Chapter 6

Consciousness and Social Cognition from an Interactionist Perspective: A New Approach on Understanding Normal and Abnormal Relations between Metacognition and Mindreading

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Abstract

Contemporary discussions on relations between metacognition and mindreading result in several theoretical accounts allowing various combinations of both mechanisms in the process of formation of beliefs, intentions, and decisions with respect to oneself or others. In fact, various prefrontal areas of the brain are activated when individuals mentalize about themselves and about other people. Interestingly, the latest accounts of the relationship between mindreading and metacognition clearly favor arguments for interactionism between functionally different mechanisms in the formation of our social knowledge. In particular, a two-level architecture enables a mutual interaction within a complex metacognitive system that is evolutionarily structured into higher and lower level metacognition with different functions and tasks. In our opinion, cognitive architecture of such systems needs to include conscious mechanisms that incorporate information accessibility as activation through the interaction. Here, we will argue that the combination of the two-level account on mindreading and metacognition along with a global broadcasting architecture embedded in the human brain is a good starting point that explains formation of accurate social knowledge and access to such knowledge. In our opinion, it becomes clear that consciousness via the interaction activates many unconscious brain regions, including interpreter systems such as metacognition and mindreading.

Keywords: consciousness, metacognition, mindreading, global workspace theory, borderline personality disorder, schizophrenia

1. Introduction

The questions about the nature of how we know other people's minds (mindreading, "theory of mind" [1]) and how we know our own mind (metacognition [2, 3]) are intensely debated in a variety of research fields such as cognitive sciences, psychology, or psychiatry [4, 5]. The term "metacognition" describes cognitive processes that are involved in "thinking about own thinking" by which people can reflect upon (monitor) their own internal mental states and use their knowledge to evaluate and regulate (control) their own mental states [6, 7]. On the other hand, the notion of mindreading is related to our own cognitive processes that can be applied to other people ("thinking about the thinking of others") in terms of recognizing others' intentions, mental states, emotions, as well as predicting possible behavior of other people [1, 4, 8]. In fact, Bateman and Fonagy [9] point out that both mental capacities (metacognition and mindreading) can be a form of mentalization engaging cognitive processes that are aimed at implicit and explicit interpretation of our own actions and actions of other people as meaningful. In fact, both components influence one another and involve complex and critical operations in human social life [8].

Crucially, clinical research interest focuses also on attempts to explain various mental disorders in relation to deficits in mindreading [10], dysfunctional metacognition, [11] as well as an abnormal relationship between both cognitive facilities [11]. Typically, clinical researchers define mindreading deficits as limitations or complete loss of capacity to recognize and attribute mental states in order to understand other people, including their intentions, beliefs, emotions, and possible behaviors [4, 11]. For instance, such persistent mindreading deficits are commonly observed in a group of patients with schizophrenia [11]. In turn, impairments in metacognition are thought to be involved in formation of abnormal recognition and understanding one's own mental states and deficits in proper control and monitoring of one's own internal states [12]. Apparently, deficits in metacognition are demonstrable in a variety of mental disorders. Some clinical studies demonstrate influence of dysfunctional metacognitive beliefs on the development of and formation of psychotic symptoms, including hallucinations and symptoms of anxiety accompanying mental disorders [13]. For instance, a core positive symptom of schizophrenia, which is a lack of insight, clearly represents a failure of metacognition. Over the last decade, the empirical research emphasizes the role of dysfunctional metacognitive beliefs (declarative knowledge) or metacognitive thought control strategies (procedural knowledge) as predictive to development of psychosis in normal and clinical populations [14–16] and maintenance of neurotic symptoms [17]. A vast body of research gives also indication that patients with psychosis have also dysfunctional meta-beliefs. For instance, in a nonclinical sample, García-Montes and colleagues [18] based on Metacognitions Questionnaire construct (MCQ construct; [19]) in their correlation study showed that both metacognitive factors such as thought control strategies about worry as well as loss of confidence were indicative to hallucination proneness when trait anxiety was controlled.

