

THEORY OF MIND AND MENTALIZING IN AUTISM SPECTRUM DISORDER

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ABSTRACT

The Theory of Mind (ToM) refers to the capacity to understand both ourselves and others mental states, such as feelings, desires, wishes, attitudes and goals. It is a fundamental capacity in our complex social environment. Mentalizing is more of an umbrella concept that encompasses theory of mind, empathy and mindfulness. Children with Autism Spectrum Disorder seem to have difficulties in understanding other peoples` mental and emotional state and so, their social interactions are significantly impaired. This review is trying to present some of the studies regarding the alteration of the capacity to mentalize in children with Autism Spectrum Disorder and some theories surrounding their deficits in socializing.

Keywords: theory of mind, mentalizing, autism spectrum disorder, social interaction.

INTRODUCTION

Children with Autism Spectrum Disorder (ASD) have a neurodevelopmental condition which significantly impairs their social interactions, verbal and non-verbal communication skills and it often presents with comorbid intellectual disability and weak central coherence [1].

They may also have coexisting cognitive difficulties in the areas of executive function, which is an umbrella term for cognitive processes that include working memory, inhibition, planning and shifting [2].

In other words, the child with ASD may be very good at remembering and observing the details, but he is not able to see the whole picture, thus having misread a situation or misunderstand wider contexts.

Theory of Mind refers to one`s ability to represent and understand others` mental states, such as goals, emotions, and beliefs [3], but also to attribute subjective mental states to oneself [4]. This ability is not only crucial to understanding other people`s behavior, but also one`s own.

There have been many studies that showed the difficulties that the Autism Spectrum Disorder children have with deducing and understanding the thoughts, beliefs, wishes and intentions of others. For the most part, they perform significantly lower on tasks designed to measure Theory of Mind than individuals with typical development [5]. Also, a large number of studies have demonstrated that these children encounter great difficulties in shifting their perspective to understand someone else`s thoughts, instead of simply reporting what they know [5].

Following the great number of studies that have established this impairment [6], interventions have been developed worldwide to improve the Theory of Mind skills of individuals with autism [7].

According to P. Luyten and P. Fonagy (2015), mentalizing is more of an umbrella concept that covers empathy and mindfulness (affective components of this concept) and ToM. Mentalizing is considered broader than these other concepts, as “it focuses both

on self and others and on both cognition and affect" [8].

The interaction of social affect and cognition

As social species, humans are continuously required to adapt their behavior to many complex social situations. This is a result of dynamic interplay of socio-affective and socio-cognitive processes, such as compassion, empathy and Theory of Mind [9]. These capacities are central topics in both social psychology and neuroscience.

Empathy is a complex multidimensional concept that can be divided into two: affective-empathy and cognitive-empathy.

Affective-empathy is an ability that allows a person to share others' emotions, regardless of valence, in full knowledge that the other person is the origin of this emotion. It can also be represented by the drive to respond with an appropriate emotion to someone else's mental state.

Compassion is a complementary social emotion, a feeling of warmth and concern for others.

In contrast to social-affective processes, socio-cognition referred to as Theory of Mind, or cognitive empathy (to whom is closely related), is more of an abstract and imaginative process. This helps the person to understand more complex causes of emotions, beliefs, desires and intentions of another, without influence of one's own states or biases. Studies show that children with ASD, with the same mental age as a typical child have difficulty with mental states as causes of emotion. Also, in comparison to a group of children without autism but with general developmental delay, the children with ASD had greater difficulties. These results suggest that this may be an autism-specific deficit [9].

A study that used Empa ToM task that stimulates both socio-affective and socio-cognitive functions concurrently showed that "strong empathizers are not necessary proficient mentalizers". In ASD ToM is de-

ficient [10], but there could not be observed any empathy deficits, when controlling for alexithymia [11].

Alexithymia is a deficit in the ability to verbally describe and recognize emotions within one self and in distinguishing from the bodily sensations of emotional arousal [12]

Although people with autism were thought to be unable to recognize feelings or have empathy, today, studies have shown that in fact alexithymia is associated with lower level of empathy, not autism. However, the incidence of alexithymia in ASD is higher than in general population (50% vs 10%) [13].

