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Social intelligence and adequate self-expression in patients with orbitofrontal cortex injury and in the criminals

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Summary

Background:

The aim of present article is to compare patients with damage to the orbitofrontal cortex and prison inmates in terms of social intelligence and social intelligence monitoring. In addition, personal principles and emotional regulation of behavior will be assessed in both groups.

Material/Methods:

20 patients with orbitofrontal cortical injury, 20 prisoners and 20 controls answered questions from the Social Interactions Assessment Questionnaire. Then they evaluated their self-disclosure, reported their emotions related to self-disclosure and declared their personal principles concerning conversations with strangers.

Results:

The patients with damage to the orbitofrontal cortex disclosed themselves to a stranger less appropriately than did other subjects, and did not assess it critically. They also violated their own declared principles, but did not feel embarrassed because of that. The prison inmates spoke out less forthrightly on many topics and felt confused during the whole examination.

Conclusions:

Damage to the the orbital part of frontal lobes may result in a disorder of self-disclosure monitoring and impairment of social intelligence in conversations with unknown persons. Prison inmates give information about themselves unwillingly, which may result from their specific experiences during criminal and judicatory procedures and confinement.

key words:

intimate information • self-awareness • behavioral regulation • frontal syndrome • anti-social behavior

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BACKGROUND

Social intelligence monitoring in persons with orbitofrontal cortex injury was the subject of a previous article in this journal [1,2]. The authors reported there impairments in conversations with strangers on intimate topics, that is, unconscious, inappropriate self-disclosure while answering questions. Such self-disclosure was inconsistent with declared personal principles and did not cause embarrassment. In the present study, we are presenting the results of comparative research involving patients with orbitofrontal damage and prison inmates serving sentences. The inmates became the subject of our study because of a frequent connection between punishable acts and impairment of self-control and behavioral restraint. Criminals display difficulties in regulating and planning their action. Their lower level of reflectivity and insight, as well as mental rigidity, increase the tendency to impulsive responses [3].

Based on definitions from the literature, we define social intelligence as the ability to adapt one's own behavior, including the manner of communication, to the current social situation. This ability is based on identifying and understanding one's own emotions and on accurate analysis of other people's mental states [4–7]. Social intelligence enables a person to cope effectively with environmental requirements, which can be essential to survival [8]. An important component of this ability is the theory of mind [9,10]. The construct of social intelligence is related to constructs of personal intelligence and emotional intelligence.

The concept of "self-monitoring," [11], it is the ability of the observation and control of one's own expressive behavior and self-presentation, based on situational signals concerning social appropriateness. Self-monitoring means a conscious or unconscious cognitive process, by which a person evaluates her current behavior in order to make certain that it is consistent with the way she wants to behave and the behavior the environment expects from her [12,13]. People with high self-monitoring depend on assessing their emotions based on external signals more than people with low self-monitoring, divorcing the situational emotional reaction from observed action [14]. The former are flexible in devising strategies of self-presentation and managing it [15,16]. The model of self-regulation assumes that a person needs to compare her current behavior with certain reference points, such as social principles, one's own purposes, and the expectations of others [13].

Social behavior depends on both the psychological characteristics of a person and on the situation [15]. Typical in interactions with strangers is restraint of one's own manner [13]. The manner and intensity of the interlocutor's self-disclosure are also an important element of a situation [15]. Reciprocity of self-disclosure is especially relevant during the early stages of a relation and when the information revealed by an interlocutor is very intimate or not at all intimate. This reciprocity depends on self-monitoring: persons with high self-monitoring disclose themselves in a more intimate manner than persons with low self-monitoring when the interlocutor does the same, but in a less intimate manner when an interlocutor reveals little [17].

Social intelligence and social intelligence monitoring are associated by researchers with the orbital part of the frontal

lobes [15,16]. This region is involved in inner control, adjusting one's activity to features of the situation, defining the value of stimuli. Moreover, the orbitofrontal cortex enables us to formulate a theory of mind for the participants in interaction, identify and revise mistakes, take into account while acting out obligatory rules, social norms and a chosen plan [10,18–23]. The orbitofrontal part of the brain is particularly involved in social behavior regulation, especially in distinguishing attitudes that are appropriate towards unknown people from these appropriate towards friends [24]. Patients with damage to this area manifest a tendency to improper jokes [25], revealing needless intimate information, for example concerning their sex life [13]. At the same time they usually do not realize that their social behavior is inappropriate, and overestimate the pertinence of the disclosed information [13,26]. It is important for such patients to acquire knowledge about behaviors that are proper and improper in a given situation [13,14].

