



Towards a better understanding of emotions in schizophrenia II: Cues from functional magnetic resonance imaging



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BACKGROUND

Emotional disturbances have been reported for patients suffering from schizophrenia since the very first description of the disorder. However, whereas measures based on the expression of affects often reveal affective flattening and anhedonia, physiological measures of basic emotional processing, like the startle modification, could not replicate these deficits.

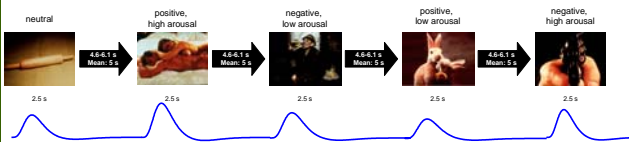
Our own work (see poster next to this) replicated the failure to find emotional disturbances in schizophrenia patients in an experimental setting. Therefore, we were interested to find out, whether brain activation measures of emotional processing might reveal differences between schizophrenia patients and controls that are undetected by psychophysiological, behavioral or subjective measures.

The present study used the same stimuli as well as the same patient sample as our startle modification paradigm. Here we present data from preliminary analysis of a subset of that sample. In a more explorative approach, we were interested in differences in the brain activation between schizophrenia patients and controls passively viewing emotionally relevant pictures.

Subjects

	Schizophrenia (N=17 males)	Control (N=17 males)	Statistics
Age (in years)	38.8 (19-50)	29.12 (18-42)	p < .01
Duration of illness (in years)	12.0 (3-21)		
Number of hospitalizations	4.18 (1-20)	-	
SAPS Globalscore	1.53 (0-7)	-	
SANS Globalscore	6.11 (0-20)	-	

Design



- Event related design
- randomized order,
- each category, containing 10 pictures, was presented 30 times

fMRI Measurement and Analysis

- Siemens Symphony 1.5 T Scanner
- T-2* weighted Echo planar imaging sequences
- 30 slices á 4 mm, 1 mm gap, descending order
- 64 x 64 matrix, FOV = 192 mm (3x3x5 mm Voxel)
- TA = 100 ms, TE = 50 ms, Flip-angle = 90°
- TR = 3 s, 396 Volumes, Duration: 20 min
- SPM 2 (The Wellcome Institute of Cognitive Neurology, London, England)
- Slice time correction, realignment, normalizing and smoothing (6 mm kernel)
- Event related design with a hrf basis function for each picture category separately
- Movement parameters as covariates
- Second level analyses (random effect)

METHODS

RESULTS

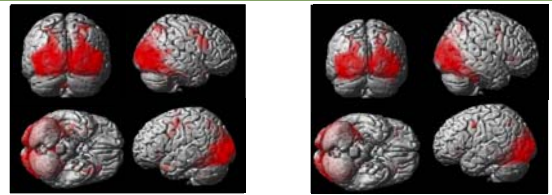


Figure 1: Brain activation pattern during the perception of positive pictures compared to neutral pictures for the whole sample (left) and the control subjects (right), p<.001 uncorrected.

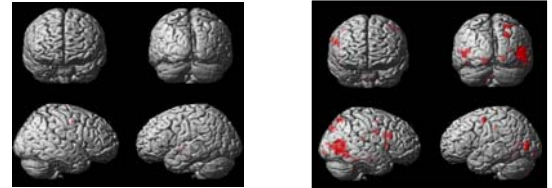


Figure 2: Brain activation pattern during the perception of positive compared to neutral pictures: Comparison between groups: Controls > Patients (left) and Patients > Controls (right), p<.001 uncorrected.

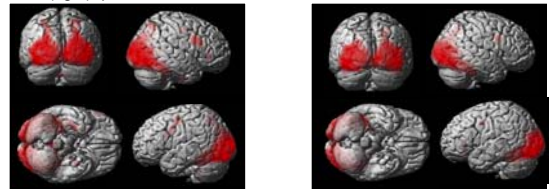


Figure 3: Brain activation pattern during the perception of negative pictures compared to neutral pictures for the whole sample (left) and the control subjects (right), p<.001 uncorrected.

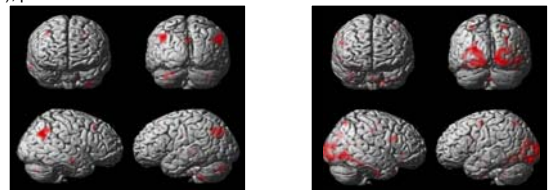


Figure 4: Brain activation pattern during the perception of negative compared to neutral pictures: Comparison between groups: Controls > Patients (left) and Patients > Controls (right), p<.001 uncorrected.

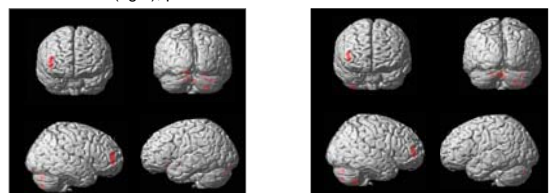


Figure 5: Relationship between affective flattening and brain activation during the perception of positive compared to neutral picture: Neg. correlation between affective flattening (SANS) and activation (left) and contrast patients without affective flattening (N=7) > patients with affective flattening (N=10, right) , p<.001 uncorrected.

DISCUSSION

- Passively viewing the pictures elicited brain activation in the same cortical and subcortical regions as reported in the literature (e.g. Bradley et al. (2003), *Behavioral Neuroscience*, Stark et al. (2004), *Neuropsychobiology*). (Fig.1 & Fig 3)
- The activation in visual regions was more accentuated in the schizophrenia patients than in the controls (Fig. 2 & Fig 4., right panel)
- For the positive pictures no substantially stronger activation was found for the controls when compared to the patients. (Fig. 2 left panel)
- For the negative picture, a stronger parietal (BA 39) and to some degree right prefrontal (BA 9) activation was found in the control group when compared to the patients. This activation might reflect an attentional network as described by Posner (Posner & Petterson (1990) *Annual Reviews of Neuroscience*.)
- The amount of affective flattening, as measured by the SANS was not related to the occipital or subcortical processing of the emotional pictures. A stronger cortical activation for those patients with a lower degree of affective flattening was only found in the right dorsolateral prefrontal cortex (BA 46) possibly indicating a more accentuated cognitive processing of the pictures. (Fig. 5)