Both empathy and ToM enable the differentiation between one's own emotional and mental states and the states shares with others, which is why the distinction of self and others is a very important element [14]. Although these two processes have individual networks, they are both activated in complex social contexts, and can influence each other. However, in some cases, like ASD, only one can be affected, the result being a difficult social adaptation.

The neurobiology of mentalizing

In the past decade the studies in regard to the Theory of Mind and mentalizing have increased considerably due to the fact that disruptions in this capacity are one characteristic of most forms of psychopathology and also because of the impact of one's social interactions and its applicability on psychotherapy.

Mentalizing is, to a certain extent "pre-wired", but mainly, it is a developmental achievement. Research findings suggest that this is a capacity first acquired in the context of attachment relationships, in particular early attachments during infancy, and its development is influenced by the extent to which our early and later environment focuses on internal mental states [15].

It has been shown that the extent to which attachment figures have been able to have affective displays of their own experience in response to the infant's subjective experience can be positively associated with the child's ability to develop mentalizing capacities [16]. This has an impact on the affect-regulative processes and self-control, because they are needed in acquiring the capacity to reflect on internal mental states. Later in life, the exposure to a wider environment is considered crucial in broadening and strengthening the development of mentalizing.

So called "alien-self" experiences are considered to have originated in the incapacity to reflect on self and others and cannot validate the individual's experience. They are a result of failures in marked mirroring and may lead to a constant pressure to externalize these unmentalized self-experiences. This is considered to be a part of the problem for ASD patients, when it comes to their struggles to adapt in a complex social world.

The concept of mentalizing is an umbrella concept, which covers empathy, mindfulness, ToM and relies on attentional processes and cognitive reasoning, although it is distinct from the former, neuroimaging studies showing the different neural circuits involved [17].

A good capacity to mentalize means the ability to balance all these components, but it is also believed to be dependent on the interaction between two determining factors, such as: stress or arousal and the use of attachment strategies in response. Depending on the variations of these two factors, we can talk about automatic and controlled mentalizing. Automatic or implicit mentalizing is reflexive, fast and triggers the fight or flight response. Controlled, or explicit mentalizing requires the correction of biases assumptions (associated with automatic mentalizing), is conscious and effective.

Some psychopathologies, particularly personality disorders, seem to have different

degrees of impairment of the capacity to control mentalizing [18].

Automatic and controlled mentalizing are thought to have two relatively different neural circuits. Older brain circuits that rely mainly on sensory information, such as amygdala, basal ganglia, ventromedial prefrontal cortex (VMPFC), lateral temporal cortex (LTC), and dorsal anterior cingulate cortex (dACC) [19], appear to be the basis for automatic mentalizing.

These areas are known to be involved in the rapid detection of threat and fast processing of information. The amygdala has a central role in the fight-or-flight response, through its reactivity to facial emotional expressions. Both amygdala and basal ganglia are modulated by the VMPFC, the latter two being also involved in automatic intuition. The LTC is related to face recognition, attribution of intentions and automatic processing of biological motion.

Controlled mentalizing involves newer brain circuits from a phylogenetic point of view, such as lateral prefrontal cortex (LPFC), medial prefrontal cortex (MPFC), medial temporal lobe (MTL), lateral parietal cortex (LPAC), medial parietal cortex (MPC) and rostral anterior cingulate cortex (rACC) [19]. The LPFC is activated by tasks requiring asymmetrical reasoning and computational resources, the LPAC is also involved in tasks requiring reasoning and the MPAC has a role in explicit perspective-taking. Also, the rACC is thought to be involved in conflict processing, in an explicit and reflective way. The MPFC is larger in humans, and it is considered to be a central structure for mentalizing. Also, it has been shown a positive association between the grey matter volume of mentalizing areas and the size of one's social group [20].

Another aspect that strongly correlates to the capacity of mentalizing is the history of attachment. Studies suggest that exposure to early stress and attachment trauma may

lower the threshold for controlled to automatic mentalizing.