The current literature has proposed several possible explanations of the mechanisms underlying impaired social regulation accompanying dysfunctions of the orbitofrontal cortex:

- decreased ability to assess oneself;
- difficulties in adequate perception of others' assessments, for example in identifying the facial expression of "self-awareness emotions" [13];
- inadequate filtering of insignificant information, leading to a failure to inhibit reactions [27,28].

These mechanisms of self-monitoring impairment bring on decreased self-awareness of such emotions as embarrassment, shame, or guilt. Consequently, patients assess inaccurately whether their present behavior meets social standards accepted by them or others, and hence they are not motivated to alter inappropriate behavior [13,14,20,28].

Objective

In our research we attempted to compare the levels of social intelligence and the ability to monitor it in a group of persons with orbitofrontal cortical damage, a group of prison inmates, and a control group of persons without brain damage who were at liberty. We also had in view an evaluation of personal principles concerning self-disclosure to strange people and an evaluation of the extent of compliance of behavior with declared principles in these groups. We also intended to compare the groups in terms of emotional regulation of one's own verbal expression during interaction with a stranger. We formulated the following research questions:

1. Do people with orbitofrontal cortical damage have a lower social intelligence monitoring ability than inmates?
2. Do inmates have a lower social intelligence monitoring ability than controls?
3. Do patients with orbitofrontal cortical damage have the same level of social intelligence during interaction with a stranger as inmates?
4. Do inmates have the same level of social intelligence during interaction with a stranger as the control group?
5. Is disclosure of intimate information by patients with orbitofrontal cortical damage and by inmates equally consistent with the principles declared by them?
6. Do patients with orbitofrontal cortical damage have the same personal principles concerning the disclosure of intimate information to strangers as inmates?

7. Do patients with orbitofrontal cortical damage have a lower emotional regulation of verbal expression during interactions with strangers than inmates?

Material and Methods

Our research involved two experimental groups and a control group. The first experimental group consisted of 20 patients with unilateral (right hemisphere) and bilateral damage to the orbitofrontal cortex, caused by head trauma, stroke or neurodegenerative disease. They were patients hospitalized in the Clinical Department of Neurosurgery and Neurotraumatology at the Jagiellonian University's Medical College in Cracow, Poland, in the 1st Military Hospital in Lublin, in the Cracow Rehabilitation Center in Cracow, and clients of the Crisis Intervention Center in Lublin, Poland. Medical data based on neuroimaging was obtained from specialists working at these institutions. The second experimental group consisted of 20 prison inmates without brain damage, serving out their sentences, who were confined in the prison in Zamość, Poland. We took into consideration four articles from the Polish Penal Code: 148 (homicide), 197 (rape), 207 (family abuse), and 280 (robbery). In the control group there were 20 persons, neurologically, with no criminal record and not in any other kind of involuntary confinement. This group was matched with the first experimental group, so the levels of incidental independent variables were equalized. For the second experimental group this was not possible, and so its composition differs from the others as regards demography.

A comparison of the groups in terms of demographic variables indicates no differences in mean age and a similar composition as regards levels of education and types of occupation in the first experimental group and the control group. In the second experimental group fewer persons had elementary, secondary and higher education, and considerably more had a vocational education. There were also more manual laborers in this group. We excluded from our research persons with mental disease, depression, aphasia, epilepsy or alcohol addiction.

The person who spoke with the participants remained unknown to them till the beginning of the examination. We applied the following research instruments:

- interview;
- analysis of medical documentation;
- dictaphone recordings;
- the Mini Mental State Examination (MMSE) [29];
- the Social Interactions Assessment Questionnaire [13,21], which examines certain aspects of the subjects' social intelligence: behavioral flexibility, adequacy while talking with strangers, ability to distinguish others' intentions and needs;
- the Inappropriate Self-Disclosure Assessment Questionnaire [13,21], in which the subjects assess the intimacy and propriety of their statements;
- a questionnaire concerning emotional reactions to one's own answers;
- an authorial questionnaire regarding personal principles pertaining to conversations with strangers on given topics.

RESULTS

In order to analyze social intelligence monitoring when disclosing intimate information to unknown people we used

Figure 1. Average sums of positive differences between the evaluations of competent judges and the participants in each group.

analysis of variance. We took into consideration positive differences between the average evaluations of the participants' answers in the Inappropriate Self-Disclosure Assessment Questionnaire made by competent judges and evaluations made by the participants themselves. The results indicate a statistically significant effect of interaction between group, age and level of education ($F=4.934$; $p=0.030$). Participants above the age of 60 and those between 40 and 59 years old with elementary or vocational education working as manual laborers evaluated their own self-expression the worst.

The impairment of social intelligence monitoring in terms of disclosure of intimate information to strangers is indicated also by number of positive differences between evaluations of the competent judges and of the subjects, which was about half again as large in the first experimental group as in the other groups. An average sum of the positive differences between these evaluations in the first experimental group was over twice as large as in the second experimental group and almost twice as large as in the control group (Figure 1).

