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Social Cognition Disorder in schizophrenia and bipolar disorder – similarities and differences

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Summary

In the first part of the article, two aspects of social cognition, such as the Theory of Mind (ToM), i.e. the ability to infer about mental and affective states of other people, having both cognitive and perceptive aspects as well as empathy, i.e. the ability to understand other person's perspective and take an emotional response of the observer to the affective state of the other person, were presented. Next, research on social cognition in schizophrenia and bipolar disorder (BD) has been reviewed, and the disturbances, observed in these two illnesses were compared, with particular emphasis on studies investigating social cognition in both schizophrenia and BD. The results of studies show that ToM disturbances occur both in schizophrenia and BD patients, however, in schizophrenia they are of greater severity. As for empathy, patients with schizophrenia have significant disturbances of recognizing emotions, as well as of cognitive and affective empathy. Patients with BD do not have abnormalities in cognitive empathy, have lesser disturbances of emotion recognition disorder compared with schizophrenia and show a connection between disturbances of affective empathy and the course of the disease (time period after manic or depressive episode). Further exploration of these issues seems important in order to determine to what extent the disturbances of social cognition can influence social and professional life of patients. It is also a potential area for therapeutic interventions supportive to pharmacotherapy.

Key words: social cognition, schizophrenia, bipolar disorder

Social cognition

According to Christopher and Uta Frith, social cognition is the sum of the processes that allow a person to live in the society and manifest mainly through the ability to create effective relationships with others and through interacting with them [1].

A similar definition of social cognition was formulated by Beer and Ochsner [2]. According to these authors, it is a totality of processes by which people understand themselves and others. In view of the fact that social cognition enables to encode information about the world, a detailed description of social cognition should include the following elements: information processing about people in general, about oneself and about the norms that are in operation in the world. Social cognition is also defined as the ability to think about other people, also in more complex categories, as the ability to form a representation of a relationship between the person and the others, and the ability to use it in social behaviors. Social cognition may be also analyzed in regard of the function it plays, namely predicting intentions of others, anticipating social behaviors, and even predicting emotions of other people [3].

Developing these skills to a high level plays an adaptive role, and in a broader perspective contributes to survival of not only individuals, but also the entire human species [1]. Thanks to the mechanisms for social cognition, it is possible to acquire knowledge about the world and about people with whom we interact. This can be done in an indirect way, when the acquired information is based on the knowledge of other people and also in a direct way by independently gathering information about the environment. In addition, apart from the accumulation of knowledge, social cognition allows one along with others, to create a so called common world in which necessary interactions take place and without which, the man as a social being, could not exist. The above-mentioned skills are possible, thanks to the existence of so-called social cues. This information is processed most often unconsciously (emiting them by the sender is also unintentional). Social cues often have non-verbal nature, therefore the ability to use them appears already from the earliest period of life. Certainly, there are also more advanced mechanisms that require involvement of conscious awareness. Their acquisition starts after 18 months of age. They are responsible for more specialized skills such as taking the perspective of another person. [1]

Mechanisms involved in social cognition enable the acquisition of knowledge about the world [4]. This information comes not only from the experience of the individual but also from relationships with others (so-called social referencing). In the first years of life, a person who is the most important source of social reference is the mother – infant treats her as a trustworthy person and at the same time endowed with wisdom. In later years a mother is superseded by other significant people such as e.g. peers who become successive models of social learning [1].

In addition to the ability to acquire knowledge about the world, social cognition is also involved in processes associated with getting to know other people. It is possible to distinguish two types of knowledge, on which the beliefs about the behaviors of others are based. Firstly, it is the knowledge about who a particular person is, secondly, it relates to how a person behaves: i.e. knowledge of the actions, intentions, feelings and beliefs of others [3]. Both during an inference on permanent characteristics of given individual, such as personality traits, and on variables – such as intentions, a number of available social cues is used [1].

Processes of mentalisation (most often referred to as the theory of mind – ToM) and of empathy seem to be the most explored phenomena belonging to social cognition. In addition, the ability to make decisions in social situations, understanding social norms, as well as acquisition of social skills during development of an individual, belong to important aspects of social cognition. Social cognition also pertains greatly to emotional functioning. Recognizing facial emotional expression, eye contact and reaction to prosody, i.e. to the emotional aspect of speech, are among most common research scenarios.