Nonetheless, the present article considers a more complex cognitive architecture of social cognition that may possibly underline the dysfunctional interaction between mindreading and metacognitive capacities. For example, recent clinical studies on various causes of mental

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disorders identify abnormal patterns of recognition and attribution of mental states either to themselves or others in patients suffering from schizophrenia [20, 21], social phobia [10], as well as patients diagnosed with borderline personality disorders (BDP) [22, 23]. It is important to emphasize that new approaches to conceptualization of the interaction between metacognition and mindreading become important not only for understanding abnormal social cognition but also for finding effective treatments of mental disorders and offering appropriate psychological care to patients. Our paper aims to demonstrate that combination of an interactionist approach on metacognition and mindreading [6] with a theory of consciousness mechanisms [24, 25] is a convenient cognitive perspective that takes into consideration the interaction between both mental capacities and conscious access to information in ensuring effective social behavior.

2. Metacognitive therapy and role of consciousness

Before going ahead with our theoretical discussion, it is first instructive to start with discussing a case from clinical intervention that shows cognitive complexity and real challenges behind the relation between social cognition and consciousness. Recently, there has been a substantial progress in the field of cognitive-behavioral interventions for treatment of psychiatric disorders (for instance, see [26]). Empirical studies on new therapeutic approaches based on metacognitive training provide solid evidence that corrective experiences are efficient in handling cognitive biases in psychiatric populations [27]. Positive clinical results are achieved through a variety of metacognitive technique exercises including the "theory of mind" skills (https://clinical-neuropsychology.de/metacognitive_training/). Research studies clearly show that psychiatric patients who underwent intervention of metacognitive training for psychosis can substantially reduce their cognitive biases [26]. For instance, patients undergoing a therapeutic intervention based on the "theory of mind" module for psychosis by engaging conscious evaluation may diminish overconfidence in errors, frequency of jumping to conclusions, etc.

Let us imagine an omnipotent patient that attempts to identify the actor as a leader who speaks to the crowd and may be overconfident in his/her wrong response. The example shown in **Figure 1** can help us to capture the phenomenology of social cognition and conscious evaluation. It is most likely that abnormal information processing in this patient would lead to biased responses (distortion in social cognition) and overconfidence (abnormal metacognition) in his/her attempts to recognize social information. We can see that in these circumstances the patient can fail to construct accurate knowledge. Although after therapeutic intervention and engaging mechanisms of conscious access to his/her interpretation, it comes to a symptom's reduction, and the patient gains accurate knowledge about their surrounding others. This particular situation illustrates how faulty interpretation can be potentially corrected by conscious evaluation. How then the patient eventually gains accurate knowledge and forms the proper interpretation? Here, we will attempt to answer these research questions from a cognitive perspective by demonstrating that conscious access is an important mechanism for correcting our theories and judgments intended to interpret and predict behavior of other people.

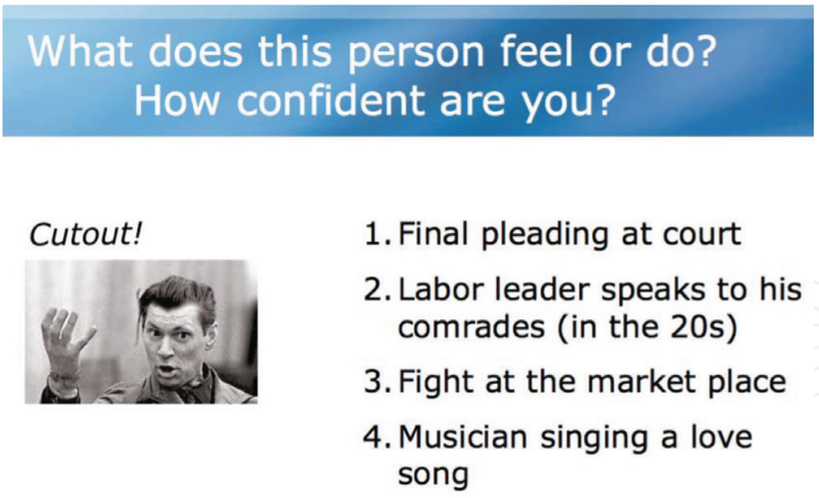

Figure 1. An example of cognitive intervention from the metacognitive training course aimed at cognitive enhancement of social cognition (https://clinical-neuropsychology.de/metacognitive_training/). The exercise activates formation of social understanding by asking a client to infer emotional states of the actor on the picture. During this exercise a patient attempts to recognize an emotional state of the actor presented on the picture by choosing one of four options and then expresses confidence in his/her responses. The therapist analyzes the client's answers and helps the client to reach a correct answer (option no. 4).