Brain activity in mentalizing areas when participants with ASD watch an animated triangles movie (an early non-verbal mentalizing study) is abnormal [9].

Considering that the capacity to mentalize is dependent on the social activity and interactions, one can see how decreased expertise in social cognition and ToM deficiencies would be the result of reduced time spend attending to the social world (Schultz, 2005). Children with ASD are usually having restricted interests, that may be considered bizzare, and their social interest may be absent, or low. Frequently it is manifested by the rejection of others, passivity, or inappropriate approaches. This is why the quality of their already limited social relationships is very low.

Theory of Mind and Autism

Humans construct theories in their minds about others mental state using their own experiences as a guide. Many people with ASD seem unable to build a mental model of other peoples` minds because they cannot imagine that one may not have the same information, motivation, beliefs, feelings or abilities as they, and thus, they find it difficult to foresee what others might say or do.

Although ToM deficits are frequent in ASD patients, the research shows that they are neither specific, nor universal in autism. ASD cannot be explained only through this theory, since there are other aspects that do not pertain to the social features, such as restricted repertoire of interests and repetitive behavior. However, these features can interfere with the normal development of the capacity to infer what others are thinking or feeling. Some theories suggest that ToM limitations may be at the core of many behaviors associated with ASD.

ToM challenges may result in a lack of reciprocity and also, in approaching a so-

cial situation with an inaccurate assumption. This may lead to an often perplexing behavior and sometimes even inappropriate (i.e. having paradoxical reactions to various emotional situations). However, one must remember that ASD children are not intentionally careless about other peoples` feelings, but they just have a difficulty in understanding that their behavior may hurt others around them.

Explicit ToM can be measured with traditional false-belief tasks, such as the one with Sally and Anne or Maxi's chocolate, in which one character has a false-belief about the location of an object. The participant is usually required to say or point to the place where the character will look for the object. This ability is considered to be acquired in time (from personal experiences and interactions) and it seems that typical children below 4 years old often fail this task. Also, studies show that ASD children with a verbal mental age below 9.2 years also tend to fail it [9]. However, high functional autistic people, or even more able ones, often pass false-belief tasks, and in some cases, they may even pass more complex second order tasks. There is a distinct heterogeneity in the time course of explicit false belief development in ASD children that can emerge between 1 or 2 years of age and may last throughout the lifespan. In typical children this ability emerges around 4 years and it is usually complete by 8 years of age.

Implicit ToM can be measured by recording gaze duration and eye movements of the participants as they are watching movies in which an actor has a false belief. This ability develops over the first two years of life, at the same time that autism emerges.

Firth argues that failure of implicit ToM is the core difficulty in autism, since even high functional adults with ASD who pass verbal false belief tasks, do poorly in an eye moving task. Studies showed that their brain activation during this test is abnormal, even

in subjects with good explicit ToM skills. This can explain why implicit ToM impairments are seen even in high functional adults with ASD.

Another test that has been designed to detect the variance in ToM ability is the Reading the Mind in the Eyes Test (RMET), in which the participants have to match emotion and mental state descriptor words to images of the eye region of faces.

The difference between this test and other ToM tasks is that this one includes emotional states and it also relies on the recognition of subtle facial cues. A study in 2016 showed that RMET is detecting more the emotion recognition abilities rather than ToM [21]. Lower scores for people with ASD could be also due to the fact that alexithymia frequently co-occurs with ASD. This study supports the alexithymia hypothesis of emotion-related deficits in ASD.

CONCLUSION

Questions concerning the representation of ToM and the ability to mentalize have occupied cognitive scientists for decades. The ability to represent mental states (ToM) and emotional states, along with empathy are crucial in understanding complex social contexts.

ASD is a neurodevelopmental delay that affects many areas, in various degrees, but one of the most important impairment is in social cognition. Studies showed that the ability to mentalize is deficient in this case, and because the prevalence of alexithymia is higher in this group of people, the incapacity to understand emotions only increases the difficulty to adapt in an ever changing world, in which social skills are of most importance.

Children with ASD seem to score lower on tasks that evaluate their capacity to mentalize and functional neuroimaging has supported this discovery by distinguishing the abnormal neuronal circuits during these tests.