Theory of Mind

One of the most important skills that played a significant role in the adaptation to social environment was ToM, determining the ability to represent one's own mental states and mental states of others as well as the ability to determine the relationship between them in the context of a displayed behavior of others [4]. There are many types of mental states which affect the quality of our interaction with other people. We can distinguish character traits such as other person's honesty or short-term emotional states such as anger or joy, needs, intentions and beliefs. Many of these conditions can be identified based on another person's facial expression. Moreover, other people's emotions can be inferred not only from facial expressions, but also from voice and movements of the whole body. However, while recognizing beliefs, it is important to take into account the perspective of the other person. This process is more complex and requires putting oneself in a situation of the other person and taking into account his or her preferences and knowledge [4].

Some researchers claim that ToM cannot be treated as a single construct [5]. Shamay – Tsoory et al [6] postulate the existence of a cognitive and affective aspect of this ability. Cognitive aspect of mentalising involves inferring on cognitive mental states, mainly beliefs of other people. The essence of the affective aspect is inferring on emotional states of others. According to Tager-Flusberg and Sullivan [7] within the ToM framework, one can distinguish a socio-cognitive and a socio-perceptive aspect. The first one is the equivalent of the ability to infer on mental states of other people. Based on observation of behavior one can infer on thoughts, intentions and beliefs. The effectiveness of actions controlled by this aspect of ToM is closely related to the functioning of cognitive abilities. The socio-perceptive aspect is based on the ability to recognize emotions. It is linked to affective system and allows to distinguish people from other objects, and for inferring about mental states of other people, based on facial expressions and body movements. This aspect is independent from cognitive functions. Neuropsychological research confirmed distinct features of both these aspects

Empathy

Research on social cognition also pertain to the mechanism of empathy. As Wiener states in his review, Franz DeWall, a prominent theorist of this area of research, defines empathy as "a process of direct simulation of the emotional state of another organism, which results in the acquisition of certain properties of the simulated object by the observer" [8]. According to this researcher, empathic processes are derivative of imitative processes and do not require involvement of propositional knowledge, i.e. the 'I know', 'I think' knowledge. They can, therefore, occur on unconscious level, beyond the control of higher cognitive centers. Francessco Gallese, an Italian neuroscientist, presents a similar point of view, trying to combine two perspectives: the phenomenological and neurobiological one. He describes empathic processes by using a phenomenological terminology, justified by neurobiological research on the activity of specific population of neurons called mirror neurons. They are activated when a person performs an action or either hears or sees another person performing the same or similar action. This unconscious and automated mechanism, allows to understand actions of another entity and one's own behavioral activity through internal and thematically specific simulation of the corresponding mental state [8].

Empathy as a psychological phenomenon can be defined in many ways but most prevalent is the theoretical approach treating empathy as a cognitive awareness of internal states of another person and as a substitute affective reaction. According to the first standpoint, skillful empathizing enables one to know the thoughts, feelings and insights of another person [9]. Empathy, described by this approach as cognitive, is defined as the process of understanding other person's perspective with particular emphasis on the emotional life [10]. The second approach treats empathy as a vicarious affective response enabling the perception of other peoples' affective states. According to this approach, empathy reflects the feelings of the empathizing person to the extent of the feelings of the empathized person. In other words, it is the emotional response of the observer to the affective state of another person. [10] In this case, the role of imitation and the phenomenon of emotional transfer is very important [8]. Professional literature proposes a distinction between three components of empathic processes. First is the ability of emotional recognition of one's and other people's emotions by observing facial expressions, speech and behavior. Another component of empathy is the ability to receive another person's emotional perspective. In this case, however, there is a clear distinction between the perspective of the subject and another person. The third component distinguishes the ability to affective response, that is, to share emotional states of others and the capacity to experience similar emotions [11].

Disorders of ToM and empathy in schizophrenia

Initial studies of ToM in schizophrenia indicated a deficit of ToM during clinical exacerbation of schizophrenia and thereby supported the view that mentalisation

disorders are characteristic only to acute psychoses [12]. However, studies conducted in the last decade challenge this view and indicate that schizophrenia patients also during improvement have difficulty in solving ToM tasks [13-17].

