Treatment of Cognitive Dysfunctions and Behavioral Deficits in Schizophrenia

by Hans D. Brenner, Bettina Hodel, Volker Roder, and Patrick Corrigan

Abstract

Integrated Psychological Therapy (IPT) is a structured intervention program that prescribes steps to remediate cognitive and behavioral dysfunctions that are characteristic of the psychopathology of schizophrenia. Evaluative studies of IPT indicated that the program improved schizophrenic patients' elementary cognitive processes such as attention, abstraction, and concept formation but that patients' performance was still below the normal range. The clinical utility of IPT will depend on studies that document the hierarchical generalization of improvements from the cognitive to the social and symptomatic levels of functioning.

Although cognitive dysfunction has assumed a central position in describing pathognomonic characteristics of schizophrenia (Lang and Buss 1965; Burrows et al. 1986), intervention strategies addressing these dysfunctions are neither well developed nor empirically supported. It is hoped that effective cognitive rehabilitation models will arise out of recent research in schizophrenia, which has identified specific information-processing deficits in individuals with this disorder, including problems with selective attention toward relevant stimuli, sustained attention over prolonged time periods, encoding and recognition of familiar cues, storing the information for future retrieval, and drawing deductive or analogous conclusions from available information (Broga and Neufeld 1981; Nuechterlein and Dawson 1984; Brenner 1987, 1989).

Several models have explained the multiplicity of processing deficits. Proponents of one model view attention deficits as primary and skewing subsequent higher order processing (Broga and Neufeld 1981; Braff and Saccuzzo 1986). Incorrect attention and encoding of incoming information prevent accurate processing at the level of decisionmaking and response selection. Proponents of a contrasting model place the basic deficit in higher order processes (Magaro 1980, 1984). Inability to master complex conceptual processes diminishes the ability of schizophrenic patients to encode and consolidate simpler information (Space and Cromwell 1978; Marousarz and Koh 1980; Persons and Baron 1985).

Information-processing models of schizophrenia suffer from limited clinical validity when isolated from discussions of disease etiology, symptom manifestation, or social incompetence. Stress and vulnerability models of the disease integrate cognitive, symptom, and environmental constructs (Zubin and Spring 1977). Specifically, subclinical cognitive vulnerabilities hinder the acquisition of coping skills during premorbid years (Ciompi 1982; Nuechterlein and Dawson 1984). Similarly, subtle processing deficits persist even while the disease is in remission, preventing accurate recognition of social cues or retrieval of appropriate responses.

The relationship among basic and higher order cognitive deficits, and the relationship between cognitive deficits and social dysfunction, are two "vicious circles" (figure 1). A vicious circle is a positive feedback loop in which elements in the loop

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Figure 1. The vicious circles of schizophrenia that define the interaction of cognitive and social variables

**TYPE I**

**ELEMENTARY COGNITIVE FUNCTIONS**
- attention
- encoding

**COMPLEX COGNITIVE DYSFUNCTIONS**

**ELEMENTARY COGNITIVE DYSFUNCTIONS**

**COMPLEX COGNITIVE DYSFUNCTIONS**
- concept formation
- retrieval

**COGNITIVE DEFICITS**

**DIMINISHED CAPACITY**

**DIMINISHED COPING SKILLS**

**SOCIAL STRESSORS**

**TYPE II**

exacerbate one another so that deficits continually worsen (Ciompi 1982). The type I circle combines the two divergent models of information processing in schizophrenia. Deficits in elementary cognitive processes diminish higher order functioning that should integrate incoming information. At the same time, diminution of higher order processes prevents coordination of elementary cognitive functions so that attention and encoding are skewed. The overall spiral causes continuous cognitive dysfunction, which affects social perception and responding.

In the type II circle, cognitive deficits prevent sufficient acquisition of interpersonal coping skills. Without these skills, patients are more exposed to stress. Under heightened arousal, their intellectual capacity is severely limited and cognitive deficits worsen even more (Gjerde 1983). The combination of these two vicious circles describes the onset of symptoms, the diminution of social functioning, and the mechanism by which these dysfunctions are maintained in the absence of observable causal factors. Treatment programs that strive to halt these noxious, continuing feedback loops must address both the cognitive and the social dysfunctions that continue to expose the individual to stress. It is well established that antipsychotic medications confer protection to schizophrenic individuals against the stress-related exacerbations of psychopathology; moreover, there is evidence that medications also can improve schizophrenic patients' cognitive processing of information (Cassens et al. 1990). However, the concurrent use of treatment interventions that are aimed at the neuropharmacologic, cognitive, behavioral, and social abnormalities and dysfunctions that characterize the schizophrenia spectrum are likely to yield the best clinical outcomes. The development and validation of a therapeutic intervention that aims to integrate the cognitive with the behavioral and social realms of functioning may be viewed as a step in the direction of compiling a comprehensive biopsychosocial treatment program for schizophrenia.

