Spatial, object, and affective working memory in social anhedonia: an exploratory study

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Abstract

The domain-specificity of working memory was examined in psychosis-prone individuals with elevated social anhedonia scores. A group of individuals with deviant scores on the revised Social Anhedonia Scale (n = 43) were compared with a normal control group (n = 39) on delayed match-to-sample tasks involving spatial, identity, and affective information. The social anhedonia group performed less well on the spatial and emotion delayed match-to-sample tasks relative to the normally hedonic group. The two groups did not differ in terms of their performance on the identity delayed match-to-sample task. Although the social anhedonia group reported less positive affect, greater negative affect, and more alexithymic tendencies relative to the control group, there were no significant associations between these personality traits and working memory performance. In summary, the findings suggest that poorer working memory performance is not domain-specific in socially anhedonic individuals. The authors conclude that the socially anhedonic group’s relatively poor performance on the emotion delayed match-to-sample task reflects difficulty and/or inefficiency in handling cognitively taxing tasks.

Keywords: Working memory; Social anhedonia; Emotion; Alexithymia

1. Introduction

Working memory refers to a system used for the temporary storage and manipulation of information. This system involves several different processes, including active maintenance, updating, and comparative functions (Baddeley, 1986). In spatial working memory tasks, participants are required to hold information about the location of a target in mind over a delay period. Since the seminal study by Park and Holzman (1992), there have been many independent replications of spatial working memory impairments in schizophrenia patients (c.f. Carter et al., 1996; Keefe et al., 1997, Fleming et al., 1997; Spindler et al., 1997; Gooding and Tallent, 2001). There have been reports of spatial working memory deficits in schizotypal personality disordered patients (Roitman et al., 2000), schizoaffective disordered patients (Gooding and Tallent, 2002), and first-degree relatives of schizophrenia patients (Park et al., 1995; Keri et al., 2001). In contrast, spatial working memory task performance appears to be relatively intact in patients with bipolar disorder (Park and Holzman, 1992; Gooding and Tallent, 2001) and in their first-degree relatives (Keri et al., 2001). Thus, spatial working memory impairments appear to be specific to individ-
uals at heightened risk for schizophrenia and schizo-

phrenia-spectrum disorders.

In his model of working memory, Baddeley (1986) dis-

tinguished spatial working memory from verbal

working memory. A central executive, namely, an

attentional control system, operates in conjunc-

tion with two subsystems in order to maintain and manip-

ulate visual and spatial information (via a visuospatial

sketchpad) on one hand, and auditory and speech-

based information (via the phonological loop) on the


Rama et al., 2001) supports the notion that there is a

functional dissociation within the neural system so

that the maintenance of verbal and spatial visual

information is handled separately.

Single-cell recording studies in nonhuman pri-

mates (c.f. Wilson et al., 1993; Goldman-Rakic,

1999), as well as human neuroimaging studies (c.f.

Belger et al., 1998; Haxby et al., 1994), have
demonstrated that in addition to spatial and verbal

working memory, there appears to be a form of object

working memory. That is, findings suggest that non-

spatial features of a stimulus are processed separately

from its spatial attributes. Object working memory
tasks assess short-term storage of object information,
such as identity or color. Relative to studies of spatial

working memory, there have been fewer investiga-
tions of nonspatial working memory in schizophrenia

patients.

To date, findings with schizophrenia patients have
been mixed for the other types of working memory.
Although Park and Holzman (1992) found that schiz-
ophrenia patients did not display verbal working
memory deficits, subsequent studies (Gold et al.,
1997; Wexler et al., 1998; Conklin et al., 2000;
Huguelet et al., 2000) have demonstrated that with
more cognitively demanding tasks, schizophrenia
patients show deficits on auditory verbal tasks. Spind-
dler et al. (1997) observed deficits in object working
memory as well as spatial working memory among
schizophrenia patients, though Tek et al. (2002) did
not observe deficits in the former domain.

Observations of working memory impairments in
unmedicated as well as medicated schizophrenia
patients and in their first-degree relatives suggests
that working memory deficits may be an endopheno-
typic marker for the schizophrenia diathesis. Although
working memory impairments may be part of the core

deficit underlying schizophrenia, the extent to which

the working memory deficit may be domain-specific

is unclear. If working memory is an indicator of an

underlying genetic diathesis for schizophrenia, then it

has the potential to be a premorbid indicator of illness.

However, the study of schizophrenia patients is

limited in terms of its ability to inform us about the
development of the disorder and premorbid indicators

of heightened risk for the disorder.

One strategy for studying the viability of premor-

bid indicators of underlying risk is to assess individ-

duals determined to be at heightened risk on the basis

of their genetic relationship to a clinically affected

person or on the basis of psychometrically defined or

clinically defined characteristics (Gooding and

Iacono, 1995). Analysis of the Chapmans’ longitudi-

nal study of psychosis-prone individuals (Kwapil,

1998) revealed that individuals with abnormally high

scores on the revised Social Anhedonia Scale are at

heightened risk for the later development of schizo-

phrenia-spectrum disorders. This finding instigated a

growing number of investigations of socially anhe-

donc individuals. To date, there has been only one

study of working memory performance in socially

anhedonic persons. In a study using a visuospatial

working memory task, we (Tallent and Gooding,

1999) observed that individuals with social anhedonia

performed less well than comparison subjects. The

goal of the present study was to determine whether

socially anhedonic individuals would also display

subtle impairments in the storage and maintenance

of nonspatial visual information. Thus, in addition to a

spatial working memory task, we included an object

working memory task in the present study.

Social anhedonia, by definition, involves a deficit

in affective experience. Previous neurocognitive stud-

ies (Luh and Gooding, 1999; Kerns and Berenbaum,

2000) suggest that individuals reporting social anhe-

donia process affective information differently. These

findings, along with a report of normative emotion-

modulated startle response in socially anhedonic indi-

viduals (Gooding et al., in press), are consistent with

the notion that the observed affective abnormalities

reflect cortical involvement. Thus, we were interested

in investigating whether socially anhedonic individu-

als would differ from normally hedonic individuals in
terms of their ability to store, maintain, and manipu-
late affective information.
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