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SOCIAL COGNITION DISORDERS IN CHILDREN

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Abstract: One of the important problems facing modern science is the search for the biological basis of human social behavior. Social neuroscience attempts to answer the question to what extent behavior is determined by the work of the brain and to what extent by social factors.

Key words: social cognition, neuroscience, brain, preschool age.

Introduction. The term "social cognition" (social cognitions, social cognition) denotes a complex process of cognition of one person by another. Back in the 70s of the XX century D. Wegner and R. Vallacher [cited in 1] defined social cognition by the following formula: "how people think about people". Social cognitions reflect the ability to build representations of relations between oneself and others and to use these representations flexibly to manage social behavior. There are 3 functions of social cognition: integration of complex information into an emotionally and socially significant whole; evaluation of the situation from the point of view of ethical behavior; self-regulation [2].

According to M. Tomasello [3], the unique ability of a human being, which distinguishes him from higher primates, is the perception of another person as an active purposeful subject (intentional agent) similar to himself. This ability appears in a child starting from 9 months of age. M. Tomasello writes that it opens the possibility for the child to learn cultural experience with the help of another person. Understanding other people's consciousness is the ability to reflect the consciousness of other individuals [4].

To understand social cognition, the most commonly used term to understand social cognition is Theory of Mind, a model of the mental, which refers to the cognitive function of attributing mental phenomena (intentions, emotions, and thoughts) to others. This model can be seen as the basis of social cognition. The term was first used by D. Premack and G. Woodruff in 1978. [5] when discussing the ability of the chimpanzee monkey to understand human mentality and emotions. According to E.A. Sergienko et al. [6], the mental model includes the following abilities: to attribute mental states both to oneself and to others; to recognize mental states by their external manifestations in behavior ("She is smiling, she probably likes it"); to connect these mental states with each other to explain and predict the behavior of others ("He thinks I forgot", "I went there because I know...").

Interaction between people is impossible without understanding another person's mental state (thoughts, beliefs, convictions, beliefs, intentions, desires, emotions) and the ability to look at an event from different points of view: to compare one's model of mental state in the actual situation and the

other person's. It is the ability to understand mental states that helps people explore the world around them and be more productive. Externally observed components of human behavior play only a small role in the process of social interactions between people. A person needs to interpret the mental states of another person [6].

According to P. Carruthers [7], the basis of the mental model is Mindreading - attributing mental states to others, predicting and explaining their behavior. The author identified the following components of the mental model: perceptual (perceptual mind-reading) - the ability to attribute mental phenomena to another person based on facial expression or voice intonation (e.g., an angry look or threatening intonation); cognitive (cognitive mind-reading) - the ability to attribute mental phenomena to another person based on knowledge about this person ("I know he is angry").

S. Shamay-Tsoory et al. [8] distinguish cognitive and affective components of the mental model. The cognitive ("cold") component allows us to understand another person's thoughts, beliefs, and plans. The affective ("hot") component includes understanding the emotional state of another person (cognitive empathy) and experiencing the emotions and pain of another person - emotional contagion (affective empathy).

The formation of the mental model does not arise suddenly, but has a long history of development. Thus, in the work of M. Legerstee [9] shows that already at the age of 2 months children evaluate people as social objects, smiling at them, at the same time infants consider non-social objects as a goal (to take, to bite). At the same time, people, rather than physical objects, elicit more intense emotions in infants. At 12 months of age, infants can point to something to a person, but do not point to a nonliving object. The most important milestone in the development of the mental model for the preschool child is the emergence of the understanding that "one's own mental is not identical to the mental of another" [6].

Since the 80s of the XX century, the concept of "social brain" has been used in scientific literature. M. Gazzaniga [10] introduced this term to assess emotional disorders and interpersonal communication after right hemisphere lesions. L. Brothers [11] suggested that the brain regions that are responsible for processing information about social objects should be identified as a separate system.

