Abnormal Recognition of Facial Expression of Emotions in Depressed Patients with Major Depression Disorder and Schizotypal Personality Disorder

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The aim of this paper is to study the recognition of facial expression of emotions in depressed patients with major depressive disorder (MD) and schizotypal personality disorder (STP). The pictures of sad, emotionally neutral, and happy faces followed by a masking stimulus were displayed for 80 msec on a computer screen randomly in the left or right hemifield of vision (LHF and RHF). The subjects had to respond by pressing a three position key. Multiple analysis of variance revealed that all depressed patients, relative to control subjects, made more errors in a task of recognition of facial affect. The characteristics of impairment of performance were found to be related to the nosology of depression. MD patients revealed significantly impaired recognition of negative (in LHF and in RHF) and positive (in LHF) facial emotions, as well as poorer recognition in the right hemisphere, and reduced hemispheric asymmetry. In remission, they showed statistically significant recovery of recognition function. STP patients were less impaired and showed slightly poorer recognition of sad (in RHF) and happy (in LHF) expressions. This group demonstrated significantly poor recognition of happy expressions, and more marked dysfunction of the left hemisphere. In remission, STP patients failed to improve in recognition of emotion. This suggests, that the features of emotion recognition in MD and STP groups reflect some differences in the neurophysiological mechanisms underlying the affect-related dysfunction in these groups of depressed patients.

Key Words: Facial expression, emotion, recognition, hemisphere, depression

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Introduction

Emotional disorders in depressed patients are characterized by pathological affect as well as by disturbances in perception of emotionally salient information (Fienberg et al 1986; Gur et al 1992; Min and Oh 1992; Rubinov and Post 1992; Stip et al 1994). Abnormal recognition of emotional facial expressions by psychiatric patients is well known (Fienberg et al 1986; David and Cutting 1990; Gur et al 1992; Rubinov and Post 1992; Schneider et al 1992). It is considered to be a critical factor for poor communication and alterations of adaptative behavior. Lately, some new data about emotional recognition impairments in psychiatric patients has been revealed, and most studies have focussed on major depression and on schizophrenia

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(Harrington et al 1989; David and Cutting 1990; Grusser et al 1990; Heimberg et al 1992; Schneider et al 1992).

According to these data, major depression is characterized by: (1) overall poor recognition of all types of facial emotional expressions; (2) negative shift in the test of emotion recognition, i.e., judgment of neutral faces as sad and happy faces as neutral ones (Gur et al 1992); (3) decrease of hemispheric asymmetry in emotion recognition performance (Davidson et al 1987; David and Cutting 1990; Schneider et al 1992).

The studies of recognition performance in schizophrenics have shown the following: (1) significant disturbances of this performance, which were more significant than those in depression (Cutting 1981; Feinberg et al 1986; David and Cutting 1990; Heimberg et al 1992); (2) significant deficit of recognition of both emotional polarities (Walker et al 1980; Heimberg et al 1992), or more extensive impairment of recognition of negative emotions (Dougnerty et al 1974) or positive ones (Schneider et al 1992); (3) interhemispheric imbalance because of left-hemispheric dysfunction (David and Cutting 1990; Schneider et al 1992). Analysis of known data shows that their wide variability, some inconsistencies, and even contradictions are due to the different methodologies applied.

Many problems of recognition performance in depression are still far from being solved. They are: (1) the role of the right and the left hemispheres in impairment of recognition of emotional expression; (2) relationship between type of emotional expressions and abnormalities of recognition; (3) recovery of recognition function in remission; (4) characteristics of emotion recognition in subtypes of depression. Regarding schizophrenia, the features of emotion recognition performance are well-known, but there is little literature concerning other schizophrenia "spectrum" disorders (Poreh et al 1994), such as schizotypal personality disorder (Kendler 1985; Baron and Gruen 1991). The study of schizophrenia-related disorders with affective traits may promote the examination of the influences of affect on the function of emotion recognition.

The purpose of the present study is to investigate the recognition of emotionally negative (sadness), neutral, and positive (happiness) facial expressions in depressed patients with major depression and with schizotypal personality disorder both in acute depressive state and in remission. The role of the right and left hemispheres in emotion recognition was studied using a technique of brief lateralized presentation of stimuli followed by a mask. We believe that this method permits us to judge the role of the right and left hemispheres in emotion decoding more precisely.

