

are consistent with the hypothesis that deficit schizophrenics have increased costs in the LVF.

## FACTORS ASSOCIATED WITH NEUROPSYCHOLOGICAL PERFORMANCE IN FIRST-ADMISSION PSYCHOTIC PATIENTS

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As part of the Suffolk County Mental Health Project of first admission psychosis, a neuropsychological battery was administered during the follow-up assessments of patients with schizophrenia, psychotic depression, and psychotic bipolar illness. At 6- and 24-month follow-up, alternate forms of the Quick Test were administered. At 24-month follow-up, a comprehensive battery was administered that assessed memory, executive function, language, visuo-spatial perception and visuoconstructive praxis. On the Quick Test, all three groups declined somewhat over time, and the schizophrenics performed worst and bipolar patients best at each assessment. This decline was mirrored by a deterioration measure derived from the WAIS-R. On most of the remaining tasks, the schizophrenics had poorer performance than the affective subjects. One exception was visual memory. Although delayed visual memory performance differed in the expected direction, no significant difference was found for immediate memory. This presentation focuses on whether the factors associated with the dysfunctions in neuropsychological performance are similar across the diagnostic groups. Specifically, after controlling for medication status and duration since first psychotic symptom, we examine the predictive utility of a set of psychosocial risk factors (i.e., premorbid adjustment) as well as contemporaneous illness factors (i.e., type and stability of symptoms).

## SPATIAL WORKING MEMORY DEFICITS AND NEGATIVE SYMPTOMS IN SCHIZOPHRENIA

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Since its earliest description negative symptoms in schizophrenia have been compared to those associated with frontal lobe lesions. Imaging studies have generally supported this association but results have been mixed. A known *cognitive*

function of dorsolateral prefrontal cortex is its role in spatial working memory, which is linked to the integrity of dopaminergic neurotransmission in this region. Deficits in spatial working memory have recently been reported in schizophrenia. We used a computer presented spatial working memory task with 0 and 8 s delays to test the hypothesis that spatial working memory deficits in schizophrenia would correlate with negative symptoms. Eighteen unmedicated outpatients were tested and compared with controls. Symptoms were rated using the BPRS and either the NSA or the SANS. Patients showed a greater increase in errors with delay, consistent with previous findings in medicated patients. As predicted, patients' negative symptom scores correlated significantly with the increase in errors with delay ( $r=0.52$ ,  $p<0.03$ ). Total BPRS, and BPRS positive symptoms also showed non-significant trends towards correlating with working memory performance, however, and all 3 symptom measures were highly intercorrelated in this relatively remitted group of outpatients. The implications of this finding for the pathophysiology of negative symptoms in schizophrenia will be discussed.

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## A COGNITIVE NEUROPSYCHOLOGICAL STUDY OF SCHIZOPHRENIA SYMPTOMS: CORRELATES OF STROOP AND SEMANTIC PRIMING PERFORMANCE

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Different symptoms of schizophrenia have been associated with specific patterns of cognitive impairment. Such associations can shed light on underlying pathophysiological mechanisms. Increased Stroop facilitation has been found in a subgroup of patients who show more disorganization and negative symptoms. This suggests 2 competing hypotheses: (1) increased facilitation is associated with negative symptoms and a release from "top down" influences over automatic word reading; (2) increased facilitation results from increased automatic spreading activation in semantic networks, a phenomenon also tapped by semantic priming tasks and increased in thought disordered patients in some studies. We studied 29 chronically ill patients and found facilitation correlated positively with disorganization but not with negative symptoms. Semantic priming (lexical decision and word reading) also correlated with disorganization. However there were no correlations between Stroop measures and priming or between the two priming tasks themselves. This suggests that increased Stroop facilitation is related to thought disorder but not via the mechanism of increased automatic spreading activation. Medication effects may complicate this interpretation since the

priming measures, but not Stroop performance, correlated with neuroleptic dose. A further analysis in a larger group of subjects will address the relative contributions of medication dosage and thought disorder to both Stroop and priming effects.