This topic is particularly important not only because it can lead to a better understanding of the problems and behavior of children with ASD, but also due to its applicability in therapy.

REFERENCES

1. Frich U., (1989). Autism: Explaining the enigma.
2. Kimbi Y. (2014). Theory of Mind Abilities and Deficits in Autism Spectrum Disorders. *Topics in language disorders*, 34 (4), 329-343.
3. Bauminger-Zviely N., (2013). Social cognitive and emotional competence. *Social and academic abilities in HF-ASD*, 31-58
4. Baron-Cohen S, Ring HA, Bullmore ET, Wheelwright S, Ashwin C, Williams SC. The amygdala theory of autism. *Neurosci Biobehav Rev*. 2000 May; 24(3):355-64. Review.
5. Mathesul D., McDonald S., Rushby J.A. (2013). Understanding advanced theory of mind and empathy in high functioning adults with autism spectrum disorder. *Journal of Clinical and Experimental Neuropsychology*, 35, 655-668.
6. Allen, J., Fonagy, P., & Bateman, A. (2008). Mentalizing in clinical practice. *Washington American Psychiatric Press*
7. Brewer R., Murphy J., (2016) People with Autism Can Read Emotions, Feel Empathy, *Neurological Health, Spectrum*, July 13.
8. Fonagy, P., & Luyten, P. (2009). A developmental, mentalization-based approach to the understanding and treatment of borderline personality disorder. *Development and Psychopathology*.
9. Castelli F., Frith C., Happé F., Frith. U., (2002). Autism, Asperger syndrome and brain mechanisms for the attribution of mental states to animated shapes. *Brain: Journal of Neurology*, 125, 1839-1849.
10. Oakley B.F, Brewer R., Bird G., Catmur C. (2016). Theory of Mind Is Not Theory of Emotion: A Cautionary Note on the Reading the Mind in the Eyes Test, *Journal of Abnormal Psychology*, 125 (6), 818-823.
11. Fonagy, P., Luyten, P., Bateman, A., Gergely, G., Strathearn, L., Target, M., & Allison, E. (2010). Attachment and personality pathology. In J. F. Clarkin, P. Fonagy & G. O. Gabbard

- (Eds.), *Psychodynamic psychotherapy for personality disorders. A clinical handbook*, 37-87.
12. Fonagy P, Luyten P, Bateman A (2015). Translation: Mentalizing as treatment target in borderline personality disorder, *Personality Disorders*. 2015 Oct;6(4), 380-392
 13. Happé F.G., (1995). The role of age and verbal ability in the theory of mind task performance of subjects with autism. *Child Development* 66 (3), 843-855.
 14. Lewis P.A., Rezaie R., Brown R., Roberts N., & Dunbar R.I.M., (2011). Ventromedial prefrontal volume predicts understanding of others and social network size. *NeuroImage*, 57, 1624-1629.
 15. Lieberman M.D., (2006). Social cognitive neuroscience: a review of core processes. *Annual Review of Psychology*, 58,259-289.
 16. Luyten P, Fonagy P, (2015). The neurobiology of mentalizing, *Personality Disorders*, Oct;6(4), 366-79.
 17. Peterson C, Wellman H.M., Slaughter V., (2012) The mind behind the message: Advancing theory-of-mind scales for typically developing children, and those with deafness, autism, or Asperger syndrome. *Child Development*, 83, 469-485.
 18. Satpute A.B, Lieberman M.D. (2006). Intergrating and controlled processes into neurocognitive models of social cognition. *Brain Research*, 1079, 86-97.
 19. Schultz r., (2005). Developmental deficits in social perception in autism: the role of the amygdala and fusiform face are. *International Journal of Developmental Neuroscience*, 23(2-3), 125-141.
 20. Uddin L.Q., Iacoboni M., Lange C., & Keenan J.P., (2007). The self and social cognition: The role of cortical midline structures and mirror neurons. *Trends in Cognitive Science*, 11, 153-157.
 21. Van Overwalle, F. (2011). A dissociation between social mentalizing and general reasoning. *NeuroImage*, 54, 1589-1599