Methods

Subjects

The patients participating in this study were 35 right-handed male (Annet 1970) inpatients in the psychiatric clinic of the Research Institute of Clinical Psychiatry (Mental Health Research Center, Moscow). The diagnosis was based on information available about each patient obtained from patients and informants. The assessment was performed by two independent psychiatrists (senior authors T.V. and E.T.) using DSM-III-R criteria. All patients were classified into two diagnostic groups. The first group (18 patients) met criteria of major depression (MD), single episode (296.22, 296.23) or major depression, recurrent (296.32, 296.33). The second group (17 patients) met criteria of schizotypal personality disorder (STP) (301.22), accompanied by depressive symptomatology. The levels of depression were rated using the 21-item Hamilton Rating Scale for Depression (HRSD) (Hamilton 1960), and Beck Inventory for Measuring Depression (BDI) (Beck et al 1961). MD and STP patients did not differ in average total HRSD, nor in average BDI scores. The MD group total of HRSD was 22.86 $\pm$ 2.17 in acute depression, and 3.77 $\pm$ 1.10 in remission; the STP group was 28.57 $\pm$ 1.74 and 10.67 $\pm$ 4.02, respectively. The averaged BDI scores in MD were 20.80 $\pm$ 2.18 in acute depression, and 5.22 $\pm$ 1.45 in remission, and in STP 22.10 $\pm$ 2.35 and 6.00 $\pm$ 1.29, respectively. MD and STP patients had no significant differences in age (21.3 $\pm$ 1.7 vs 21.8 $\pm$ 1.0 years), in the length of the current depressive episode (6.0 $\pm$ 0.8 vs 6.5 $\pm$ 1.0 months), and in the number of previous hospitalizations (1.3 $\pm$ 0.6 vs 0.4 $\pm$ 0.2 cases).

The control group included 16 right-handed normals matched to patients in age, sex, and education level. The mean age of the healthy controls was 25.4 $\pm$ 2.2 years. All patients and controls were physically healthy, had no history of neurological damage, and had normal or corrected-to-normal vision. No significant differences in the level of education were found across the groups of patients and controls: most of the subjects were university students or college graduates. All healthy subjects were paid to participate in the experiments.

Depressed patients were tested twice (within 8 weeks): once in acute depression and once in remission. They were medication free for the first examination, and were treated with low or average doses of antidepressants and neuroleptics by the second test.

Stimuli and Apparatus

The battery of 20 pictures of five different facial expressions were used as stimuli. Four different faces (two

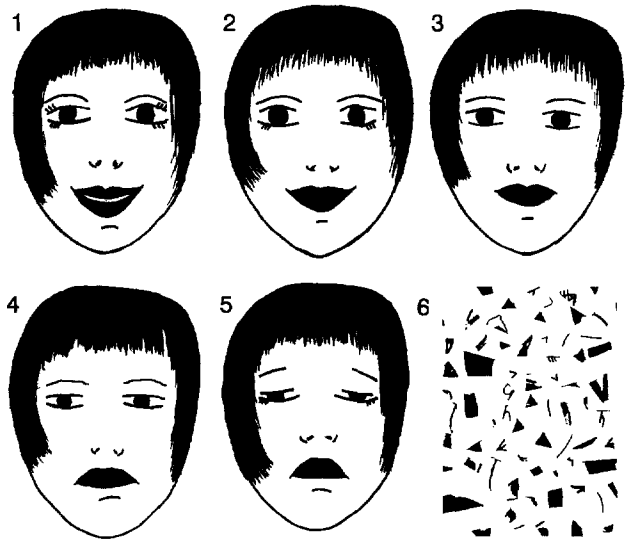

Figure 1. (*1–5*) The examples of pictures of female face with five different emotional expressions: *(1)* happiness, *(2)* mild happiness, *(3)* neutral expression, *(4)* mild sadness, *(5)* sadness, and *(6)* masking stimulus.

