

## Using Artificial Intelligence Tools to Diagnose and Correct Autism Spectrum Disorders in Children

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### Research Article

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### Abstract:

**Objectives:** The purpose of this article is to explore the use of artificial intelligence technologies for the diagnosis and treatment of early childhood autism.

**Methods:** The methodology used is an interdisciplinary and multi-level approach, highlighting the use of artificial intelligence for the diagnosis and treatment of autism at the social, individual, and psychophysiological levels.

**Results:** The main prompt-queries for generating developmental tasks and corrective exercises using a neural network have been identified. A hypothesis has been put forward about the importance of taking into account the psychophysiological mechanisms of childhood autism using artificial intelligence models, and new research directions and ways of their practical application have been outlined.

**Conclusions:** New approaches have been proposed to address the issues of inappropriate use of artificial intelligence in the analysis of autistic children and potential violations of ethical standards.

**Keywords:** early childhood autism; diagnostics; artificial intelligence; correction; psychophysiological mechanisms; ethical aspects of use.

## 1 Introduction

Autistic spectrum disorders (hereinafter ASD) encompass a variety of manifestations of dysontogenesis, associated primarily with disorders of the processes of adaptation to changes in the environment and the formation of a child's set of adequate contacts with people around them. Primarily, this syndrome manifests itself in serious difficulties in the sphere of social communications, repetitive forms of subject activity, problems in establishing emotional contacts with close adults (WHO, 2019). Summarizing the accumulated experience of studying such children, it is possible to describe ASD in children as a systemic disorder of their mental development, significantly reducing their adaptive capabilities due to the lack of full-fledged interaction with the world (Korzh & Gromova, 2023). One of the main approaches to describing autism is the model of level-based development of affective and behavioral complexes, in which a clinical psychologist identifies the dominant behavioral complex in a child through включенного наблюдения (Bardyshevskaya, 2020). Another approach focuses on identifying types of childhood autism based on the varying degrees of maladjustment in an autistic child's relationships with others and the environment (Kurtines, 1986).

All of this highlights the multidimensional and complex nature of autism, which contributes to the challenges in diagnosing it in children. Another source of difficulty in solving the problem of identifying signs of childhood autism is the personal characteristics of close people (and especially the mother), which can significantly affect the completeness and accuracy of the description of autism in a child, and the formation of an adequate picture of the problems of this mental disorder. As a result, the risks of either misdiagnosing the signs of autism in a child, or untimely (late) diagnosis and delayed psychological care increase significantly. According to statistical reviews, the proportion of children with ASD is increasing, which raises the question of finding new and effective tools for diagnosing and treating such children (Pravdnikova, 2024).

## 2 Materials and Methods

One of the possible directions in working with such children is the use of modern technologies of artificial intelligence (hereinafter AI). To date, some works in this area are known. So, Russian authors Korzh E.M. and Gromova A.V. in their rather

complete review of various developments in the application of AI in the field of psychology indicate that the RP-VITA intelligent robot is successfully used to encode diverse expert knowledge about mental disorders, which are further used to make a diagnosis and suggest certain methods of treatment (Dixon et al., 2017). A separate section is dedicated to AI developments for helping children with ASD. For example, it describes the intelligent robots KASPAR and Nao, which are successfully used to develop social skills in children with ASD. In particular, the KASPAR social robot is a human-like image of a child's figure with expressive facial expressions, which is positively received by children with autism. On the other hand, the Nao robot helps children to successfully recognize faces and form a reaction to eye contact, leading to positive outcomes in their therapy. This can be seen as a modern, socially relevant analogue of one of the first psychotherapeutic methods used to treat autistic children, known as "holding therapy" (Welch, 1983). The use of AI tools in working with children with ASD can be considered at both the diagnostic and treatment stages.

## 3 Results and Discussion

Diagnosis of ASD signs in children using AI technologies can be based on self-learning algorithms in the assessment and analysis of two main segments of a child's behavior. As studies of children with ASD show, such segments can be the child's emotional reactions to changes in the surrounding objective and social environment, as well as the features of background behavior when interacting with toys and with oneself (repeated actions and autoaggression). For more effective training of a neural network, it is advisable to use such a type of requests as prompt-clarification, which allows for a sufficiently deep study of behavioral signs of early childhood autism. An important point here is the source of data about the child's behavior for the AI learning system, as close family members (primarily the child's mother) may provide a lot of irrelevant information, reducing the effectiveness of the expert system. In our opinion, the best approach in this situation is for parents to prepare a series of short videos that illustrate two main segments of the child's behavior. This will allow the neural network to analyze and identify the key aspects of the child's behavior, leading to a well-informed conclusion.

At the stage of corrective actions when working with children with ASD, AI technologies

can be used to provide advice to parents and relatives of such children in the field of specific techniques for overcoming the observed deviations. The information and reference resources of the neural network can be maximally used by using prompt-tasks, which will allow you to describe the recommended actions in an accessible and accurate manner. It is possible to prepare, using AI resources, the simplest game tasks for a child, in analogy with the above-mentioned KASPAR and Nao robots, it is possible to develop, using AI, such tasks in a game form, which are aimed at overcoming such neuropsychological symptoms as synkinesia, weak interhemispheric interaction, impulsiveness and field behavior (Mayes, 2012). At the same time, it is highly desirable that the first game tasks the kid perform under the watchful guidance of a benevolently-minded adult. In the future, it will be possible to generate tasks for two or more children using a neural network, which will lay the foundation for the progressive development and full-fledged social adaptation of an individual in the future (Nikolskaya, 2017).