3. Cognitive models of mindreading-metacognition relation

Contemporary scientific discussions on the relation between metacognition and mindreading result in several theoretical accounts allowing various combinations and configurations of both mechanisms in the formation processes of beliefs, intentions, and decisions with respect to oneself or others [4]. Cognitive architecture that considers possible configurations of these sets of mechanisms must embrace different functions, knowledge structures, as well as mechanisms that provide access to the information [6]. Yet, it seems that the discussion on the adequacy of each theoretical account is still open, and there is no unambiguous evidence pointing out clear superiority of the specific theoretical account on the relation between metacognition and social knowledge.

For example, Nichols and Stich [28] in their theoretical description of how we access and utilize self-knowledge and other-knowledge propose a hybrid architecture composed of metacognition and mindreading as distinct and innate mechanisms. According to this view, the basis of self-knowledge is formed by two metacognitive mechanisms of self-monitoring nature: one responsible for recognizing and providing knowledge about internal states (our own propositional attitudes) and one for recognizing and providing information on our experiential states [4]. Whereas the mindreading faculty constitutes independent mechanism that deals with the attribution of mental states to understand other people. Since metacognitive and mindreading systems are modular, there is a superior coordinating mechanism that manages the interaction between components [28].

In other theoretical proposals, cognitive architecture on social cognition takes on a more radical form, as the cognitive system is greatly simplified to only one capacity, which is, namely, mindreading or metacognition. For example, Carruthers [4] in his theoretical approach denies that there is an introspective access to propositional attitudes and postulates the existence of

only one mindreading mechanism that underlie our social cognition. This view claims that metacognition is only grounded on mindreading and therefore attribution processes of mental states to oneself and other people are results of prior unconscious interpretation. Adoption of such a one-system architecture indicates that knowledge about our own state results only from mindreading mechanisms that accesses a variety of information sources (percepts): incoming perceptual states or quasi-perceptual states [4]. This account clearly implicates that introspection of propositional states is replaced by interpretation without conscious access [4].

Indeed, the idea of one-system architecture ignores conscious access to the information that is, in fact, in contradiction with commonsense observations of the role of consciousness in regulating our behavior. In fact, although our cognitive system in various situations is dominated by unconscious events and shows some limitations, we can consciously correct our theories and judgments to interpret and effectively predict behavior of other people (see, for instance, [29]). In fact, it is important to emphasize that the one-system architecture by Carruthers [4] excludes clear activation of conscious access through the interaction between modules, because the architecture implicates a homogeneous mechanism that processes the content of various kinds from different functionally levels and the inputs. The same conclusions may come also from consideration of another architecture which postulates that mindreading and metacognition are parts of the one metacognitive mechanism [30–32]. In this account, it is believed that the attribution of mental states to other people depends on our direct access to these mental states (introspection) via subsequent processes of simulation and inference. Thus, human capacity for mindreading is based on the introspective data, which are initially accessed to imagine other's state, and then is used to make the attribution of this state to interpret or rationalize other's behavior (simulation).

4. Interactionist approach in social cognition

Interestingly, the latest accounts of the relationship between mindreading and metacognition clearly favor arguments for interactionism in the formation of social knowledge. In particular, Arango-Muñoz [6] presents a two-level architecture (two different levels of complexity) enabling a mutual interaction within a complex metacognitive system that is evolutionary structured into higher- and lower-level metacognition with different functions and tasks. Both metacognitive systems "start to interact and influence each other" by forming a complex social cognition [6]. In particular, mindreading is the higher level structure that engages rational knowledge, which is a psychological concept or naive psychological theory, to interpret and rationalize others' behavior. The main function of this level is therefore to interpret others' behavior, although self-interpretation from this level is possible but is not a priority. Within lower level structures operate unconscious processes of control and evaluation that serve to adjust epistemic states (e.g., subject's feelings) to the individual's current behavior. The dual-process account makes predictions of cognitive regulation based on the bidirectional interactions: (i) a "from-low-to-high-level" direction that predicts possible evaluation and monitoring and then the attribution of a psychological content and (ii) a reverse interaction in a "from-high-to-low-level" direction that activates rational knowledge and control processes to regulate current social responses to others people.