female and two male) were used. Examples of five expressions of a female face are shown on Fig. 1 *(1–5)* These expressions were: *(1)* happiness, *(2)* mild happiness, *(3)* neutral expression, *(4)* mild sadness, and *(5)* sadness. All pictures were made by a professional artist (M. Vradii) as black line drawings against a white background and approximated real faces. All pictures were subjected to a preliminary expert estimation procedure with a group of 30 healthy subjects. Only these pictures, which were estimated as faces with sad, mildly sad, neutral, mildly happy, and happy emotional expressions with over 95% probability of estimation were selected, scanned, and entered into a computer program. We used the drawings of emotional faces because in preliminary investigation most of our patients had difficulty in recognizing emotional faces from 'pictures of facial affects' (Ekman and Friesen 1976) in the experimental conditions we used (brief lateralized presentation followed by masking stimulus). On the other hand, the special study demonstrated that outline schematic faces generally retain the emotional distinction of "natural" faces (Paramey 1993).

The stimulus duration was 80 msec. The distance between the subject's eyes and the computer screen was 60–65 cm. The angular size of the stimulus was six angular degrees (deg), and the distance from the fixation point to the midpoint of the presented face was nine deg. The mean screen luminance was 14 lux, and there was no significant change of luminance during each stimulus exposition.

In the experiment, facial stimuli were displayed on the computer screen in a pseudo-randomized order to the left, or to the right of the central fixation point (a small cross). The proportion of male and female faces shown, faces with sad, neutral, or happy expressions, and faces displayed to the right or to the left visual hemifields was equalized. The order of the presentation of the facial stimuli of different sexes, and different expressions was randomized both between and within the hemifields. Every stimulus presentation was followed by a masking stimulus that consisted of small elements of the faces used (Fig. 1 *(6)*).

The duration of a single trial was 6 sec. It consisted of the presentation of a facial picture (80 msec), that was immediately followed by a masking stimulus (920 msec) and included an interval between the end of the masking stimulus and the beginning of the next face presentation (5 sec). Each experimental session included 60 trials with a total duration of 6 min and consisted of 30 LHF- and 30 RHF-presentations. Each 30 LHF/RHF presentations consisted of six pictures of each expression (happy, mildly happy, neutral, sad, and mildly sad faces). Thus, each session (60 presentations) included 12 presentations of happy faces, 12 mildly happy, 12 emotionally neutral, 12 mildly sad, and 12 sad faces. Each subject was exposed to three experimental sessions, and the results of these sessions were averaged.

During the experiment, the subject sat in a comfortable chair in a sound-attenuating room and was asked to fix his/her gaze on a central point of the screen. The subjects were instructed to identify the expressions of the displayed faces and to respond by pressing the joy stick with their right hand: forward for happy faces, backward for sad, and to the left for neutral ones. All subjects were exposed to a preliminary training procedure for adaptation to experimental conditions.

Results

Emotion Recognition in Patients with Acute Depression

OVERALL ANALYSIS. A repeated-measures analysis of variance (ANOVA) was conducted on the full data set with the group of subjects, stimulus type and hemifield of presentation. A 3 (group: MD vs STP vs healthy subjects) × 3 (stimulus type: sadness vs neutral expression vs happiness) × 2 (hemifield: LHF vs RHF) ANOVA showed a significant effect of group ($F [2.334] = 3.36$; $p < 0.05$), a significant effect of stimulus type ($F [2.334] = 13.86$; $p < 0.0001$), and a significant hemifield effect ($F [2.334] = 4.40$; $p < 0.05$). In general, these results reflect impaired recognition performance in depressed patients relative to controls, with impairments significantly greater for some of the displayed facial stimuli and for one

