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Early visual information processing deficit in depression with and without Borderline Personality Disorder

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Abstract

Backward masking is a measure of early visual information processing usually abnormal in psychotic disorders. Previous studies of subjects with Borderline Personality Disorder have been inconsistent regarding their impairment or lack of impairment on backward masking. We examined visual backward masking performance in samples of unmedicated depressed patients with ($n=12$) and without ($n=16$) Borderline Personality Disorder, and healthy volunteers ($n=18$). Accuracy was poorer in depressed BPD patients, relative to both non-BPD depressed and healthy comparison subjects. As in previous studies, no differences in accuracy were found between non-BPD depressed patients and healthy comparison subjects. Differences in BPD subjects' accuracy were most evident at the fastest ISI and were not attributable to intercurrent psychotic symptoms. Beyond these group differences, accuracy at faster ISI's correlated with self-ratings of impulsiveness in all patients, and may be a general correlate of this trait. Poor early information processing appears to be a feature of Borderline Personality Disorder, and may play a role in the impulsive behavior that is characteristic of the disorder.

Keywords: Backward masking; Borderline Personality Disorder; Depression; Information processing; Impulsiveness; Impulsiveness assessment

1. Introduction

Individuals with Borderline Personality Disorder (BPD) may experience transient psychotic states (Stern, 1938; Frosch, 1964; Kernberg, 1975; Gunderson, 1984; Brodsky et al., 1997), and possibly share neuropsychological characteristics with psychotic disorders (Lenzenweger et al., 2004). Neuropsychological studies of BPD, however, suggest that the most common deficits in this disorder are those associated with affective illness, namely deficits in attention and memory (Burgess, 1991; Kurtz and Morey, 1999; Posner et al., 2002). There have been few studies examining the earliest stages of information processing in BPD, via tasks such as backward masking. Deficits in early information processing may underlie some of the distortions of reality and seemingly irrational behavior in both psychosis and BPD, and warrant further scrutiny.

Backward masking is a measure of early information processing and visual perception that involves very brief presentation of a target stimulus followed closely in time

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by a second "masking" stimulus that interferes with processing of the target (Turvey, 1973; Breitmeyer and Gantz, 1976; Rund et al., 1993; Green et al., 1994b; McClure, 1999). Degree of disruption in the processing of the target is a function of the temporal delay between the target and the mask (interstimulus interval or ISI). Backward masking performance is typically most impaired when the target and mask are presented contiguously and improves as the onset of the mask is delayed further in time (Braff, 1981; Rund et al., 1993; McClure, 1999; Butler et al., 2002; MacQueen et al., 2001).

Research on backward masking performance has historically focused on psychotic disorders, where it is a predictor of a vulnerability to schizophrenia (Balogh and Merritt, 1987; Green and Nuechterlein, 1999). However, it is unclear if impaired backward masking is specific to schizophrenia spectrum disorders (Rund et al., 2004). Studies comparing backward masking performance of subjects with bipolar disorder to that of non-patients have been inconsistent (Saccuzzo and Braff, 1981; Green and Walker, 1986; Rund, 1993; Green et al., 1994a; Fleming and Green, 1995; MacQueen et al., 2001). Studies comparing backward masking performance of subjects with major depression without psychotic features to that of non-patients, on the other hand, consistently find no differences (Saccuzzo and Braff, 1981, 1986; Elkins et al., 1992; Suslow and Arolt, 1997, 1998; Rund et al., 2004).

Two studies have examined backward masking in subjects with BPD. The first found no differences between a small group of BPD subjects ($n=8$) and both non-psychotically depressed patients and non-patients (Schubert et al., 1985). Two comparison samples of schizoaffective and manic bipolar subjects performed more poorly than these other groups. Most of the BPD subjects in that study (6 of 8 subjects; 75% of sample) were receiving psychotropic medication at the time of assessment, and met criteria for minor depression. A more recent study of a larger group ($n=22$) of predominately unmedicated BPD subjects (19/22; 86.4% of sample unmedicated) found they differed from healthy controls in requiring a longer ISI to identify target stimuli at better than chance levels (Stevens et al., 2004). BPD subjects' backward masking difficulties were linked to a more general set of cognitive impairments that included deficits in working memory. However, this study did not include a psychiatric comparison group, and it was unclear if these deficits were unique to BPD.

On the basis of these prior reports, we hypothesized that unmedicated, depressed BPD subjects would exhibit deficits on backward masking. We further hypothesized that these deficits would be related to behavioral characteristics of BPD, such as impulsiveness, hostility, and aggression. Performance on a computerized backward masking task using a single number target and spatially overlapping mask was compared among samples of unmedicated depressed subjects with and without BPD, and healthy volunteers. Correlations between backward masking performance and impulsiveness, hostility, and aggression measures were examined as well.

2. Methods

2.1. Subjects

Subjects were 28 depressed patients meeting DSM-IV criteria for either unipolar major depressive disorder ($n=21$) or bipolar disorder, depressed ($n=7$). This patient sample included 12 subjects with comorbid Borderline Personality Disorder and 16 without. The 16 depressed non-BPD subjects included 11 with no Axis II disorders, 2 with Avoidant Personality Disorder, 1 with Obsessive–Compulsive Personality Disorder and 2 with Personality Disorder, Not Otherwise Specified. Patient groups were compared to 18 healthy volunteers with no current or past Axis I or Axis II disorders. Subjects in all three of the study groups were free of medical and neurological disorders likely to affect testing such as head injuries, stroke, or chronic illnesses (via physical exam and history) and of any current substance use (urine assay). All subjects were recruited via advertisement or referral from local clinicians for participation in studies conducted within the Conte Center for the Study of Suicidal Behavior at the New York State Psychiatric Institute.

Patient subjects were psychotropic medication-free for at least 2 weeks prior to testing (4 weeks for antipsychotics, 5 weeks for fluoxetine), as part of their participation in other biological procedures in our center. This study was approved by the local institutional review board, and all subjects signed informed consent prior to participation.

2.2. Clinical assessment

Structured Clinical Interviews for the DSM-IV (SCID) were used to determine Axis I and Axis II diagnoses for patients (Spitzer et al., 1990; First et al., 1996). Axis II assessments were completed after treatment to insure that Axis II diagnosis was not confounded by acute symptomatology. Healthy controls were assessed using the nonpatient version of the SCID