To sum up, the higher-order structures deal with our rationality which is linked with attribution of available psychological concepts and folk theories to interpret oneself and others' behavior, while lower-level functions of control and monitoring attempt to adjust one's cognitive activity in automatic and unreflective manners [6, 20]. Since the dual-process theory implicates different levels of metacognition, the role of interaction itself is to link such different levels of complexity in a single unit of metacognition [20]. This, in turn, indicates that both levels of metacognition influence one another via such interaction [20], which is critical in dynamic formulating and executing complex cognitive operations in our social responses. Therefore, one can expect that selective impairments in the high-level structures can give rise to impairments in the low-level metacognition and vice versa. For instance, impairments in mindreading processes that develop from childhood onward may cause specific abnormalities in metacognition among individuals later in their adulthood diagnosed with schizophrenia [56].

5. Consciousness as a vehicle of interaction

Nonetheless, in case of formation of social knowledge predicted by the two-process theory [6], it is important to identify possible mechanisms of accessing the content within such complex capacity. The two-level account proposed by Arango-Muñoz [6] implies that activation of the current content occurs via the interaction which depends on a specific level of processing and a specific psychological context (either related to oneself or other people). This model indicates that higher-order inferential mechanisms should interact with the low-level control and monitoring mechanisms activated in the automatic and unconscious way. Thus, this interactionist account suggests that at the lower level there is no conscious control or monitoring of others' behavior as well as no conscious attribution when handling a specific psychological context of individual either related to the self or others. Clearly, this conclusion is contradicted with common sense that people are often aware of their attributions and can finally formulate accurate and realistic interpretations about others even though they initially produced false attributions.

How conscious control or evaluation of social cognition is then possible? It should be emphasized that interactionists (see [6]) claim no explicit architecture of consciousness mechanisms that are responsible for managing the information content within the system. In our opinion, cognitive architecture of such system needs to include a conscious access mechanism that ensures accessibility of information understood as activation through the interaction. Here, we will argue that a combination of the two-level structures of mindreading and metacognition [6] along with a global broadcasting architecture of consciousness [25, 33, 34] is a reasonable theoretical proposal that explains how conscious access contributes in formation of accurate social knowledge.

6. Global workspace, social cognition, and their neural substrates in the brain

For over two decades now, we have been observing the rapid development of research on consciousness [35–37]. This research by addressing questions about subjective nature of experience has resulted in well-empirically established theories that describe formation of

conscious knowledge as well as determine directions of contemporary empirical studies on the brain [35, 36]. One of the most well-known accounts on consciousness is a global workspace theory (GWT) postulated by Bernard Baars [33, 38]. The GWT theory has originated in several empirical studies implicating a notion of a neuronal global workspace that has contributed to numerous findings and concepts on possible neural architecture of access consciousness in the brain [39]. The GWT theory has been also found useful in several computational applications, including the field of artificial intelligence or neural network modeling [40].

The central claim of GWT is that consciousness has an integrative function that organizes and provides access to a distributed set of knowledge sources that otherwise work as independent structures [25, 34]. According to the conscious access hypothesis, consciousness is considered as an agent that makes the content globally available to unconscious systems [34]. In other words, consciousness enables exchange, coordination, and control of broadcasting the information content among a set of unconscious, specialized, and separate processors [25]. GWT also assumes that the unconscious contents of the mind compete or cooperate with each other in order to gain access to the global workspace. In other words, when the specific information content wins the competition for access over other information, it gets into the neural global workspace that allows its broadcasting to other regions of the brain (specializes processors) in which other processes and resources are activated. In this way, conscious events are results of the interaction between unconscious processors that attempt to spread the information content via the global workspace for other specialized areas of the brain [25, 34, 38].