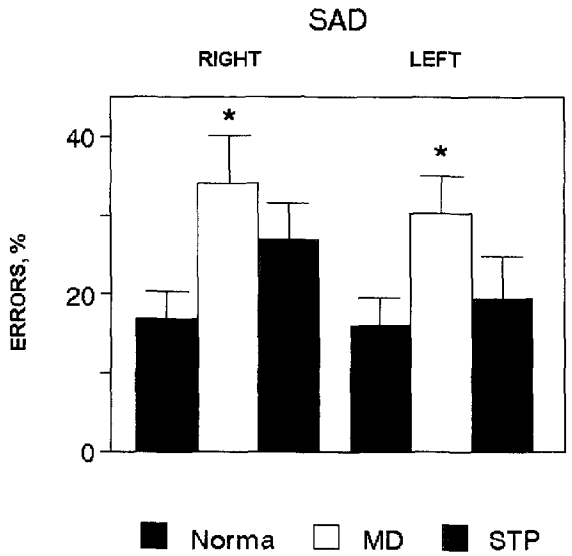

Figure 2. Mean errors (in %) of recognition of sad expression in acute MD and STP depressed patients and healthy controls under RHF and LHF stimulation. Statistically significant impaired recognition of sad expression was shown in MD patients in both hemifields of vision ($p < 0.03$). As compared with healthy controls, STP patients demonstrated the tendency of poorer recognition that was less accurate in RHF ($p = 0.10$).

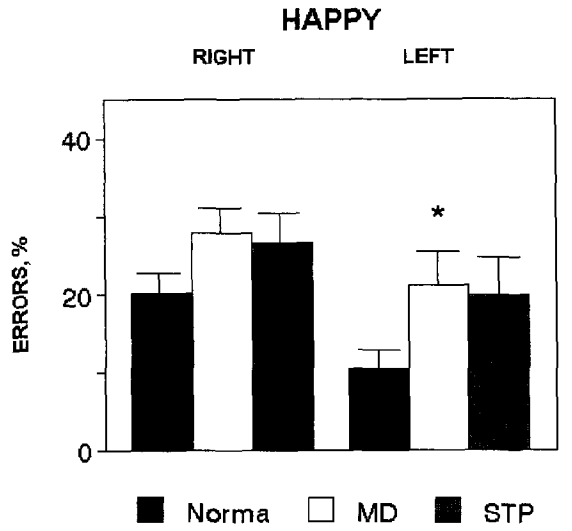

Figure 3. Mean errors (in %) of recognition of happy expression in acute MD and STP depressed patients and healthy controls under RHF and LHF stimulation. Statistically significant impaired recognition of happy expression was shown in MD patients in LHF ($p < 0.02$). STP patients demonstrated poorer recognition compared to healthy controls through two hemifields of vision ($p < 0.01$). This dysfunction was nearly significant in LHF ($p = 0.06$).

hemifield. Additionally, a 3 × 3 × 2 ANOVA showed a significant interaction of the group × stimulus type (F [2.334] = 4.04, $p < 0.005$). These data indicated that examined groups of subjects were different in recognition of various types of facial expressions. There were nonsignificant interactions of group × hemifield (F [2.334] = 0.53) and of hemifield × stimulus type (F [2.334] = 0.10).

BETWEEN-STIMULI COMPARISON. The most significant effect was observed for stimulus type (F [2.334] = 13.86, $p < 0.0001$). Three other separate analyses were performed to compare the effects of a group of subjects and of hemifield of vision for three types of stimuli (negative, positive, and neutral).

An analysis of accuracy of sadness recognition with a 3 (group) × 2 (hemifield) ANOVA revealed a significant main effect of group: F [2.102] = 5.75, $p < 0.005$. This effect was due to significantly worse recognition in depressed patients compared to healthy controls.

The characteristics of recognition of sad expression in two groups of depressed patients and in the healthy controls are shown in Figure 2. The averaged value of errors (in %) of recognition for LHF and for RHF in MD group were 30.40 ± 5.07% and 34.04 ± 7.27%, in STP group 19.62 ± 5.39% and 26.96 ± 4.73%, in healthy controls 16.24 ± 3.59% and 16.83 ± 3.55%, respectively.

A 2 (group) × 2 (hemifield) ANOVA performed through hemifields of vision showed a significant deficit of sadness recognition in MD patients but not in STP patients (for MD group F [1.80] = 10.67, $p < 0.002$ and for STP F [1.68] = 2.36, NS).

