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Visual self-recognition in patients with schizophrenia

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Abstract

Self-processing is associated with distinct patterns of behavior and neural activity in healthy individuals. Self-monitoring deficits have been reported in schizophrenia in auditory and tactile modalities but it is unknown whether they generalize to all sensory domains. We investigated self-face recognition in patients with schizophrenia, using a visual search paradigm with three types of targets: objects, famous faces and self-faces. Schizophrenic patients showed increased reaction time (RT) for detecting targets overall compared to normal controls but they showed faster RT for self-face compared with the Famous-face condition. For healthy controls, there was no difference between Self- and Famous-face conditions. Thus, visual search for self-face is more efficient than for famous faces and self-face recognition is spared in schizophrenia. These findings suggest that impaired self-processing in schizophrenia may be task-dependent rather than ubiquitous.

Keywords: Schizophrenia; Self-recognition; Self-face; Visual search; Social cognition

1. Introduction

Self-related information enjoys privileged access to our conscious awareness (e.g., "Cocktail party phenomenon"). Past research suggests that self-processing is associated with distinct patterns of behavior and neural activations (Keenan et al., 1999, 2000a, 2001; Platek et al., 2004, 2006; Tong and Nakayama, 1999; Turk et al., 2003; Uddin et al., 2005).

Schizophrenia has been associated with deficits in self-processing. Frith and Done (1988) proposed that a breakdown in the awareness of self-generated actions may result in symptoms of schizophrenia (e.g., auditory hallucination and delusions). Evidence from voice recognition studies supports this theory. Schizophrenic patients have difficulties differentiating their own from other voices and as result, they tend to misidentify their own voices as alien (Allen et al., 2004; McGuire et al., 1995). Impaired self-processing in schizophrenia extends to other domains. Schizophrenic patients have difficulties in discriminating self-generated tactile sensations from those generated by others (Blakemore et al., 2000). In addition, they may experience altered perception of their own bodies (Daprati et al., 1997; Traub and Orbach, 1964).

While there is accumulating evidence for altered self-information processing in schizophrenia from auditory and tactile modalities, surprisingly little is known about their visual self-recognition. Self-face is a very compelling stimulus; people process their own faces more

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efficiently than other faces (Keenan et al., 1999, 2000a; Tong and Nakayama, 1999). For example, RT for detecting self-face is faster than that for stranger faces (Tong and Nakayama, 1999). Furthermore, there may be a specialized neural network for self-face processing (Keenan et al., 2000a,b; Platek et al., 2006; Sugiura et al., 2005). Altered self-face processing in schizotypal individuals has been reported (Platek and Gallup, 2002; Platek et al., 2003). In these studies, healthy individuals showed a right hemisphere advantage for self-face processing but such asymmetry was absent in schizotypal individuals.

The present study investigated visual self-recognition in schizophrenia with a visual search paradigm. Since past research suggests that self-processing is impaired in schizophrenia, we hypothesized that visual self-recognition would be impaired. To control for the fact that self-faces are more familiar than stranger faces, we included famous faces. To control for the fact that faces are more complex than other stimuli, we included objects.

2. Methods

2.1. Participants

Twenty schizophrenic outpatients (11 women; SZ; 14 paranoid subtypes) were recruited from the Outpatient Clinic of Seoul National University Hospital, Korea. All patients met the criteria for schizophrenia of the Diagnostic and Statistical Manual of Mental Disorders-4th edition (DSM-IV) (American Psychiatric Association, 1991) based on the Structured Clinical Interview for DSM-IV (SCID) (First et al., 1997). Nineteen healthy controls (9 women; CO) were recruited through advertisements from the local community. Exclusion criteria for all participants were (1) current substance use, (2) brain injury, (3) neurological disorder and (4) mental retardation. In addition, CO were excluded if they had (1) past or present DSM-IV Axis I or Axis II disorder, or (2) a family history of psychotic illness. The Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987) was used to assess symptoms in SZ. All patients were taking atypical antipsychotic drugs (clozapine, risperidone, quetiapine, amisulpride or olanzapine) at the time of testing. All participants gave written informed consent after a complete description of the procedure was provided and were paid. The Institutional Review Board of Seoul National University Medical College approved the study protocol and consent procedure. See Table 1 for detailed demographic information.

Table 1
Demographic information

	CO (N=19)	SZ (N=21)		
Age	26.4 (2.6)	25.5 (5.1)	$t_{36}=-.8$	NS
Education (years)	15.3 (1.6)	14.2 (1.5)	$t_{36}=2.1$	$p<.05$
SES for participants	3.1 (.6)	2.8 (.4)	$t_{34}=-1.26$	NS
SES for parents	2.9 (.5)	3.0 (.6)	$t_{34}=.28$	NS
Handedness (R/L/B)	19/0/0	17/3/1	($\chi^2=2.1$)	NS
Gender (M/F)	10/9	10/11	($\chi^2=.22$)	NS
Age of onset	21.9 (5.3)	NA		
PANSS total	27.1 (6.0)	NA		
PANSS positive	14.6 (4.9)	NA		
PANSS negative	12.9 (3.9)	NA		

Values are given as mean (SD).
SES (social Economic Status).

2.2. Apparatus

A Macintosh G4 with a 17-inch CRT monitor (Flatron, LG Inc.) was used to present the tasks. Participants were tested individually in a quiet room with normal interior lightning. The unrestricted viewing distance to the monitor was about 50 cm.

2.3. Visual search paradigm

In the visual search task, participants were instructed to detect a target among distractors as quickly and accurately as possible. There were three conditions: Self-face, Famous-face and Object conditions. In all conditions, the stimulus set size varied from 2 to 8 (set 2, 4, and 8). In the Self-face condition, the self-face of each participant was the target to be detected among distractor face images. In the Famous-face condition, the face of a famous actor or actress was the target. In the Self-face and Famous-face conditions, the gender of all images matched the gender of the participant. For example, for female participants, a set of five female faces were used as distractor faces and an image of a famous actress was used as the target in the Famous-face condition. In the Object condition, an image of a ribbon was the target and images of a butterfly were distractors.

2.3.1. Stimuli

There were three types of face images: self-face, famous face, and unfamiliar stranger face. For object stimuli, an image of a ribbon and an image of a butterfly were used. All face images were of Korean women and men. Those faces were presented without hair, facial hair, or any other obvious visual cues against a uniform