Schizophrenia patients have also disorders of empathy. The results of studies indicate that these patients have a deficit in each of the three components of empathy [18]. In patients with schizophrenia, abnormalities in recognizing emotions from facial expressions of other people have been observed. The ability to recognize emotions among patients with first-episode of schizophrenia was found to be impaired both before and after the treatment. Schizophrenia patients have also problems with the adoption of an emotional perspective. These tasks involve patients both on the cognitive and emotional level. Research shows a link between the deficit of this component of empathy and the difficulties in ToM tasks. Results demonstrating the overall impairment of empathic abilities in schizophrenia were presented by Derntl et al [18]. Salva et al showed that the longer duration of illness, the greater are the deficits in perception and processing of emotions [19].

Disorders of ToM and empathy in bipolar illness

Studies conducted by Kerr et al. found a deficit of ToM during both manic and depressive episode [20]. Disorders of ToM were also observed in patients with BD during remission [21]. Results of the studies conducted by Bora et al. [22] suggest that the ability to metalize is impaired in BD not only during acute episode of mania and depression, but also in remission. Another attempt to assess the ability to mentalise in remitted BD patients was undertaken by Shamay-Tsoory et al. [6]. The results obtained indicate that the clinical group reached a significantly lower level of performance in the field of cognitive ToM, however, there was no significant difference in case of the affective component as compared to healthy subjects. Also, research team led by Montag confirmed the above relationship [22]. The results of most recent studies confirm that ToM disturbances exist both in mania, depression, as well as in remission [24-27] .

Besides of the deficit of mentalisation, patients with BD also show disorders of empathic abilities. A research team headed by Shamay – Tsoory [6] indicated that BD patients obtained significantly worse results in tasks on the cognitive aspect of empathy, whilst significantly higher scores than the control group in tasks on affective empathy. Studies by Cusi et al. [28] demonstrated a deficit of the cognitive aspect of empathy, while a team led by Seidel [29] found that there is a deficit of affective empathy in BD. According to Derntl et al. [30] cognitive aspect of empathy in BD remains intact which contradicts the results of studies by Montag et al. [23] and by Wiener et al. [31], where patients studied were in remission.

Comparative studies of social cognition in schizophrenia and BD

In order to identify similarities and differences in the ability of social cognition selected works on ToM and empathy deficits in schizophrenia and bipolar disorder have been analysed. Only those works that focused exclusively on the topic of ToM and empathy as well as concerned both of those mental disorders.

The first of the studies discussed in this work, and at the same time the first Polish study, was conducted at the Department of Adult Psychiatry, Poznan University of Medical Sciences [31]. The clinical group consisted of patients with schizophrenia and BD type I (n=20 for each group). Participating patients were in a state of improvement, as assessed by the PANSS scale (Positive and Negative Symptom Scale) (<70 points) for schizophrenia, and by the HDRS (Hamilton Depression Rating Scale) (<12 points) and YMRS (Young Mania Rating Scale) (<10 points) for BD. The control group consisted of 40 subjects. A group of patients with BD was divided into two subgroups, based on the criterion of the episode preceding remission, mania or depression.

Two types of tests were used to assess the mentalisation abilities: Baron–Cohen's Eye Test (Reading the Mind in Eyes Test, Revised Version II) and for assessing empathic abilities Multifaceted Empathy Test (MET) by Dziobek [10] was employed. Eye test is used to assess the ability to recognize complex mental states. This test presents a series of 36 photos of the eyes and their area. Patients have to choose one of four responses that best describes what the person on the picture is thinking and feeling. A multi-dimensional empathy test is used to assess the level of empathy and its various aspect : affective empathy and cognitive empathy. Affective empathy is defined as the emotional response of one person to the emotions of another person. The cognitive aspect of empathy involves understanding emotional state of another person and accepting his or her point of view. Research material presented in the MET contained stimuli of positive and negative valence, and therefore cognitive and affective aspect of empathy could be distinguished for positive and negative emotions.