As for the level of social intelligence in self-disclosure to unknown people, the analysis of variance shows a statistically significant effect of interaction between group and subjects' age ($F=4.612$; $p=0.001$). The general level of this ability in persons above the age of 60 was significantly lower than in persons under 40 years old. The exception was the first experimental group, in which age did not differentiate the results. In the group of inmates between 40 and 59 years old, impairment of social intelligence in this respect was the least.

An analysis of the subjects' answers in the Social Interactions Assessment Questionnaire shows statistically significant differences between the groups as regards particular aspects of social intelligence in respect to self-disclosure. The persons in the first experimental group revealed significantly more information than persons in the second experimental group and the control group on embarrassing experiences ($F=29.958$; $p=0.00$), attitude towards fame ($F=22.642$; $p=0.00$) and matters important to discuss before death ($F=17.275$; $p=0.00$). While talking about embarrassing experiences, the subjects in the first experimental group presented disadvantageous facts more frequently, recalling events caused by themselves. The participants in the second experimental

Figure 2. Forms of extraneous comments.

Figure 3. The sums of positive differences between competent judges' assessments and declared principles in the examined groups.

group spoke less openly than others on most topics: negative – for example unrealized desires ($F=10.534$; $p=0.00$) and moments of crying ($F=14.739$; $p=0.00$) – as well as positive, such as precious memories ($F=15.549$; $p=0.00$).

In the analysis of the level of social intelligence in the examined groups we took into account some spontaneous forms of expression during testing with the Social Interactions Assessment Questionnaire. A high number of these may indicate lowering of social intelligence. These forms are presented in Figure 2.

An analysis of Figure 2 enables us to conclude that people in the first experimental group are definitely more inclined to disrupt conversation by asking irrelevant questions, telling amusing stories, or adding inessential information. Furthermore, they talk about some matters as the only topic. The subjects in the second experimental group tended to complete their statements spontaneously and talk about drinking more often than the subjects in the control group, but more rarely than those in the first experimental group.

The participants' personal principles regarding conversations with unknown people differ significantly on a general

level: the participants in the first experimental group declared readiness to lesser disclosure than the other participants ($F=55.757$; $p=0.00$). Comparable differences are also found in respect to principles concerning some topics, including precious memories ($F=8.188$; $p=0.004$), desires ($F=5.382$; $p=0.021$). The people in the second experimental group are ready to reveal to a stranger more information about their embarrassing experiences ($F=6.254$; $p=0.010$) than the other subjects.

Insofar as compliance with declared principles is concerned, the persons in the first experimental group obtained in general significantly lower results than the others ($F=12.676$; $p=0.00$). Considering particular topics of conversation with a stranger, we noticed probable violation of personal principles when disclosing intimate information (such as desires) and information disadvantageous to the subject (such as embarrassing experiences). Moreover, only the persons in the first experimental group talked more than they intended about their health and fears (Figure 3).

As to emotional regulation of one's verbal expression, in no group was there an increase of embarrassment after listening to one's own answers, even though the persons in the

first experimental group disclosed more intimate and disadvantageous information than average and violated their declared principles. In the second experimental group, embarrassment was significantly higher both after the conversation and after hearing an audio recording.

DISCUSSION

The patients we studied with orbitofrontal damage manifested lower social intelligence monitoring in terms of intimate disclosure to unknown persons than did the subjects from healthy control group. They overestimated the appropriateness of their statements, as Beer and colleagues also found [13]. Therefore dysfunction of the orbital part of the frontal lobes may inhibit insight into one's own verbal behavior, and the ability to control and modify it depending on the context [14,18–21]. The reason for such difficulties may be the impairment of verbal consciousness caused by disturbance of one of the cognitive elements of consciousness: working memory [21]. It is also necessary to take into account Graziano and Bryant's [14] hypothesis that persons with low self-monitoring rely in managing their behavior on their own emotions rather than on external signals. In the inmates there were no manifestations of social intelligence monitoring impairment in respect to self-expression to strangers.

In interpreting these results we should also take into consideration Graziano and Bryant's [14] assumption that the structure of self-monitoring may not be the same in the entire population, as one of the possible effects of development dependent on the interaction of predispositions and social experiences. This appears to be confirmed by the fact that the possibility of self-monitoring impairment in our study is higher in older individuals with less education and jobs in manual labor. The effect of these variables on monitoring ability suggests that careful equalizing of their levels in the examined groups is essential. Since it proved impossible to match the inmates in terms of demographic variables, caution is needed when generalizing to conclusions.