In a one-way ANOVA analysis we compared each group of patients with healthy controls and revealed some differences between groups of patients. A significantly poorer performance of sadness recognition in MD patients vs healthy controls was shown in both hemifields of vision: for LHF $p < 0.03$ and for RHF $p < 0.03$. The STP patients demonstrated only a marginally poorer recognition of sad expressions in comparison with healthy controls, which was less accurate in the RHF ($p = 0.10$).

In the analysis of recognition of happy expression, a 3 × 2 ANOVA showed a significant main-effect of a group (F [2.102] = 4.72, $p < 0.01$). This effect was due to less accurate recognition of happy expression in depressed patients in comparison with healthy controls. The characteristics of happy expression recognition are shown in Figure 3. The averaged value of errors (in %) in LHF and in RHF in MD was 21.24 ± 4.29% and 27.93 ± 2.88%, in STP 19.82 ± 4.88% and 26.57 ± 3.84%, in healthy controls 10.57 ± 2.36% and 20.23 ± 3.14%, respectively.

Further analyses were performed separately for MD and for STP patients. An analysis which was performed through two hemifields of vision yielded poor recognition of happiness in MD group (F [1.80] = 8.32, $p < 0.005$), and in STP group (F [1.68] = 4.86, $p < 0.03$) as compared to controls. This dysfunction was significant in MD for

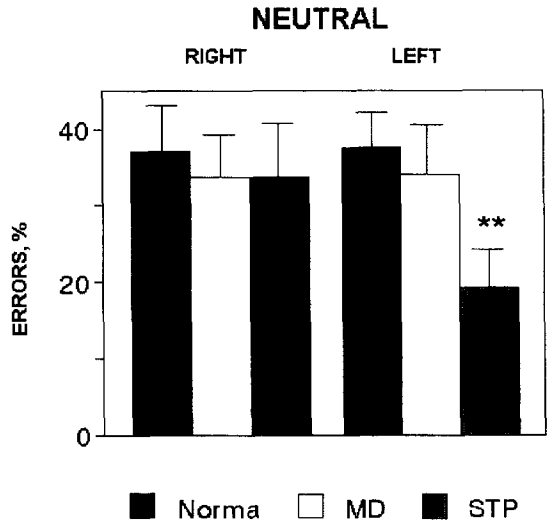

Figure 4. Mean errors (in %) of recognition of emotionally neutral expression in acute MD and STP depressed patients and healthy controls under RHF and LHF stimulation. MD patients showed no significant difference in relation to the healthy controls in the recognition of neutral expression. STP patients recognized neutral expression in LHF even more accurately than healthy subjects ($p < 0.01$).

LHF ($p < 0.02$), and marginally significant in STP for LHF ($p = 0.06$).

In depressed patients, the recognition of emotionally neutral facial expressions was less impaired than recognition of sadness or happiness. The averaged levels of error recognition (in %) of neutral expression in the two groups of depressed patients and in healthy controls are shown in Figure 4. The analysis of recognition performance with a 3 × 2 ANOVA revealed neither effect of group nor effect of hemifield, however, the separate comparison of each group of depressed patients with the control group showed that the STP patients recognized neutral expression in LHF even more accurately than healthy subjects (errors of recognition were 19.27 ± 4.63% vs 37.56 ± 4.72% respectively; one-way ANOVA, $p < 0.01$). The MD patients showed no significant difference in relation to the healthy controls in the recognition of neutral expression.

BETWEEN-GROUPS ANALYSIS. We examined emotion recognition in each of three groups: in healthy controls, in MD and STP patients. Healthy subjects were found to have significant differences in recognition of various stimuli: a 3 (stimulus type) × 2 (hemifield) ANOVA showed a significant effect of stimulus condition ($F [2.136] = 19.13$, $p < 0.0001$). Moreover, in healthy subjects the recognition of all types of stimuli was found to be more accurate in LHF than in RHF. Recognition in the LHF of happy expression was significantly higher (one-way ANOVA, $p < 0.001$). In a 3 (stimulus type) × 2 (hemifield) ANOVA, STP patients revealed a significant effect of hemifield: $F [1.66] = 5.11$, $p < 0.03$. This effect was due to more accurate recognition of neutral and sad expressions in the LHF (t test, $p < 0.05$ and $p = 0.06$, respectively). The MD patients did not demonstrate any significant hemifield effect.