In the area of brain research, significant progress has been made in understanding the cognitive and neuronal basis of consciousness [41]. Given the cognitive division into conscious and unconscious processing, brain research shows that architecture of consciousness in the brain may be reflected by functionally separate brain regions that are associated with conscious representation and other brain regions responsible for the unconscious processing of lower-order information to which conscious re-representations are referred [37]. According to the cognitive architecture based on GWT, it is assumed that neural underpinnings of conscious access occur in the prefrontal region (hub) of widely distributed reentrant circuity [41]. Other consciousness studies based on metacognitive approach provide evidence that higher-order representations of consciousness are associated with the activity of prefrontal and parietal cortical structures [42] with a high degree of interconnectivity [43]. It is likely that mechanisms of conscious access localized in the prefrontal and parietal regions receive different kinds of inputs that are required to formulate accurate social interpretation. Following the GWT assumption, unconscious, special-purpose brain processes linked with metacognition and mindreading attempt to get access to a neural global workspace which enables reversible broadcasting to the whole system [44, 45]. Therefore, since mindreading and metacognition constitute unconscious domain-specific processes ("modules"), their neural architecture should be also distinct from conscious structures. For instance, Dimaggio and colleagues [8] show that people who mentalize about themselves (metacognition) and about others (mindreading) activate regions associated with medial prefrontal cortex (mPFC). Interestingly, several regions of the mPFC specialized in social cognition are dissociable when individuals think of others who are perceived as similar or who are dissimilar to the self [8]. Some researchers also suggest that other brain areas such as a bilateral temporal parietal junction (TPJ) may be involved in social cognition as it may be a solid candidate for representing

mindreading module [46]. Interestingly, functional neuroimaging studies of clinical population have demonstrated that mindreading deficits are associated with decreasing activation within the medial prefrontal cortex [47]. Some other fMRI study on mindreading deficits in patients with schizophrenia also shows abnormal activation within the left medial prefrontal cortex [48]. Obviously, the actual organization of brain circuity resulting from the proposed framework of linking the dual-process social cognition and the global workspace is considerably more complicated. However, such simplified cognitive architecture of conscious social cognition can allow us to understand how normal and abnormal behavioral and neuronal patterns that accompany conscious processes in social cognition can be developed.

7. Clinical implications of dual-process framework of social cognition and consciousness

Given the proposed framework of dual-process social cognition [6] and access in the global workspace [33, 34, 38], we attempt to explain abnormal social cognition in clinical disorders. We demonstrate how our framework can bring new light into understanding selected examples of clinical disorders in which there are deficits in mindreading and metacognition. Here, we show examples of clinical disorders such as borderline personality and schizophrenia.

A vivid of example showing abnormality in conscious access may be presented by patients with borderline personality disorder. Individuals diagnosed with BDP characterize instability of emotional and behavioral reactions as well as unstable relationships with others [49]. It has been argued that BDP symptoms arise from deficits in perceiving and interpreting social signals [50–52]. Several researchers believe that patients with BPD have difficulties in their ability to correctly ascribing mental states to oneself and recognizing others' mental states; therefore, BPD is considered to be a metarepresentation disorder [53]. It is believed that a lack of long-term bonds with others may be due to the difficulty in maintaining a stable representation of others' mind and one's own mind [54]. Moreover, Semerari and colleagues [53] point out that impairments in BPD in reflecting one's own thoughts and emotions are of selective nature, since they are mainly associated with integrating representations of self and others in consciousness. In particular, these researchers have video-taped four patients suffering from BDP and then evaluated clinical outcomes of therapeutic intervention over the first year of their therapy with the Metacognition Assessment Scale [55]. The MAS focuses on measuring basic metacognitive functions such as monitoring, integration, and differentiation [55]. Here, we focus on monitoring dimension associated with the ability to identify one's inner states, and other functions of metacognition linked with integration defined as the "ability reflect in different mental states and or contents giving them an order and hierarchical relevance" [55]. The study clearly has demonstrated that four patients had the ability to identify their own internal states, although their integration functions aimed at organizing metacognitive representations of self and others were impaired. Following our theoretical framework of dual-process cognition and consciousness, this abnormal pattern of the metarepresentative functions in patients with BPD may indicate that the low-level structures of control and evaluation are preserved; however, there may be difficulties in consciously accessing higher-level structures containing

available psychological knowledge. Since conscious access should endorse integrating nature of the metacognition-mindreading relation, its disturbances can lead to abnormal information flow between both subsystems [3]. Here, one can interpret this situation as results of abnormal regulation in accessing the information content that goes in the "from-low-to-high-level" direction. Therefore, low-level processes of evaluation and monitoring work properly, but the further attribution of psychological contents fails. Thus, our theoretical proposal is that patients with BPD may have disturbances in conscious access that affects activation of interpretative data from metacognition and mindreading to establish proper social behavior.