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## DISENGAGING FROM AUTOMATIC PROCESSES IN SCHIZOPHRENIA: OVER-RIDING THE GESTALT PRINCIPLES

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The principles of perceptual organization, also known as the Gestalt principles, are the ways people organize their visual field into coherent chunks. Chey and Holzman (1994) have demonstrated that schizophrenics were able to employ the principles of perceptual organization as the normal population. However, schizophrenics differed from the control groups in that they had difficulty disengaging or over-riding these principles.

The study examined two main questions. First, is the difficulty of schizophrenics over-riding these principles (Chey and Holzman, 1994) an enduring phenomena? In conjunction with this question, the study purported to replicate the findings of intact employment of the principles in schizophrenia (Chey and Holzman, 1994; Knight, Elliott, and Hershenson, 1993). Specifically, the principles of proximity, collinearity, and similarity were examined. Second, the possible involvement of the short-term visual memory deficit in the difficulty of disengagement was investigated (Knight, Elliott, and Freeman, 1985; Park and Holzman, 1992).

Two perceptual tasks, the embedded figure task and the similarity task altered from Chey and Holzman (1993), were administered to schizophrenic patients (12), bipolar patients (12), and normal controls (12). Digit Span, Visual Digit Span, and Figural Memory, subtests of the Wechsler Memory Scale-Revised (1987), and Block Design of the Wechsler Adult Intelligence Scale-Revised (1981) were also administered to examine the short-term visual memory. The data shows that schizophrenics have no difficulty utilizing the automatic processes, but that they had difficulties disengaging from or over-riding them.

## PREFRONTAL CORTICAL FUNCTION AND SCHIZOPHRENIA

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Postmortem findings suggest that schizophrenia can result from a variety of combinations of specific CNS lesions.

Prefrontal dysfunction has long been implicated in schizophrenia by evidence from neuropsychology, electroencephalography, and imaging of cortical blood flow, summarized as "hypofrontality", yet diagnosis of schizophrenia is made on the basis of reported internal experiences and observed behaviour. Much research effort has been applied in recent years to attempting to explain the occurrence of these signs and symptoms through recourse to theories of cognition and developing knowledge of the neural systems underlying cognitive processes.

Goldman-Rakic (1991) proposed that deficient internal representation and regulation of behaviour by working memory is the primary cognitive abnormality, manifest as symptoms, both positive and negative, and neuropsychological deficits.

The prefrontal cortex has a special, perhaps pre-eminent role in working memory processes, dependent upon its multiple reciprocal connections with other cortical and sub-cortical areas.

The present study examines the model of primary working memory deficit put forward by Goldman-Rakic (1991) and the subsequent ability of neuropsychological test data to predict the major syndromes of schizophrenia.

## A COMPUTATIONAL MODEL OF PREFRONTAL CORTICAL AND HIPPOCAMPAL FUNCTION, AND THEIR INTERACTION IN BEHAVIORAL TASKS

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Disturbances of both prefrontal cortex and hippocampus have been implicated in schizophrenia. However, the relationship of these structures to cognitive disturbances in schizophrenia is poorly understood. Such an understanding must proceed from an understanding of the normal function of these structures, and their interaction with one another. We describe a computational model based on current theories of PFC and hippocampal function: PFC is thought to support active representations needed to guide behavior, while the hippocampus is responsible for establishing novel associations, and transferring these to neocortical structures over time. The model is used to simulate performance in behavioral paradigms (such as latent inhibition and blocking) thought to differentially tap the function of these structures. The model provides new insights into how PFC and hippocampus may interact, both contributing to performance in these tasks. The models also make predictions about the pattern of behavioral deficits that should arise from disturbances in these structures. These predictions can be used to test hypotheses concerning the contribution of PFC and/or hippocampus to schizophrenic cognitive deficits. The model also provides insights into how these structures may interact to support higher cognitive processes, such as planning and action control, that are characteristically impaired in schizophrenia.