BETWEEN-HEMIFIELDS COMPARISON. Finally, we analyzed the effect of group and stimulus type under LHF and RHF conditions separately. We performed a separate comparison of each group of patients vs healthy controls. A 2 (group) × 3 (stimulus type: sadness, neutral expression, happiness) ANOVA revealed differences between MD patients and healthy controls in LHF: $F [1.120] = 3.60$, $p = 0.057$). If neutral expression was excluded, a 2 (group) × 2 (stimulus type: sadness, happiness) ANOVA showed more prominent differences between patients and healthy controls. The differences between MD patients and healthy controls were significant in both hemifields of vision: in LHF $F [1.80] = 10.71$, $p < 0.002$, and in RHF $F [1.80] = 8.21$, $p < 0.005$. The differences between STP patients and healthy controls were less marked and were significant in RHF only: $F [1.68] = 4.24$, $p < 0.05$.

Emotion Recognition in Depressed Patients in Remission

Comparison of emotion recognition in depressed patients before and after pharmacological treatment revealed some differences between the acute state and remission in each group of patients, and between MD and STP groups as well. Thus, MD patients revealed a significant decrease in total HRSD scores in remission (22.86 ± 2.17 in acute depression vs 3.77 ± 1.10 in remission, t test, $p < 0.0001$). The averaged BDI scores were 20.80 ± 2.18 in acute depression, and 5.22 ± 1.45 in remission (t test, $p < 0.0005$). MD patients demonstrated more accurate recognition in remission compared with acute depression (Fig. 5). Significant improvement was revealed in LHF for sad and for happy faces (error level of 30.4 ± 5.07% in acute state vs 18.93 ± 4.48% in remission and 21.24 ± 4.29% vs 10.95 ± 3.2%, respectively; t test, $p < 0.05$), and in RHF for happy faces (27.93 ± 2.88% vs 14.2 ± 4.16%; t test, $p < 0.02$). Meanwhile, MD patients demonstrated worse recognition of emotionally neutral expressions in remission, which was statistically significant in RHF (33.77 ± 5.63% of errors in acute state vs 50.15 ± 10.02% in remission; t test, $p < 0.05$).

In the STP group the reduction of total HRSD in remission was significant: from 28.57 ± 1.74 in acute depression and 10.67 ± 4.02 in remission (t test, $p < 0.001$). The averaged BDI scores were 22.10 ± 2.35 in acute depression, and 6.00 ± 1.29 in remission (t test, $p <$

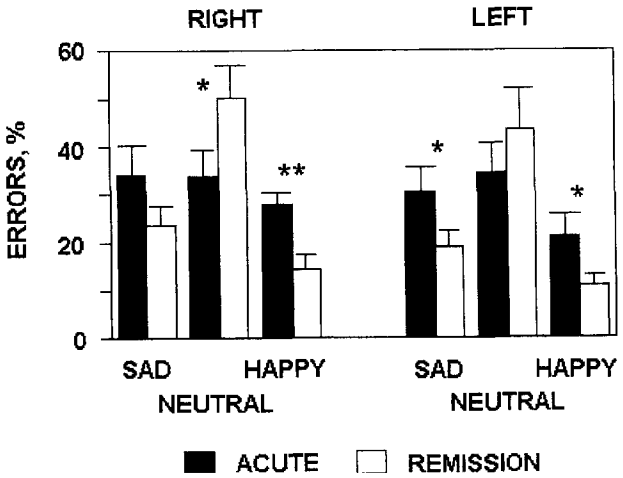

Figure 5. Comparison of mean errors (in %) of emotion recognition between acute MD patients and MD patients in remission under RHF and LHF stimulation. MD patients revealed the improvement of emotion recognition both of sadness (in RHF and in LHF) and happiness (in RHF), while the recognition of emotionally neutral expression revealed the worsening, that was statistically significant in RHF.

Figure 6. Comparison of mean errors (in %) of emotion recognition between acute STP patients and STP patients in remission under RHF and LHF stimulation. STP patients in remission failed to exhibit any significant improvement of the emotion recognition, furthermore they demonstrated the tendency to worse the recognition performance.

