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# Visuospatial working memory in schizotypal personality disorder patients

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## Abstract

**Background:** Cognitive processing deficits have been identified as an abnormality that schizotypal personality disorder (SPD) individuals share with schizophrenic patients. It has been hypothesized that impaired working memory may be a critical component of several of the more complex cognitive deficits found in schizophrenia spectrum patients. **Method:** 18 DSM-III-R SPD patients, and 17 normal comparison subjects were compared on a pen and paper visuospatial working memory task. Moreover, we identified a second psychiatric comparison group comprised of nine patients with other, non-odd cluster personality disorder diagnoses who met no more than one of the SPD criteria and were also tested on the same task. Each person was given 14 immediate recall trials and 10 trials using a 10 s delay. **Results:** SPD patients performed significantly worse than normal control subjects on the working memory task. SPD patients also performed significantly worse compared to the non-schizophrenia-related personality disorder psychiatric comparison group. **Conclusions:** Like schizophrenic patients, SPD patients demonstrate working memory impairment compared to normal controls. This impairment may be specific to the schizophrenia-related personality disorders. © 2000 Elsevier Science B.V. All rights reserved.

**Keywords:** Cognitive deficits; Personality disorders; Schizophrenia; Visuospatial memory

## 1. Introduction

Cognitive deficits have been identified as one of the central abnormalities found in schizophrenic patients. In fact, cognitive impairment in schizophrenia may be a better predictor of daily functioning than symptom severity (Gold and Harvey, 1993; Green, 1996). However, the susceptibility to schizophrenia occurs in a spectrum and the prototypic spectrum disorder is schizotypal personality disorder (SPD), which shares common genetic and

biologic substrates with schizophrenia (Battaglia et al., 1995; Gunderson et al., 1983; Kendler and Diehl, 1993; Siever et al., 1990, 1991, 1993a). It is critical to identify whether any particular cognitive deficits in schizophrenia are related to these common substrates of the spectrum (in which both schizophrenic and SPD patients would be expected to show impairment) or are associated specifically with chronic schizophrenia, with its accompanying psychosis and prior long term treatment (in which case, these deficits would be found in chronic schizophrenic patients but not in SPD patients). Since schizotypal subjects do not suffer from the

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chronic psychosis associated with schizophrenia, their performance on cognitive tasks is less likely to be confounded by poor motivation, long-term neuroleptic effects, or chronic hospitalization. Studies to date have shown impairments in sustained attention, verbal learning, executive functioning, and performance on eye tracking tasks in schizophrenic patients, SPD patients, schizotypal volunteers and relatives of schizophrenic patients (Gold and Harvey, 1993; Siever et al., 1993b; Lees Roitman et al., 1997; Braff, 1981; Weinberger et al., 1988; Park and Holzman, 1993; Cannon et al., 1994; Keefe et al., 1994, 1997; Trestman et al., 1995; Javitt et al., 1995, 1997).

While schizophrenic patients are likely to show marked deficits in most areas of cognitive processing, schizotypal patients show largely intact general intelligence with more circumscribed cognitive deficits (Trestman et al., 1995). The differential deficits shown by SPD patients make them an ideal population in which to study the cognitive impairments thought to characterize the schizophrenia spectrum. Schizophrenic subjects show particularly impaired performance on a range of tasks sensitive to frontal lobe dysfunction; the task that has been frequently used to assess prefrontal impairment is the Wisconsin Card Sorting Test (WCST), which measures the ability to identify and maintain a shifting cognitive set in response to verbal feedback (Weinberger et al., 1988). Clinical and non-clinical schizotypal subjects, like schizophrenic patients, are significantly more impaired on this task than normal comparison samples, although they do not show deficits in general IQ or spatial orientation measures (Battaglia et al., 1994; Lenzenweger and Korfine, 1994; Trestman et al., 1995). In addition, SPD patients are impaired on other tasks that are thought to involve prefrontal cortical functioning such as the Verbal Fluency Test and the Stroop Color–Word Interference Test (Trestman et al., 1995).

Impaired working memory is hypothesized to be a central component of several of these more complex cognitive deficits found in individuals with schizophrenia spectrum disorders. Working memory is defined as the function that serves for the retention of the stimulus information during

the delay period between stimulus acquisition (Baddeley, 1983). Studies of non-human primates have shown that lesions in prefrontal cortex lead to severe spatial working memory deficits (Funahashi et al., 1989; Goldman-Rakic and Friedman, 1991; Goldman-Rakic, 1994). Human analogues of the delayed response tasks which activate prefrontal cortex in monkeys have been developed and used to study working memory within the schizophrenia spectrum (Keefe et al., 1995). Unlike other tasks such as the WCST that include utilization of working memory as part of performance of a complex task component of task performance (Gold et al., 1997), the delayed response task is a much simpler and specific task involving working memory. Using such analogues, spatial working memory deficits have been identified in schizophrenic individuals who varied in their overall severity of illness (Park and Holzman, 1993; Keefe et al., 1995; Harvey et al., 1995), relatives of schizophrenic patients (Park et al., 1995a; Cannon et al., 1994; Keefe et al., 1994, 1997; Carter et al., 1996), individuals with elevated perceptual aberration scores on the Chapman Scale (Park et al., 1995b) as well as psychometrically defined (by self-report) SPD individuals (Park and McTigue, 1997) from college samples. None of these studies addressed the specificity of this finding to SPD by examining a non-schizophrenia-related psychiatric comparison group.

While most studies to date have focused on non-clinical SPD samples, who may or may not meet DSM-III-R criteria for SPD, it is also advantageous to study clinically identified SPD patients when investigating cognitive deficits. A clinical sample includes individuals with a broader range of intellectual functioning who, by definition, meet full criteria for SPD. In contrast, deficits in cognitive impairment are difficult to identify in college samples because they are already preselected on the basis of good intellectual functioning (Lencz and Raine, 1995). In such samples, SPD individuals identified on the basis of scales such as the Chapman Perceptual Aberration Scale may also include people with affective disorder symptomatology (Chapman et al., 1980). Thus, it remains to be determined whether clinically diagnosed SPD

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