

processes related to learning rather than the expression of learned procedures.

NEUROPSYCHOLOGICAL PROFILES OF FIRST EPISODE SCHIZOPHRENIA

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This paper presents the neuropsychological (NP) findings from the initial comprehensive examinations of patients participating in the Prospective Study of Psychobiology in Schizophrenia at Hillside Hospital. Results from 81 patients with RDC diagnoses of schizophrenia or schizoaffective disorder, mainly schizophrenic subtype, were compared to a reference group of 32 healthy volunteers. The NP data comprise results from an extensive battery of widely used clinical instruments and additional experimental measures. The exams were administered approximately 6 months after patients entered the study, at which time most had achieved conservative criteria for clinical stabilization on antipsychotic medications. Initial analysis focused on identifying measures that best discriminated the patient from the reference group, by performing profile analysis on six NP domain scores (comprising language, memory, attention, executive, motor, and visuospatial measures). The mean profile of patients was approximately 1.3 SD below that of the reference group. Three domain scores (memory, executive, and motor) deviated significantly (with 95% confidence) from this overall profile mean, suggesting areas of relative deficit. Stepwise discriminant function analysis, aiming to identify orthogonal sources of deficit that differentiate patients from the reference group, showed that memory measures best identified the patients, with additional contributions from language and motor domains. Among patients, there were moderate relations of NP results with illness severity and course, and with total cortical volume as measured on magnetic resonance images. These results corroborate prior reports of both generalized deficit and relatively pronounced memory deficit, and suggest that additional language and motor disturbances may contribute to the diathesis, or reflect early illness effects, in schizophrenia.

HOW CHAOTIC IS SCHIZOPHRENIA?

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Performance deficits by schizophrenic patients across many paradigms may result from inappropriate selection, ordering, and sequencing of behavioral elements. Recent advances in

nonlinear dynamics provide techniques to quantify and better understand these dysregulated patterns of behavior. Measures derived from "chaos theory" have quantified patterns of biological, physiological, and physical phenomena ranging from EEG to weather variability. A simple binary choice paradigm was combined with nonlinear analysis techniques to assess the organization of response selection and thought-contingent processes. The task consisting of predicting 500 random right/left appearances of a stimulus, the dynamical entropy measure quantified the degree of interdependency and state of organization of consecutive responses in 22 schizophrenic patients and 16 controls. Abnormalities of schizophrenic patients are not a linear increase or decrease of functions. It appears that individual schizophrenic patients show periods of predictable, inflexible behaviors that alternate with more random-appearing patterns of behavior. The data reflect a coherent dysregulation and disorganization of the arrangement of responses. Thus, schizophrenia is not characterized by entirely random or unpredictable behavior but can be understood in terms of complex, non-linear, and quantifiable dysregulation of the organization of behavior.

LEARNING AND MEMORY IN SCHIZOPHRENIA

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Numerous studies have demonstrated learning and/or memory impairments in schizophrenia patients. Despite considerable research, the nature of specific cognitive defects and neuroanatomical dysfunctions associated with poor learning and memory processes in schizophrenia remains unclear. The California Verbal Learning Test was used to characterize the learning and memory impairment in schizophrenia and to evaluate potential clinical and demographic factors associated with this impairment. Schizophrenia patients ($n=175$) performed worse than normal subjects ($n=229$) on all learning, recall, and recognition memory measures. The most important clinical correlates of these impairments were earlier age of onset, greater anticholinergic dosage, and more negative symptoms. Schizophrenia patients showed a prominent recognition retrieval deficit, suggesting an encoding deficit. In contrast, the relative absence of a storage deficit is suggested by the lack of rapid forgetting. Using a discriminant function analysis that differentiates cortical dementia (e.g., Alzheimer's Disease), subcortical dementia (e.g., Huntington's Disease), and normals, 50% of the schizophrenia patients were classified as having a subcortical memory profile, 35% were classified as having a normal profile, and only 15% were classified as having a cortical memory profile. These results allow us to make inferences about cortical and subcortical brain dysfunction in the group of schizophrenias.