The general level of social intelligence of patients with orbitofrontal cortical damage in terms of contacts with strangers is lower than average and does not depend on age. It manifests itself as revealing more information on intimate (including shameful) topics, developing statements without taking into consideration the interlocutor's expectations, excessive shortening of social distance. These behaviors are emphasized by the fact that the interlocutor asking the questions spoke in a non-intimate and non-emotional manner. These results are consistent with the conclusions of Rolls et al. [24] and Beer et al. [12], that persons with damage to the orbitofrontal cortex do not differentiate between behaviors suitable for interactions with strangers or behaviors suitable for interactions with close acquaintances. Moreover, our results confirm the idea of a theory of mind deficit and the hypothesis of impairment of inner control and inhibiting reactions in patients with orbitofrontal dysfunction [17–21]. In general, the results of our research indicate the particular involvement of the orbitofrontal area in social behavior regulation.

The inmates we tested did not manifest social intelligence disorders in the form of disclosing intimate information to unknown people. Admittedly, they bring up issues connected with alcohol more often than average, but this may

Figure 4. Microgenetic model of perception-action cycle on the basis of language's text and context [30].

result from their specific experiences. They talk less than patients with orbitofrontal cortical damage and the controls on many intimate topics, including those related to positive emotions. We should search for an explanation of this fact in the inmates' social learning process. As they go through consecutive police, judicatory and penitentiary procedures, they may form the habit of giving personal information as cautiously as possible in order to protect their own interests. Another motive to avoid self-disclosure may also be fear of the disapproval of their fellow inmates.

Lowered social intelligence pertaining to conversations with strangers in patients with orbitofrontal damage correlates with the tendency to violate declared personal principles. This tendency may be regarded as a sign of inability to guide one's own actions in accordance with accepted social norms. On that basis we may confirm Beer and coworkers' conclusion [13] that knowledge about abstract social norms is not sufficient to ensure the appropriate social behavior.

It should be emphasized that persons with damage to the orbital part of the frontal lobes violate rules and customs prevailing in our culture without feeling embarrassment. This indicates an impairment of "self-awareness emotions," which involve assessments of how a given behavior is received by the environment and by the subject himself [13]. Deficits in recognizing the meaning of complex social situations lie at the base of the impairment of the emotional regulation of behavior [14]. The significantly higher level of embarrassment during and after conversation with a stranger may be explained in the way they do this – with sparser and less intensive contacts with people from beyond the prison. According to the subjects, this relates especially to unknown women.

The results we obtained concerning inmates reminds us of the great complexity of frontal lobes functions, not all of which have to be disordered concurrently. Many researchers, contrary to our conclusions, report negative results obtained by criminals in tests for diagnosing damage to the frontal area. Therefore one should take into consideration a dissociation between the functions or aspects of functions localized within the frontal area, both in scientific research and clinical diagnosis.

It is also important to note that according to microgenetic theory (Figure 4), the subject (that is, the person with frontal lobe dysfunction) is the whole of subjectivity, which includes the body, space and external objects.* The direction of actualization – or becoming – is from the instinctual core of the subject into the body and objects in space [30]. The trajectory from core to object – which comprises one epoch of subjectivity – actualizes the being of the state. The completion of one cycle of becoming-into-being gives existence to the state. The object appears as the outer portion of the state, but its existence requires the entire transition. An object is the exteriorized portion of the subject. It is a subjective event. It differs from a physical or noumenal entity outside the subjective field, which similarly exists over the duration – temporal extensibility – of its own actualization, in which an important role is played by the dysfunctions of frontal lobe [20,30,31].

At the end of our discussion we want to emphasize that the research presented here is a preliminary analysis. In order to continue our study it would be necessary to increase the size of the groups, particularly the group of inmates, in order to make comparisons between criminals who have committed various kinds of crimes.

CONCLUSIONS

1. Damage to the orbitofrontal part of the brain may entail impairment of social intelligence and the ability to monitor it in respect to disclosing intimate information to an unknown interlocutor.
2. Moreover, the level of social intelligence and social intelligence monitoring may depend on the subject's age and level of education.
3. Lowered social intelligence in terms of self-expression to strangers in patients with orbitofrontal damage coexists with a tendency to violate declared social principles and an impairment of emotional regulation of behavior.
4. Going through numerous police and judicatory procedures, which is connected with interrogations and statements, may cause a significant decrease of forthrightness and increase of caution in conversations on the part of inmates.

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* For the present purposes, awareness is defined as the relation of a subject to external objects and bodily states. A subject is the subjective whole of the organism, excluding its external portion. An object is the external portion of that whole, perceived as existing outside the organism. An object is a perceived event. An entity is a physical event postulated to exist outside perception. The external or objective world is defined as a segment of the subjective that has objectified. In contrast, the physical world is the world of physical entities.