Now, turning to the domain of schizophrenia, we attempt to present how development of clinical symptoms in schizophrenic patients suffering from persecutory delusions can be understood within our proposed framework. With reference to delusional beliefs in schizophrenia, cognitive theories suggest that persecutory delusions often emerge as misinterpretation of social interactions [56]. Therefore, individuals with persecutory delusions are preoccupied with intensions to others [57]. Thus, psychotic patients fail to make accurate judgments in relation to their experiences attributed to others. It has been also suggested that delusional impairments in inferences on the social data may arise from the mindreading deficits. Apparently, deficits in mindreading are demonstrable in schizophrenia as indicated by the meta-analysis by Sprong et al. [21]. Frith [58] hypothesizes that mindreading skills in people with persecutory delusions develop normally; however, those theories of mind capacities are "lost" during psychotic episodes. There is also substantial evidence for mentalizing deficits in patients with first-order episode schizophrenia in the early course of schizophrenia [59]. In fact, mentalizing skills have been shown empirically to be impaired in psychotic patients with persecutory delusions. Patients that follow a paranoid subtype of schizophrenia perform poorly on a wide range of the "theory of mind" tasks including those exercising the attribution of intentions [60]. Moore et al. [61] have explored cognitive etiology of persecutory delusions in patients with late onset of schizophrenia and found that patients performed poorly in a deception task by making more mentalizing errors as compared to healthy participants.

Interestingly, theoretical developments in the conceptualization of relation between metacognition and mindreading skills underlie an interesting casual formation of persecutory delusions. As we mentioned above, the Carruthers' account [4] views metacognition as beliefs of our own attitudes that arise from turning mindreading capacities on ourselves. This implicates that mindreading deficits are prior leading in consequences to dysfunctional metacognition capacities. On the other hand, another explanation is possible as at least deficits in both capacities are paired and may be explained by the interactionist view on social cognition [6]. Indeed, an empirical study by Köther and collaborators [62] on schizophrenic patients could support such interactionist view on persecutory delusions as results of mindreading deficits accompanied with relevant dysfunctional metacognition capacity. In particular, the researchers by employing Reading the Mind in the Eyes test (Eyes Test; [63]) with an additional confidence measure showed in schizophrenic patients not only impaired social cognition in terms of perceiving emotional and social cues but had also commitments to make more high-confidence errors and at the same time made fewer high-confidence correct responses. Obviously, this raises questions about specificity of delusions that may be due to the failures of mentalizing skills and subsequently failures in lower-level metacognition that mirrors

mindreading deficits in delusional-prone individuals. Following our framework on social cognition and consciousness, it is likely that unconscious interpretative contents from the higher-level structures are not properly broadcasted to other systems via global workspace in order to get proper monitoring and evaluations from the low-level structures. Moreover, because the information contents remain unconscious, correction of faulty beliefs and interpretations is not possible.