**Integrated Psychological Therapy**

Integrated Psychological Therapy (IPT) comprises five subprograms (figure 2) designed to ameliorate cognitive dysfunctions and social-behavioral deficits characteristic of schizophrenia (Brenner 1987; Brenner et al. 1987, 1989, 1990; Hermanutz and Gestrich 1987; Kraemer et al. 1987). Subprograms are arranged hierarchically; early interventions target basic cognitive skills, middle interventions shape cognitive skills into verbal and social responses, and later interventions train patients to solve more complex and arousing interpersonal problems. Each subprogram contains discrete steps that prescribe therapeutic tasks for improving social and cognitive skills. IPT is presented to groups of five to seven patients for 30- to 60-minute sessions three times a week for approximately 3 months (Brenner et al. 1980, 1991; Roder et al. 1988).

How do the five IPT subprograms affect the vicious circles perpetuating diminished cognitive and behavioral function characteristic of schizophrenia? The Cognitive Differentiation subprogram aims to improve the schizophrenic patient's ability to accomplish elementary cognitive tasks, whereas the succession of the Cogni-
Figure 2. The five subprograms of Integrated Psychological Therapy

**COGNITIVE DIFFERENTIATION**

**SOCIAL PERCEPTION**

**VERBAL COMMUNICATION**

**SOCIAL SKILLS**

**INTERPERSONAL PROBLEM SOLVING**

**SOCIAL SKILLS**

**COGNITIVE ABILITIES**

**Cognitive Differentiation** and Social Perception subprograms aim to facilitate improvement of more complex cognitive functions. According to the model depicted in figure 1, training in these subprograms should interfere with the ongoing repetition of the type I vicious circle. Secondly, diminution of cognitive deficits should improve patients' ability to acquire social and coping skills. The Verbal Communication, Social Skills, and Interpersonal Problem Solving subprograms at the same time increase patients' behavioral repertoires so that the individual is less vulnerable to future social stressors, thereby halting the type II vicious circle.

Patients first work on improving basic cognitive abilities in the Cognitive Differentiation subprogram. During the first step of this subprogram, patients learn to discriminate stimulus categories by participating in a card-sorting task. Four attributes are printed on each card: (1) a number, (2) a geometric form, which is drawn in (3) a color, and (4) a day of the week. Patients are instructed to sort cards by one or more attributes. When they are competent at the simple stimulus task, training moves to word problems. Concept formation is trained through a series of tasks in which patients identify antonyms and synonyms, distinguish concepts with different definitions, and establish a hierarchy of related concepts. Finally, systematic search strategies are trained through a variation of the game 20 questions, thereby improving retrieval of verbal concepts.

In the Social Perception subprogram, patients are trained to accurately encode social stimuli. In part, the patient must be able to discriminate between relevant elements of social stimuli and environmental noise. To accomplish this task, patients view a series of slides in which actors interact in different social activities and display emotions of various intensity. As the subprogram progresses, the emotions and interactions increase in complexity and distress. In the last steps, slides are purposely ambiguous and the emotions and interactions are difficult to interpret. For each slide, one patient in the group is asked to list the observable qualities of the individual: "Describe the person to me. What is the person doing?" The therapist prompts and directs patients' attention to relevant aspects of the slide. From the initial description, members of the group are asked to interpret the intent of the actions and the emotion displayed by the actors. The group as a whole discusses individual interpretations of the scenes in terms of their "reality adequacy." The aim of the discussion is not always to achieve a group consensus, but rather patients' understanding of reality-related interpretations. Individuals who express extremely discrepant interpretations are gently confronted with reality-based evidence.

The first two subprograms target patients' cognitive abilities, especially focusing on the processing of social information. The first steps of the Verbal Communication subprogram extrapolate skills learned in previous subprograms to improve patients' ability to pay attention to voiced statements of others, to improve patients' ability to accurately understand what is being said, and to facilitate the associative-semantic processes necessary for answering. During initial exercises, patients are rewarded for repeating verbatim the statements of their partners. Literal repetition is quickly replaced with paraphrasing partners' statements. Reciprocal communication is improved with questions that foster mutuality in both listening and talking. Patients are taught the utility of basic question words (who, what, where, why, how) and are prompted to use them in conversation practice.
Successful patients are instructed to continue free communication without immediate prompts. Therapist feedback fine-tunes patient performance throughout this subprogram.