The mental model has several aspects (e.g., understanding one's desires, intentions of other people, judgments of beliefs, understanding of different types of humor, metaphors, etc.), and each of these aspects, as studies with functional neuroimaging show, involves its own neural networks. Areas such as the medial prefrontal cortex (PFC), temporoparietal junction (TPJ), superior parietal sulcus (STS), and temporal poles play a key role [12, 13]. Thus, activation in the left and right temporoparietal nodes as well as in the posterior cingulate gyrus were selectively associated with reasoning about beliefs but not about bodily sensations [14]. In a study by M. Manfredi et al. [15] showed that occipitotemporal cortical areas appear to be involved in detecting visual inconsistencies (e.g., in humorous cartoons), while more anterior areas, such as Broca's area and the temporal pole, are involved in detecting the linguistic consistency of the verbal content in these cartoons, and are also responsible for verbal jokes. A study conducted by A. Bartolo et al. [6], revealed activation of the brain system including the right inferior frontal, left superior temporal, left middle temporal gyrus and left cerebellum in response to a humorous cartoon. These brain regions are closely associated with the detection of semantic or perceptual inconsistencies. Of particular interest for understanding the functioning of brain systems are studies of human brain evoked potentials, which reveal a number of late cognitive components. Two major components of the evoked potential, N400 and P600 (LP), have been shown to reflect cognitive processes related to humor processing. The N400 is a negative component that peaks approximately 400 ms after stimulus onset, which is sensitive to a wide range of stimuli and their characteristics, including sentence coherence, repetition, semantic priming, lexical relatedness, concreteness, abstractness, word frequency, and many others, while being relatively insensitive to physical changes in words without altering their meaning [1]. The amplitude of this component increases in response to words that do not match the context of the previous sentence or the general discourse. In addition, the

N400 is detected in response to abnormal images in visual narratives and single events in video sequences.

Often, a late positivity (LP) component, or P600, is identified after the N400, which is associated with the process of reanalyzing noncongruent information caused by inconsistent meaning, as well as with inference mechanisms [2]. Positive and negative slow waves are thought to reflect perceptual and conceptual memory processes, respectively, i.e., positive slow waves reflect the complexity of perceptual operations while negative slow waves reflect the complexity of conceptual operations in working memory [4].

According to M. Lieberman , socio-cognitive processes can be divided into controlled and automatic processes. Controlled processes are caused by the activation of the lateral and medial prefrontal cortex, medial temporal cortex. Automatic processes are associated with the activation of the amygdala, ventromedial prefrontal cortex and lateral temporal cortex [6].

The mental model is associated with the work of the Mirror Neuron System (MNS). These neurons are activated both when an action is performed and when another person observes the same action [7]. Mirror neurons play a significant role in understanding the emotional state of other people and determine the ability to empathy. The location of MNS is ventral premotor cortex (especially Brodmann area 6/44/45) and rostral inferior parietal lobe [9]. Various transmitters, especially oxytocin, play an important role in the mental model [1].

Mental model disorders have traditionally been studied in children with autism spectrum disorders (ASD). In the works of S. Baron-Cohen showed that children with autism were significantly behind in understanding mental states both from healthy children and from children with mental retardation. Children suffering from RAS are characterized by mental model disorders primarily manifesting "mind-blindness" - blindness to other people's thoughts. The results obtained allowed this author to hypothesize that it is the lack of mental model that underlies RAS [3].

One of the most important questions posed by researchers of this issue is what is primary: cognitive deficits or disorders of the mental model?

Thus, a number of studies suggest that the main role is played by a primary cognitive defect in the form of the inability to imitate behavior, which disrupts the child's contact with the mother and does not provide a point of reference for understanding another person [5]. According to T. Charman, the most important key element in the formation of mental model is joint attention (join attention), which is necessary for a child to follow the gaze, behavior of another person. Children with RAS are characterized by disorders of joint attention, with disorders of social cognition, communicative competence becoming secondary. However, the deficit of joint attention in children with RAS is not isolated, but is closely related to the insufficiency of symbolic play, which also requires not only the direct image of the toy, but also its secondary image, denoting the play value [3]. It should be noted that healthy children, starting from the age of 4-5 years, understand that another person can have their own desires, while children with RAS have no such understanding [7].