0.001). But in spite of this marked decrease of depression severity, STP patients in remission failed to exhibit any significant improvement of emotion recognition (Fig. 6). Note that in the STP group the dynamics were estimated for 12 patients only: five of 17 patients refused to participate in the second examination. That is why the value of errors for the first examination in Fig. 1–3 (acute state) and Fig. 6 (comparison of acute state and remission) are different.

Discussion

The performance of the emotion recognition task with briefly exposed and laterally displayed facial stimuli showed the overall impairment of this function in depressed patients as compared to healthy controls. These results support the earlier findings that depressive affect results in abnormalities of processing of emotional information (Fienberg et al 1986; David and Cutting 1990; Gur et al 1992; Rubinov and Post 1992). The data that we have described prove that the degree of impairment, the sensitivity to the laterality of stimulus presentation, relationships with emotional content of expression, and recovery in remission depend on the nosology of depression and are different in depressed patients with major depressive disorder and schizotypal personality disorder.

The data on emotion recognition in a group of healthy controls have been discussed previously (Mikhailova and Sushko 1993). The right hemisphere superiority for emotion recognition was statistically significant for happy faces. This result supports the right hemisphere advantage in facial processing and shows deeper involvement of the right hemisphere in the recognition of positive facial expressions as compared to negative and neutral ones (see also: Hugdahl et al 1989; Bryson et al 1991).

MD patients showed serious impairment in recognition of facial expression in comparison with healthy controls, as well as in comparison with STP patients. We described above the recognition deficit for sadness, which was extensive and present in both hemispheres, whereas the recognition deficit for happiness was present in the right hemisphere only. Previously, depressed patients were shown to have more impaired recognition of sadness than happiness under stimuli presentation to the center of the visual field (Mikhailova and Sushko 1993). These results seem to be rather unexpected: many studies described a negative shift in depressed patients, namely the misinterpretation of neutral faces as sad, and happy faces as neutral. This inconsistency with our results may be partly explained by procedural differences between the mentioned studies and our investigations. For example, the authors evaluated the perceptual bias in the free-vision chimeric faces test (David and Cutting 1990) or the sad-neutral and happy-neutral discrimination deficit in a long-term procedure (Gur et al 1992; Schneider et al 1992) used a visual half-field study which evaluated the recog-

nition of negative emotions using an averaged value for recognition of fear, disgust, sadness, and aggression.

Here we cannot ignore the possible effects of differences in task difficulty level (Chapman and Chapman 1978) on differential deficits (sadness vs happiness) observed in MD patients. Easier recognition of happy faces is well-known (see review: Pitcairn 1989). Meanwhile, both previously (Mikhailova and Sushko 1993) and in the present study we failed to reveal any significant differences in recognition of happy and sad faces in healthy subjects. This may be attributed to some sociocultural and emotional features of the Russian population. In addition, the type of experimental procedure, i.e., the method and timing of the stimuli presentation that we used may also have affected the results.

The neurophysiological basis of more extended impairment of sadness recognition in comparison with happiness observed in our study may be connected with the right hemisphere dominance for recognition of happy faces and with an absence of significant hemifield differences for sad ones (Hugdahl et al 1989; Mikhailova and Sushko 1993). It may also be hypothesized that the hyperfunction of the right hemisphere and some hemispheric disconnection may underly less deficit in happy expression recognition than sad expression recognition in depression.

As to the functional meaning of the discussed phenomenon, it is tempting to address the data on the increased threshold of visual perception of unpleasant words in psychiatric patients (Kostandov 1983). Taking these results into account, more severely impaired recognition of sadness may reflect an hypothesized "defensive" brain mechanism that prevents subjects from realizing some unpleasant stimuli, however, the origin and meaning of this effect are still unclear and need further study.

We should stress a particular impairment in decoding of emotionally salient information in MD. These patients showed a marked deficit in recognition of "basic" emotions (sadness and happiness), while impairment in recognition of neutral expression was nonsignificant. These observations seem to be complementary to the report by Feinberg et al (1986), which observed a defect in recognition of facial affect by depressed patients, and normal performance in a control-cognitive task such as age discrimination. These findings seem to reflect a specific emotion recognition deficit which, at least in part, may be determined by the deterioration of neurons responsive to facial expression in "face-specific" cortical areas located in the temporal lobes (Perret et al 1982; Rolls 1990, 1992).

