Background

- Misattribution of salience to non-salient stimuli could be viewed as a hallmark of psychosis in paranoid schizophrenia.
- Empirical studies have found psychosis-related salience misattribution tendencies in paranoid schizophrenia in terms of increased emotional arousal in response to neutral social scenes (1).
- Theoretically, the mechanism behind the salience misattribution has been explained by a dysregulated dopamine transmission leading to a stimulus-inappropriate release of mesocortical dopamine, which is responsive to antipsychotic treatment (2).
- We hypothesized that the same mechanism might result in assigning emotional salience to neutral facial expressions.

Method

Participants

Table 1. Socio-demographic and clinical characteristics of the participants

<table>
<thead>
<tr>
<th>Variables</th>
<th>Psychotic (n=15)</th>
<th>Nonpsychotic (n=14)</th>
<th>Matched Healthy Controls (n=15)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>15 males</td>
<td>12 males</td>
<td>12 males</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Mean±SD</td>
<td>38.1±11.9</td>
<td>38.5±11.8</td>
<td>38.3±11.8</td>
<td>.9</td>
</tr>
<tr>
<td>Education</td>
<td>11.7±3.9</td>
<td>12.3±3.9</td>
<td>12.3±3.6</td>
<td>.65</td>
</tr>
<tr>
<td>Parental Education</td>
<td>11.5±4.8</td>
<td>12.1±5.2</td>
<td>12.1±5.2</td>
<td>.7</td>
</tr>
<tr>
<td>Arousal Duration (s)</td>
<td>3±1</td>
<td>3.3±1.2</td>
<td>3.4±1.1</td>
<td>.8</td>
</tr>
<tr>
<td>Illness Duration (yrs)</td>
<td>15.4±11.3</td>
<td>13.6±11.6</td>
<td>12.0±10.5</td>
<td>.2</td>
</tr>
<tr>
<td>PANSS: Positive</td>
<td>33.7±15.2</td>
<td>33.9±14.4</td>
<td>33.3±14.6</td>
<td>N.S.</td>
</tr>
<tr>
<td>PANSS Total</td>
<td>91.5±14.67</td>
<td>85.3±12.75</td>
<td>85.3±12.75</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

*Current acute psychosis (psychotic state) - at least one score higher than or equal to 4 on the PANSS-positive scale, as well as at least 70 PANSS-total score; **Therapeutically improved state immediately following acute psychosis (post-psychotic state); N/A = Not applicable; N.S. = Not significant; PANSS = Positive and Negative Syndrome Scale; PANSS: Positive = subscale for positive symptoms; PANSS: Negative = subscale for negative symptoms; ***p<0.001. 

The study was conducted according to the principles of the Declaration of Helsinki and all participants gave written informed consent.

Stimuli

- Color photographs of faces (Fig. 1).
- Selected from the Facial Emotions for Brain Activation set of stimuli (3).
- Balanced for pose’s gender, ethnicity and age.

Task

Arousal rating of faces task (Fig. 2)

- Photos of neutral and happy facial expressions appeared randomly on a computer screen.
- Each stimulus was shown for 3 s followed by a 0-5 point rating scale, that was presented until a response is given.
- The task was to rate the emotional arousal level of the person in the photo.
- The response was given by button press.

Results and discussion

The aim of the present study was to test the hypothesis that there are psychosis state-related tendencies for emotional salience misattribution to neutral faces, which could be quantified with a brief and simple task for arousal ratings.

Results and discussion

Psychotic vs. Nonpsychotic schizophrenia patients vs. Healthy controls

- One-way Analysis of Variance (ANOVA) revealed a significant difference between the psychotic, nonpsychotic and control groups in their ratings of the neutral stimuli: F(2,41) = 6.91, p = .003.
- Planned contrasts revealed that the ratings of the psychotic patients were different from the ratings of both nonpsychotic patients: t(27) = 2.35, p = .026; Cohen’s d effect size = 0.90 and healthy controls: t(28) = 3.91, p = .001; Cohen’s d effect size = 1.48.
- The neutral faces were rated as more aroused by the psychotic group than by the other two groups, i.e. psychotic paranoid schizophrenia patients misattributed emotional salience to neutral faces. The results are depicted on figure 3.

Conclusion

We were able to reveal and quantify emotional salience misattributions tendencies in paranoid psychosis.

Our findings support the hypothesis that emotional misattribution to neutral faces is psychostate related being a potential measure for dopamine over-release that might be used in psychopharmacological studies.

The data obtained provide empirical basis for developing new methods to quantify emotional disinhibition, associated with psychosis in paranoid schizophrenia, which could be used as a surrogate pharmacodynamic biomarker in evaluating the efficacy of antipsychotic drugs.

In addition, thanks to its sensitivity and simplicity, the emotional arousal rating task might have further implications in both fundamental and clinical psychopharmacological studies.

References


Acknowledgements: Funding for this study was provided by the German Research Foundation (DFG, IRTG 1328)