Interestingly, disturbances in conscious access presented in schizophrenia seem to be confirmed by studies on metacognitive and mindreading malfunctioning by Lysaker and colleagues [64]. Researchers have investigated the impairments within self-generated personal narratives in terms of perceiving one's own state and mental states of others in adults with schizophrenia spectrum disorders. The researchers by using the MAS measure (MAS measure; [55]) have identified three groups of patients: the first one with impaired metacognition ("minimal reflectivity") and poor mindreading, the second group with intact basic self-reflectivity and poor mindreading, and the third group characterized with intact self-reflection and mindreading ability in terms of attributing thoughts and emotions to other people. It turned out that individuals with impaired metacognition and mindreading facilities performed worst in recognizing negative affective cues in others' faces and voices in the video-typed material. According to Dimaggio and colleagues [8], these findings could fit into the concept of the simulation theory (see above) proposed by Gallese and Goldman [65]. Thus, these findings can support the idea of priority of having direct access to one's own internal states to further involve simulation and inferences to interpret and understand others' mental states. Since the study by Lysaker and colleagues [64] was of the correlation nature, alternative interpretations cannot be ruled out. In particular, the study showed that performance results in emotion recognition task were positively correlated with general metacognitive functions (r = 0.44) assessed with the "Understanding one's own mind" subscale and to some extent with mindreading capacity (r = 0.26) as indicated by scores on the "Decentration" dimension (the ability to perceive others as having their own emotions, thoughts, and perspectives) [64]. These results may have also implication to the idea of dual-process model of social cognition and global workspace. Clearly, better performance in recognizing affective cues in other's faces and voices was linked with activation of both higher- and lower-level structures. Subsequently, the MAS measure "Understanding one's own mind" subscale including also metacognitive function of integration could indicate that low-level metacognitive functions in emotion recognition were supported by conscious access to some extent.

8. Conclusions

In our opinion, it becomes clear that efficient interactions between metacognition and mindreading capacities should be supported by access consciousness. The GWT framework by Baars [33, 38] indicates that consciousness can mediate the interaction between metacognition and mindreading subsystems by managing the access to interpretative contents from both mental faculties. Since the GWT assumes the interaction of unconscious and conscious processes, it becomes crucial how and under what conditions interpretative data of a mentalizing

and propositional nature are broadcasted globally within a cognitive system. According to Baars' theory [33, 38], we predict that consciousness mobilizes two levels of processing in "from-low-to-high" or "from-high-to-low" directions depending on a psychological contexts (related to self or other people) and integrates metacognitive and mindreading functions in such a way that interpretative contents are globally available for other specialized areas of the brain. Thus, the combined framework of dual-process social cognition and global workspace explains the basic processes that may potentially underlie normal and abnormal regulation of social behavior. This account suggests that global broadcasting enables corrective interpretation in case of detecting erroneous information about themselves and false assessments of others' behaviors, intentions, etc. We believe that this framework offers a useful cognitive perspective for better understanding of clinical disorders characterized by abnormal relations between mindreading and metacognition and elaborating their therapeutic interventions.

In fact, psychological and psychiatric research clearly shows (see [12]) that people in terms of social interactions need in a continuous way to adjust their behavior and regulate distress, implicating in this fashion a great need for establishing psychological interventions aimed at improving their metacognitive and mentalizing capabilities. Our paper clearly addresses this need by providing more comprehensive cognitive explanations of complex mental health problem as well as offering a new path toward understanding symptom expression of metacognitive and mindreading disturbances. The vital point in this paper is to demonstrate that phenomenology of social interactions as well as symptom expression in severe psychological and mental disorders can be described by adapting an interactionist approach that combines access consciousness mechanisms with mental capacities of mindreading and metacognition in a complex unit. According to this view, social cognition can be driven by a set of independent mental functions in the brain that interact with each other [12, 24, 25], and as a matter of fact each element underlying this interaction may be a subject of selective impairment. On the other hand, the interactionist model undoubtedly maximizes a role of individual within the process of psychotherapeutic intervention by emphasizing his/her conscious efforts. For instance, given the interactionist view on global access and both forms of mentalization, we can also efficiently explain the way the therapy based on metacognitive training provides promising results in treating severe psychiatric disorders [27]. Indeed, the interactionist approach suggests that the individual can consciously correct his/her theories and interpretations about oneself and others, since access consciousness mediates the effective interaction between the sets of independent mental capacities. Moreover, interactionist perspective assumes that consciousness mechanisms by its mediating and integrating functions improve social cognition including metacognitive and mentalizing skills. Therefore, future studies should seek for effects of consciousness on improving both metacognition and mindreading skills either in clinical or in nonclinical population samples.

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Conflict of interest

Authors Małgorzata Gakis, Ewelina Cichoń, Tomasz Cyrkot, and Tomasz Cyrkot declare that they have no conflict of interest.

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