The results obtained indicate that ToM disorders occur both in schizophrenia and BD. Deficit of ToM in schizophrenia was more severe than in BD, however, both groups significantly differed from the control group. Patients with BD showed the deficit both after manic and depressive episode. Disturbance in cognitive aspect of empathy was shown in schizophrenia and in BD. In patients with BD, disturbance in cognitive empathy was shown both after manic and depressive episode.

Cognitive aspect of empathy, regarding a reaction to the negative stimuli was disturbed in schizophrenia, whereas no deficit of this aspect was noticed in BD. However, the level of cognitive aspect of empathy regarding positive stimuli was significantly decreased in both schizophrenia and bipolar disorder, compared with the control group.

Disorders of the affective aspect of empathy, especially in relation to positive stimuli have been demonstrated in schizophrenia, whereas BD group, as a whole, showed no significant differences compared with control group. Abnormalities in this

respect have been shown in a subgroup of BD patients after manic episode, both in terms of positive and negative stimuli where the values were significantly higher compared to healthy subjects. Patients after a depressive episode did not show significant differences in this respect when compared with the control group.

In conclusion, the study showed abnormalities of ToM, as well as both cognitive and affective empathy in schizophrenia (for stimuli of positive emotional valence). ToM disorder in BD was less severe than in schizophrenia and did not depend on the previous episode. It was also found that abnormalities of cognitive aspect of empathy occured in schizophrenia and not in BD. The results on the level of affective empathy among BD patients after manic episode may broaden a contemporary knowledge on social cognition in BD. The MET test in such patients demonstrated a difference between patients and control subjects, where abnormality was expressed in the form of 'over-empathising' i.e. excessive reaction (as compared to the control group) to the presented stimuli.

Another scientific report by Donohoe et al [32] also focuses on the analysis of differences in social cognition between patients with schizophrenia and bipolar disorder. A study showing that these disorders differ in terms of neuropsychological deficits has become a starting point for these authors [33]. BD patients had lesser deficits of cognitive functioning, especially memory and attention, which may reflect the dichotomy between mental disorders proposed by Kraepelin [34]. The aim of the study was to verify whether a similar relationship exists in social cognition, and more specifically, in ToM.

The study included 208 patients with schizophrenia and 102 with BD. Inclusion criteria were: age (18-65 years), lack of co-occurring mental disorders, lack of addiction to psychoactive substances in the past six months, no head injury with loss of consciousness and no criminal record. The control group consisted of 132 people. Two aspects of the ToM were distinguished. The first one was defined as 'decoding' which was assessed by the Mind in the Eyes Test. The second aspect – 'inference', was evaluated using the Hinting Task test. This test is based on the presentation of 10 stories on interaction of at least two people. The statement of one of the participants of the interaction is hidden, and the testing person is given a hint which is helpful to reproduce that statement.

It was found that both schizophrenia and BD patients obtain significantly worse results compared to control group when analyzing the aspect of ToM 'decoding'. No difference in this respects was found between schizophrenia and BD. As to the second aspect of ToM – 'inference', schizophrenia patients obtained significantly worse results compared to both BD and control group, whereas no difference was found between BD and control group. Therefore, a team of Donohoe et al. [32] showed that, in BD, the aspect of the ToM referred to as 'decoding' is disturbed, while the aspect of 'infering' is not affected. On the other hand, in schizophrenia, both aspects of ToM are disturbed. Interpreting the results, authors speculate that cognitive functioning of the patients with BD may be crucial to their inferring ability which, in BD is less impaired than in schizophrenia.

A study conducted by Derntl et al. [30] contributed significantly to the description of processes of empathy in schizophrenia and BD. Clinical group consisted of 24 patients with schizophrenia and 24 patients with BD, type I and II. Severity of symptoms of schizophrenia was assessed by PANSS. In patients with BD, symptoms were assessed by the YMRS mania scale and the MADRS depression scale (Montgomery Asberg Depression Rating Scale). During the study all schizophrenia patients took atypical antipsychotic drugs, whereas patients with BD took mood stabilizers. Control group consisted of 24 subjects. In each group, half of the subjects were women. Three aspects of empathy were analyzed, identified by Decety and Jackson [11]. The study assessed the level of emotion recognition, adapting emotional perspective of others and emotional response to another person's affective state. Recognition of emotion was measured by presenting to the subjects 60 photos of facial expressions of five basic emotions and a neutral expression. Perspective taking of others, otherwise referred to as cognitive empathy was assessed using 60 images of two people involved in a social situation. The face of one person was masked, and the subject's task was to assign the person from a photo with emotion appropriate to the situation and the context. Emotional response to another person's affective state, otherwise referred to as affective empathy, was assessed by presenting a description of the situation with a question of how the subject would feel, when being in such a situation.

