	1.90	0.20	2.45	0.26
reciprocal coordination	1.50	0.18	2.13	0.29
ability to make choice	2.10	0.27	2.18	0.29
dynamic praxis	1.35	0.12	1.90	0.20
coping .simple figures	1.35	0.14	1.63	0.12
off fingers	1.45	0.18	1.59	0.19
oral gnosis	1.00	0.10	1.00	0.14
objective gnosis	1.00	0.11	1.63	0.12
acoustic gnosis.	1.45	0.15	1.13	0.16
spatial figures	1.55	0.15	2.09	0.25
recognition of emotions	1.50	0.11	2.22	0.22
overall impression	1.42	0.17	1.15	0.13
movements and actions	1.48	0.18	1.67	0.19
gnosis	1.27	0.12	1.81	0.22
relationships with people	2.30	0.27	1.40	0.13
imitation	1.70	0.15	1.63	0.16
emotional response	2.35	0.26	1.59	0.15
characteristics body	2.10	0.24	1.86	0.23
using objects	1.90	0.20	1.36	0.19
adapting to change	2.00	0.26	1.04	0.15
visual reaction	2.20	0.24	1.72	0.16
auditory reaction	2.00	0.27	1.36	0.19
sensitivity	1.55	0.17	1.09	0.20
timidity	2.20	0.25	1.63	0.15
verbal communication	2.70	0.27	2.04	0.22
nonverbal communication	2.30	0.25	1.81	0.26
activity level	2.55	0.29	1.50	0.15
intellectual development	2.55	0.24	2.72	0.260
overview	2.30	0.24	1.27	0.16
age	7.90	2.63	10.3	2.24
psychological age	4.17	1.33	5.68	2.26

Table 2

Factor analysis of results of ASD children investigation

	Factor loading (Varimax normalized)		
	Factor 1	**Factor 2**	**Factor 3**
Group	-0.25	**0,76**	0,46
orientation	0.43	0.12	**0,61**
adequacy	0.49	0.04	**0.52**
criticality	0.51	0.15	**0.61**
corrective test	**0.66**	-0.27	-0.01
reciprocal coordination	**0.78**	-0.22	0.17
ability to make choice	**0.67**	-0.01	0.31
dynamic praxis	**0.86**	0.06	-0.07
coping simple figures	**0.93**	0.13	-0.11
off fingers	**0.67**	0.05	0.22
oral gnosis	**0.79**	0.26	0.06
objective gnosis	**0.62**	-0.31	0.39
acoustic gnosis	**0.71**	0.31	0.19
spatial figures	**0.86**	-0.02	-0.07
recognition of emotions	**0.91**	-0.11	-0.01
overall impression	**0.62**	-0.01	0.53
movements and actions	**0.94**	0.08	0.17
gnosis	**0.92**	-0.06	0.08
relationships with people	-0.48	0.33	**0.61**
imitation	0.29	0.05	**0.56**
emotional response	-0.17	**0.47**	0.45
characteristics body	**0.54**	0.36	0.22
using objects	0.09	**0.81**	0.07
adapting to change	-0.33	**0.82**	0.07
visual reaction	0.43	**0.72**	0.10
auditory reaction	-0.01	**0.67**	0.10
sensitivity	0.12	**0.79**	-0.34
timidity	-0.29	**0.65**	-0.18
erbal communication	0.43	0.68	0.12
nonverbal communication	**0.62**	0.51	0.42
activity level	0.10	**0.68**	0.25
intellectual development	**0.67**	-0.02	0.19
overview	0.04	**0.87**	0.25
age	0.01	0.24	**0.61**
psychological age	**0.60**	0.33	0.44

The third latent factor indicates age differences. According to these figures, we can say that, depending on the age and overall development of children in both groups improved children's ability to imitate and establish relationships with people. Also with age and intellectual development of children in both groups improved orientation in space, time, individual characteristics and criticality of their own actions. Accordingly, this confirms our hypothesis that if active work with children with autism they can develop skills to establish contacts with the social environment and personal skills, because children who participated in the study, is actually so, which is held constant habilitation, correctional and educational work.