The Social Skills and Interpersonal Problem Solving subprograms closely parallel more conventional behavioral skills training (Hersen and Bellack 1978; Wallace 1982; Liberman 1988). Individual social skills are modeled by cotherapists, patients rehearse the skills in role plays, and feedback is provided by the trainers. However, the IPT Social Skills subprogram is facilitated by focusing on cognitive components. Similarly, the acquisition of traditional problem-solving steps is enhanced through accentuating the cognitive elements in the task. For example, selecting a solution involves cognitive analysis of the success and failures of similar solutions in other problem situations.

Evaluation of Integrated Psychological Therapy

IPT was evaluated in several independent studies. In the main study conducted at the Bern University Department of Psychiatry, subjects with International Classification of Diseases (ICD-9; World Health Organization 1978) diagnoses of schizophrenia were assigned, in order of admission to the clinic, to IPT treatment, placebo-attention activities, or routine care alone (Brenner et al. 1990) and received similar medication management regimens. Extensive cognitive and psychopathologic measures were gathered before treatment, after the 3 months of treatment, and at an 18-month followup. Cognitive measures assessed basic attentional and higher order conceptual abilities. Results showed that subjects who completed IPT scored significantly higher than both control groups on tests measuring attention. In addition, overall psychopathology decreased significantly for the IPT group while significant changes were not observed in the control groups. These effects were still present at the 18-month followup. In addition, the IPT group had significantly lower hospitalization rates than the control groups at followup. Despite improved attention scores, however, results showed that IPT had no effect on measures of visuomotor integration.

Two subsequent studies attempted to establish the order of cognitive and social skills effects (Hodel et al., in press). The first of these studies aimed to determine if the Cognitive Differentiation subprogram facilitates the acquisition of interpersonal skills, as implied in the type I vicious circle. Eighteen subjects with ICD-9 diagnoses of schizophrenia participated in a repeated measures assessment of this IPT subprogram. Cognitive, social functioning, and psychopathologic measures were assessed before treatment and at subsequent 3-week intervals during the training. Results showed that measures of concept formation and abstract thinking improved quickly after the Cognitive Differentiation subprogram began. However, no improvement in social functioning was noted during the 2 months of this study. Results of the second investigation, a within-subject study that examined whether IPT reduces both vicious circles, showed that IPT produced steady improvement in measures of word recall and overall social functioning of patients treated in an inpatient setting. However, patients' cognitive and social adjustment scores were still below normal levels at the completion of IPT.

The results from these studies suggest that IPT has favorable effects on elementary cognitive processes that can be detected within the first few weeks of treatment. Evidence was mixed regarding IPT's effect on more complex cognitive skills that coordinate and integrate information. Continued investigations of IPT are being conducted with more robust, computer-based measures of information processing (Mussgay et al., in preparation). The clinical utility of cognitive rehabilitation in general, and IPT specifically, awaits controlled clinical trials and lies in generalization of effects from improvements in cognition to improvements in more socially relevant functioning and the symptom status of patients. Controlled clinical trials of IPT are needed to confirm its clinical utility.

Direct cognitive rehabilitation supports a "cold cognition" perspective of schizophrenic processing, divorcing social cognition from its emotional and interpersonal aspects. The abstract nature of improvements in specific attentional and cognitive tasks may not interrupt the positive feedback loop among cognitive dysfunction, social stress, coping skills, and symptom formation (Brenner et al. 1990). Sufficient treatment of social cognition may require a multimodal intervention, combining methods that incorporate behavioral and interpersonal strategies as well as direct methods specifically targeting information-processing deficits.

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Announcement of Available Resource Funds

The Theodore and Vada Stanley Foundation in collaboration with the National Alliance for the Mentally Ill welcomes applications for its 1992 grant awards program. The purpose of the awards is to support research directly related to the causes of serious mental illnesses (schizophrenia, bipolar disorder, major depression). The grant awards are intended to attract established scientists from other areas of biology and medicine (e.g., biochemistry and neurology) into research on serious mental illnesses, as well as to provide support for innovative research by established scientists already in the field whose funding sources are limited. Grants are for 1 or 2 years and may be up to $50,000 per year. In the first 3 years of the program, 38 researchers have been funded.

Applications must be submitted by April 1. Notification of awards will be presented in June and funding will begin in August. Application forms, which should be requested from the address below, consist of a brief outline of the proposed project, a budget, and a list of current and pending sources of funding. Funds may be used for salaries, supplies, or equipment; but it is the policy of the Stanley Foundation not to pay indirect costs. The grant applications are reviewed by a six-person professional selection committee consisting of Dr. E. Fuller Torrey, Chairperson, and Drs. Julius Axelrod, Charleton D. Gajdusek, Seymour S. Kety, Robert M. Post, and Janice R. Stevens. Requests for applications and questions should be directed to:

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