The study showed disturbance in recognizing emotions in both schizophrenia and in BD compared with the control group, however in BD this disturbance was of lesser intensity. As to affective empathy (emotional reaction to the emotional state of another person), the deficit was observed in schizophrenia but not in BD. It was hypothesized that patients with BD can obtain information from the context and not just from the facial expression. Therefore, in terms of empathy a more profound deficit was shown in patients with schizophrenia compared with BD and control group. Depressed patients showed a similar level of empathy as control group. Only in depressed patients, a relationship between empathy and clinical symptoms was observed, which was manifested, among others, through correlation between the deficit of such aspect of empathy, as emotional response (affective empathy) and severity of symptoms and duration of the depressive episode.

In conclusion, the study showed that in schizophrenia there is a more severe and generalized deficit of empathy including all its three components. In BD, the deficit is more specific – manifested by disturbance of emotion recognition and affective empathy, i.e. emotional response. Patients with BD seem to have a problem with putting themselves in the emotional situation of the other person. However, they can compensate that through the ability to draw information from the contextual data (and not only on the basis of emotion visible on the faces), as evidenced by properly functioning cognitive empathy .

Summary – similarities and differences in social cognition in schizophrenia and BD

Table 1 presents the results of the studies discussed above.

Table 1. **Theory of mind and empathy in schizophrenia and bipolar disorder (BD) – comparison of abnormalities**

Wiener et al., 2011		
	Schizophrenia	BD
Theory of mind (Mind in the Eye Test)	+ +	+
Cognitive empathy		
Negative stimuli	+	-
Positive stimuli	+	+
Affective empathy		
Positive stimuli	+	+ (after mania) - (after depression)
Negative stimuli	-	+ (after mania) - (after depression)
Donohoe et al., 2012		
Theory of mind (decoding)	+	+
Theory of mind (reasoning)	+	-
Derntl et al., 2012		
Emotion recognition	++	+
Cognitive empathy (perspective taking)	+	-
Affective empathy (affective responsiveness)	+ +	+

'+' abnormalities; '++' severe abnormalities '-' lack of abnormalitiesIn schizophrenia, one can define a deficit of both cognitive and affective aspect of the Theory of Mind as well as cognitive and affective aspect of empathy. In BD, research conducted by Wiener et al [31] and Donohoe et al [32] confirm the ToM disorder in terms of decoding. However, inferring ability, among those patients, remains unaffected [32]. This fact explains a good social functioning of BD patients, as they obtain social information in a way that does not require decoding i.e. from the context and the situation in which they participate. The decoding ability is compensated by inferring ability.

Discrepancies regarding affective empathy between the research conducted by Wiener et al [31] and Derntl et al [30] can be explained by referring to the characteristics of particular clinical groups. Wiener et al [31] split clinical group into those after manic or depressive episode. An abnormality of the affective aspect of empathy was found in patients with BD after manic episode but not in patients after depressive episode.

When the entire clinical group of patients with BD was analyzed (both after manic and depressive episode) no differences with control group were observed. In case of cognitive empathy, the obtained discrepancies may be explained by different understanding of the analyzed concept. Derntl et al [30] defines empathy as an ability to quickly infer an emotional state of another person by taking the social context and people's behavior into account, and not as ability to understand a perspective of other person, especially his/her emotional life. This study also lacks information on whether the patients were in remission or in acute episode of the illness. It should be also noticed that in these two studies, different tools were used what could have an impact on the results.

Further exploration of the area connected with social cognition, and more specifically with the ToM and empathy, seems to be of great significance. It is important to identify the extent to which deficits of social cognition influence social and professional functioning of the patients. It is also a potential area for further therapeutic interventions supportive to pharmacotherapy.

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