Within the framework of the Weak Central Coherence model, it has been shown that healthy children can distinguish the main thing from the information when perceiving it, whereas this does not happen in children with RAS [9].

According to N.G. Manelis and T.A. Medvedovskaya, children with RAS experience greater difficulties in understanding various aspects of the "mental world" compared to healthy children and children with mental retardation. In addition, the ability to understand the mental state in children with RAS does not have a pronounced positive age dynamics. The mentioned difficulties in these children, apparently, are largely due to a specific cognitive strategy, in which the greatest importance is given to a fragment rather than to the situation as a whole.

Disorders of the mental model are actively studied in speech disorders. It is known that speech development and mental model development are closely intertwined, as both speech development and

mental model development contribute to social communication, understanding of one's own and others' inner world [1].

There are 3 approaches in the study of these relations. According to the 1st approach, the mental model contributes to the development of speech. Thus, understanding of other people's emotions helps to learn words already in infancy [2]. Accordingly, word learning problems can be explained by a deficit in the mental model [4]. According to the 2nd approach, speech contributes to the development of the mental model. According to J. Rosenqvist et al. [5], speech development is the most important predictor (compared to some neurocognitive abilities) of children's ability to recognize emotions. According to the 3rd approach, delayed speech development and mental model deficits occur simultaneously because they are caused by a single factor. Both language and mental model abilities may be manifestations of a single neuropsychological underlying structure, such as working memory as an aspect of executive functions (6). Working memory is one of the executive functions, it allows to keep information in mind while operating with it, to compare one idea with another, to remember the sequence of actions. Working memory management means the connectedness of the present, future and past, the ability to see different aspects of things and events, to understand a story, for which it is necessary to connect the beginning, middle and end [7].

According to the model of K. Cicerone et al. [8], 4 spheres are distinguished in the composition of control functions: controlling cognitive functions associated with control and planning, purposefulness of activity; functions of behavioral self-regulation associated with emotional reinforcement; functions regulating activation, i.e., providing initiative and activation of behavior; metacognitive processes. According to G.A. Vilenskaya [4], control functions can be considered as a set of mental means for self-regulation realization, which explains their wide and diverse composition.

A number of works show that social skills of preschoolers with specific disorders of speech development (SRSD) are less developed. For example, preschoolers with SCDD were rated by parents and teachers lower in social competence (e.g., perseverance, socialization skills with peers) than children without speech disorders [10]. In addition, preschoolers with SRSD were rated significantly lower by parents on skills such as cooperation, assertiveness, and responsibility. A number of researchers point out that mothers of children with delayed speech development are characterized by a lower level of emotional competence and low ability to express emotions, which leads to more behavioral and emotional problems in children with SCDD compared to healthy peers. In this case, A. Gregl et al. understand emotional competence as a key social skill needed to detect, interpret, and respond constructively to one's own emotions and the emotions of others. Insufficient vocabulary and underdevelopment of the lexico-grammatical structure of speech were important predictors of the development of the mental model [6].

In addition, in the course of an earlier study, we established the high efficacy of Cortexin in the treatment of ADHD. The use of Cortexin in children is combined with reliable neurophysiological changes indicating the activation of the regulatory systems of the brain [7]. The effectiveness of Cortexin in the treatment of dyslexia should also be noted. The results of the control study after the course of treatment showed a significant increase in reading skills. In addition, according to the results, there was an improvement in attention and working memory, which play a major role in the formation of mental model [5].

Conclusion: The conducted literature analysis shows that the process of formation of social cognition is significantly disturbed in various mental disorders. The use of nootropic drugs, in particular Cortexin, which has shown efficacy in various neuropsychiatric disorders, seems promising for improving the formation of social cognition in these children.

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