A more radical way to treat the symptoms of early childhood autism is to identify the psychophysiological mechanisms underlying autistic behavior. One such mechanism that has attracted the attention of modern neuroscientists is the Default Mode Network (DMN), which includes areas such as the medial prefrontal cortex, the posterior cingulate cortex, and the lateral, medial, and inferior parietal cortices. The DMN has been shown to promote a state of rest and solitude (Pravdnikova, 2024). It can be assumed that the manifestations of childhood autism are based on deviations in the DMN, i.e. it is either inhibited, which leads to self-stimulating stereotypical behavior, or it is over-activated, then any external influences cause an excessive inhibition and a corresponding negative reaction. If this hypothesis is confirmed, then there are opportunities for applying AI developments on the implantation of brain implants of the Neuralink® project of the Elon Musk Corporation to selectively influence the corresponding areas of the brain and influence the speed of information flow. Another area of research is the identification of emotional self-regulation and prefrontal cortex functioning in children with ASD, which manifests itself in characteristic patterns of electroencephalogram (Nikolskaya & Baenskaya, 2017). The involvement of AI algorithms for decoding and analyzing the parameters of bioelectric activity in such children will provide an early express diagnosis of ASD at the neurophysiological level. Thus, there are prospects

for comprehensive correction of children with ASD, including the use of AI technologies at the social, individual and psychophysiological level.

It should be noted that here it will be necessary to overcome a number of legal and ethical problems. The widespread use of AI algorithms for early diagnosis and subsequent correction of children with ASD has a number of advantages. These include the ability to apply various psychological approaches to the phenomenon of autism, the ability to process diverse data quickly, the ability to track the temporal dynamics of psychological indicators for each child, and more. On the other hand, the prospects for such applications require appropriate legal regulation and consideration of ethical aspects when using the results. In our opinion, it is necessary to ensure that only leading specialists (psychologists, psychotherapists) and parents (legal representatives) of our special child have access to this information. This will require additional training sessions for AI algorithms, with mandatory verification using control examples. In the future, it will be possible to transfer AI-generated conclusions and recommendations to third parties based on the authorized bodies of the professional community (e.g., ethical committees). Another way to ethically regulate generated information obtained after AI-based intervention is to create an integrated system of self-prohibitions and restrictions (stop-system) within the generative AI itself. The basis for such a self-prohibition on generation may be such rules as the lack of prompt-request authorization, a low level of detail, and others, similar to how it is described by models of regulatory behavior governed by rules (rule-governed behavior) (Posner et al., 2012). In addition to establishing a legal framework, developments in the field of personal data protection and information security technologies are necessary.

## 4 Conclusion

Various ways of using AI resources for the work of psychologists and psychotherapists with ASD in children are considered. The phenomenon of childhood autism is a complex and multifaceted phenomenon that significantly affects the entire ontogenesis and requires coordinated work of scientists from different fields: psychologists, teachers, IT specialists, psychotherapists, lawyers, and others. The use of modern AI technologies opens up new opportunities for its diagnosis and correction. In the review of the main AI developments, new opportunities are opened up by

including the psychophysiological mechanisms underlying ASD in the analytical block. At the same time, there are risks of violating confidentiality and improper use of the recommendations and conclusions obtained, which can be overcome using restrictions and self-prohibitions.

## References

- Abu-Hammad, D. M. A. (2024). Расстройства аутистического спектра у детей: коррекционные возможности творческих заданий [Autism spectrum disorders in children: Corrective possibilities of creative tasks]. *Академическая публицистика*, 2-4.
- Bardyshevskaya, M. K. (2020). Diagnostica affectivno-povedencheskogo razvitiya detej 2-3 let s rasstrojstvami autisticheskogo spectra [Diagnosis of affective and behavioral development of children aged 2-3 years with autism spectrum disorders]. *Voprosy psihologii*, 66(5), 130-144.
- Dixon, M. L., Thiruchselvam, R., Todd, R., & Christoff, K. (2017). Emotion and the prefrontal cortex: An integrative review. *Psychological Bulletin*, 143(10), 1033-1081. [CrossRef]
- Korzh, E. M., & Gromova, A. V. (2023). The potential of using artificial intelligence technologies in psychology. *Systems Psychology and Sociology*, 2(46), 60-70. [CrossRef]
- Kurtines, W. M. (1986). Moral behavior as rule governed behavior: Person and situation effects on moral decision making. *Journal of Personality and Social Psychology*, 50(4), 784-791. [CrossRef]
- Mayes, S. D. (2012). *Checklist for autism spectrum disorder*. Stoelting.
- Nikolskaya, O. S. (2017). Психологическая классификация типов детского аутизма [Psychological classification of childhood autism types]. *Voprosy psihologii*, 5, 14-25.
- Nikolskaya, O. S., & Baenskaya, E. R. (2017). Детский аутизм как системное нарушение психического развития ребёнка [Childhood autism as a systemic disorder of a child's mental development]. *Voprosy psihologii*, 2, 17-28.
- Posner, M. I., Rothbart, M. K., Sheese, B. E., & Voelker, P. (2012). Control networks and neuromodulators of early development. *Developmental Psychology*, 48, 827-835. [CrossRef]
- Pravdnikova, I. I. (2024). *Нейропсихология. Игры и упражнения [Neuropsychology. Games and exercises]*. АЙРИС-пресс.
- Rean, A. A., Kudashev, A. R., & Baranov, A. A. (2022). Психология адаптации личности. Анализ. Теория. Практика [Psychology of personality adaptation. Analysis. Theory. Practice. МПГУ. [CrossRef]
- Welch, M. (1983). *Holding-therapy*. In N. Tinbergen & E. Tinbergen (Eds.), *Autistic children: New hope for a cure* (pp. 1-10). New York University Press.