Discriminant analysis

By discriminant analysis we can determine the most important criteria for differentiating autism from other disorders. Thus, by neuropsychological study it was established the following criteria (with the accuracy of 85%) (Table 3):

• criticality - the higher the score, the greater the likelihood that the child belongs to a autistic group;

• test for objective gnosis, proof test, adequacy – the lower the score (better developed area), the greater the likelihood that the child belongs to the autistic group.

From this we can conclude that children with autism are much more affected by the criticality of their actions because they have impaired social interaction. In turn, the proof test, test for objective gnosis and adequacy shows better performance in autistic group, indicating a higher level of intellectual development in certain areas.

By discriminant analysis criteria according to CARS technique we can determine the most important criteria for differentiating autism from other disorders. With the accuracy of 100% there are the following criteria (see Table 3):

• Overall impression, emotional reaction, adaptation to changes, activity level, relationships with people, nonverbal communication, verbal communication – the higher rate (less developed area), the greater the likelihood that a child has autism spectrum disorders.

• Using objects, imitation, intellectual development and timidity – the lower rate (better developed area), the greater the probability of a child has autism spectrum disorders.

From these results we conclude that intellectual development in children with autism is better than that of children with mental retardation. Also, they have lower levels of timidity, indicating their better understanding of what is happening around. Despite this, they are much worse developed area of verbal and nonverbal communication, they do not adapt to changes in their poorly developed emotional sphere.

Table 3

Discriminant analysis of results of ASD children investigation

	Classification functions	
	ASD group P=.47	**MR group P=.52**
Test A.Luria		
adequacy	0.14	2.30
criticality	0.69	-4.5
proof test	2.21	4.49
objective gnosis	0.62	-0.31
Test CARS		
overall expression	11.4	-8.1
relationships with people	34.8	5.2
imitation	-24.2	3.2
emotional response	5.1	4.4
using objects	-36.4	4.1
adapting to change	47.0	11.1
timidity	-14.8	5.4
verbal communication	14.8	0.9
nonverbal communication	22.8	-10.9
activity level	25.7	6.9
intellectual development	-6.3	21.2

After a qualitative analysis of the performance of children from the two groups of tasks scale of Bine–Simon intellectual development, we can conclude that children with mental retardation solve the problem with a tendency to increase the number of tasks performed with the reduction of their complexity. The children with ASD show a tendency to perform a variety of tasks of varying complexity, indicating their better development in certain cognitive areas but poor development in others.

Conclusions

The study gave us the following results:

1. It was revealed the presence of a certain level of autism in children who are officially diagnosed as mental retardation.

2. Using factor analysis, we identified significant latent factors and describe their possible significance. These are three factors, which account intellectual development, belonging to the group and age peculiarities of chidren with autism.

3. It was shown that the intellectual level of children with autism is in general higher than in children with mental retardation. However, indicators of intellectual development in children with autism and children with mental retardation susbstantially differ: in children with mental retardation is present even decrease intelligence, while for children with autism some areas were accelerated developed and some areas developed normally or bad.

4. Using discriminant analysis of the experimental results obtained by A. Luria and CARS methods, we identified the most important indeces for diagnosing autism in children. For adequate differentiation of autism it is necessary high values of such indexes as criticality, overall impression, emotional reaction, adaptation to changes in activity level, relationships with people, nonverbal communication, verbal communication and low values of such indexes as test for objective gnosis, proof test, adequacy, using objects, imitation, intellectual development and timidity.

5. We have shown the dependence of criteria of neuropsychological study on child intellectual age. It was established that the higher the cognitive development of the child, the lower the level of autism, but for the complete reduction of autism it is necessary to develop other two areas of the autism triad, namely communication and socialization skills.

Author's translation of the article

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An article received by the Editorial Board 9.01.2014
Accepted for publication 20.01.2014