Regarding the hemispheric relationships in MD patients, the present study showed decreased hemispheric asymmetry and more marked impairment of the right hemisphere function in recognition performance. These results are consistent with decreased hemispheric asymmetry in recognition function in depressed patients (David and Cutting 1990; Schneider et al 1992), and provide further evidence for right hemisphere dysfunction in depression (Dimond 1979; Otto et al 1987; Gruzelier et al 1988; Bruder et al 1992; Min and Oh 1992).

This study demonstrated that STP patients differed from MD in some aspects of an emotion recognition task. The first difference is that STP patients demonstrated a smaller degree of recognition impairment than did MD patients, although these two groups did not differ in terms of their affect-related symptomatology. The observed deficit was very subtle for negative and positive emotions; overall ANOVA which was performed through hemifields of vision revealed a significant deficit in happy expression recognition. At the same time, the recognition of neutral expression was even more accurate than in controls. The STP patients did not show abnormal hemispheric asymmetry, and revealed the right hemisphere advantage in recognition performance, similar to the controls. Statistically significant impairment of recognition was shown in the left hemisphere in STP as compared with healthy controls.

It seems reasonable to compare the emotion recognition in STP patients and in schizophrenics because the former belongs to the schizophrenia spectrum disorder. According to available data, schizophrenics reveal more marked abnormalities in emotion recognition than depressed patients (Harrington et al 1989; Heimberg et al 1992; David 1993). Regarding the deficit in recognition of positive and negative emotions, there is high variability of data, which demonstrates a similar degree of impaired recognition in both emotional polarities (Walker et al 1980; Heimberg et al 1992; Gaebel and Wolwer 1992), or more extensive impairment of recognition of negative emotions (Dougnerty et al 1974) or positive ones (Schneider et al 1992). A marked interhemispheric disconnection evoked by left-hemisphere dysfunction (David and Cutting 1990; Schneider et al 1992; David 1993) has been found.

In our study, STP patients, as opposed to schizophrenics, revealed a mild degree of recognition abnormalities. On the other hand, STP patients, like schizophrenics, revealed marked left-hemisphere abnormalities in recognition function. Also, STP patients showed similar mild levels of impairment in the ability to recognize negative and positive emotions (Heimberg et al 1992); an ANOVA analysis which was performed through two hemifields of vision yielded a significant deficit in happy expression recognition (Schneider et al 1992). Furthermore, STP patients demonstrated abnormalities in recognition of emotional facial expressions, but not of emotionally neutral ones (see also: Walker et al 1980; Cutting 1981). This

result points out the specific impairment of emotionrecognition in this group of schizophrenia spectrum disorder, unrelated to attention deficit. These data seem to be linked with the suggestion of Heimberg et al (1992) that a deficit in emotional discrimination is relevant to the symptomatology of schizophrenia and may underlie some of its core features.

The features of recovery of expression recognition again raise the question of the origin of the abnormalities in recognition of facial expression whether they reflect "state" or "trait" characteristics of depression (David and Cutting 1990; Gaebel and Wolwer 1992; Rubinov and Post 1992). MD patients revealed significant recovery of recognition of positive and negative emotions. STP patients revealed a marked decrease in depressive symptomatology and failed to show any positive dynamics in recognition performance. These data seem to support a "state" origin of this deficit in MD and "trait" background of this deficit in STP patients.

Therefore, the results on emotion recognition performance in the two groups of depressed patients reported here suggest that such features of impairment of emotional expression recognition as the degree of abnormality, laterality, sensitivity to emotional content of facial expression, and recovery in remission may be of the nosological rather than of the affect-related kind. The qualitative and quantitative differences between MD and STP patients in emotion recognition may also argue in favor of different cerebral mechanisms of affect-related dysfunction in these groups of depressed patients. Further studies of electrophysiological correlates of emotion recognition must be carried out for a better understanding of the neurophysiological basis of affective pathology. Our own studies in this direction (Mikhailova and Vladimirova, 1993) are in progress.

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