Best Practice Guidelines for
COGNITIVE REHABILITATION FOR PEOPLE WITH SERIOUS MENTAL ILLNESS

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Theoretical Rationale for Cognitive Rehabilitation

There is little doubt that neurocognitive recovery occurs in people with severe mental illness. At least since the 1970's specific interventions, ranging from practice on laboratory tasks to comprehensive rehabilitation approaches, have shown that specific aspects of performance can improve (Corrigan & Storzbach, 1993; Spaulding, Storms, Goodrich, & Sullivan, 1986; Storzbach & Corrigan, 1996). Much of this improvement may be attributable to recovery from acute psychosis, and this part of the recovery process is increasingly subjected to systematic analysis (Olbrich, Kirsch, Pfeiffer, & Mussgay, 2001; Spaulding, Fleming et al., 1999). However, in many individuals significant cognitive impairment persists after other indications of acute psychosis are resolved. Some of these post-acute impairments respond to psychosocial interventions directed at the neurocognitive level of functioning. As of this writing there are 3 large scale controlled clinical trials (Bell, Bryson, Greig, Corcoran, & Wexler, 2001; Hogarty & Flesher, 1999; Spaulding, Reed, Sullivan, Richardson, & Weiler, 1999) showing that interventions that explicitly target neurocognitive functioning contribute uniquely and importantly to rehabilitation progress. The pressing research question is no longer "whether" but "when" and "for whom."

The term 'cognition' can refer to any and all of the brain's information processing activity, from the most elemental sensory processes to the most complex levels of thought. Cognition thus spans a broad continuum of levels of organization. If it were possible to divide this continuum in half, with the more molecular levels of cognition in one half and the more molar levels in another, the more molecular category would be *neuro*cognition. The prefix *neuro-* is added to indicate a closer, more isomorphic relationship between specific neurological structures and processes and the specific types of cognitive activity they support.[1] For example, the cognitive process of *visual feature detection*, which allows us to perceive the boundaries of objects in our visual field, is a relatively molecular process closely associated with specific neurons in the retina, optic tract and various brain structures. *Manipulation of spatial relations* is a more molar cognitive process, by which we use visual feature information to track and manipulate objects in space. This involves a greater number of neurons distributed more widely across the brain, but it still falls within the neurocognitive continuum. Other processes generally included in the neurocognitive continuum include simple problem solving, memory storage and retrieval, concept formation, organization and execution of behavioral responses, and elemental language processes. These involve widely distributed, but still identifiable, neurological structures and processes. Complex language and problem solving, abstract reasoning, formation of beliefs, attitudes and complex habits, generally fall outside the neurocognitive continuum, and for present purposes are categorized as *social cognition.*

[1] In psychology, isomorphic relationships are generally one-to-one correspondences between the function of a particular brain structure and a particular behavior or type of behavior.

Neurocognitive Impairments in Serious Mental Illness

Abnormalities are found in schizophrenia at all levels of the cognitive system and in all phases in the course of the disorder. Cognitive impairments are thought to play a number of roles in schizophrenia's etiology and expression (Cromwell & Spaulding, 1978; Nuechterlein & Dawson, 1984; Nuechterlein & Asarnow, 1989). Green and Nuechterlein (1999) state that schizophrenia is now seen by many clinicians as essentially neurocognitive in nature due to findings that deficits in such areas as attention and verbal learning have been found to be related to the etiology of the disorder as well as to functional outcome. It is therefore an appealing hypothesis that remediation of such impairments might lead to improvements in personal and social functioning. Many classical treatment approaches in psychiatry have attempted to address cognitive impairments in schizophrenia, but systematic specification of procedures and evaluation of outcome began in the cognitive-behavioral era.

Present day research is gradually overcoming the historical barriers to understanding the discrete nature of neurocognitive impairments in mental illness, but the picture is far from complete. The next few years will probably see substantial progress, and perhaps revision of current organizational schemes. For the time being, however, there is reasonable consensus in the neuropsychological and psychopathological communities about a few relevant principles:

1. Global neurocognitive impairment is ubiquitous in mental illness, but covers the complete range of severity across individuals;
2. Impairments in executive functioning, which include concept manipulation, response planning and organization and working memory, are also ubiquitous, and are somewhat independent of global impairments;
3. Impairments in verbal and nonverbal memory are also common, and somewhat independent of global impairment;
4. Many people with disabling mental illness have individually unique constellations of neurocognitive abnormalities, including various combinations of impairments in executive, memory, sensorimotor, perceptual and other functions.

A Three Factor Model of Neurocognitive Impairment

The episodic and qualitative dimensions of neurocognitive impairment can be integrated into a 3-factor model that is heuristically useful for clinical assessment and rehabilitation planning (Spaulding et al., 1994). It is important to remember that factors are *sources of variance*, and not types or categories. In the present context, a 3-factor model describes ways that individuals are different from each other, *within* the population of people with severe mental illness. An individual may occupy any point along the quantitative dimensions that the factors define.

Pervasive Impairment Factor: The first factor of neurocognitive impairment is *pervasive*, meaning a broad range of specific processes spanning the molar-molecular continuum are affected. In this sense, the first factor is somewhat like the concept of intelligence, in that it reflects a person's overall adaptability and behavioral functioning. Unlike intelligence, however, first factor impairment is not equally distributed across all neurocognitive

processes.[2] Some appear to be more affected than others. Research does not yet allow confident conclusions about what areas are most affected by first factor impairment, but executive processes appear to be especially vulnerable. Impairments in concept formation, planning, complex problem solving and working memory appear to be especially common. This is reflected in neuropsychological test findings, and it is also consistent with neurodevelopmental models of etiology that emphasize malformation of limbic-frontal activation pathways. Executive processes involve many brain areas and mechanisms, but limbic and frontal cortex are especially heavily involved.

The first factor is by definition a treatment refractory factor. Science and technology do not currently provide the means to correct structural problems in brain development. Even deficits in acquired abilities may not be treatable if acquisition is constrained to developmental windows. If an impairment improves, then it is not a first factor impairment. However, first factor impairment can certainly get worse over time, as in the Kraepelinian view of schizophrenia. Whether by accumulation of impairments associated with acute psychosis, or some other progressive neurophysiological factor, some individuals' first factor impairment may worsen over time despite all efforts to prevent it.

Episode-Linked Impairment Factor: The second factor in the 3-factor model is an episodic factor. Baseline neurocognitive impairment worsens, and new impairments appear, during acute psychosis. Thus, an alternative term for second factor impairment is *episode-linked* impairment. Presumably, episode-linked impairments reflect a cascade of events originating with neurophysiological dysregulation. There is considerable individual variation in how neurocognition changes over the course of an episode. High levels of first factor impairment may obscure the second factor, because detection of the second factor requires relatively good test performance at some point in time. There is some evidence that the executive domain is differentially affected by the second factor, at least in individuals with little first factor impairment. As previously discussed, some processes at the molecular end of the neurocognitive spectrum appear to be distinctly invulnerable to acute psychosis.

Post-Acute Recovery Factor: The third factor in the 3-factor model is a post-acute recovery factor. Its existence is supported by the clinical observation that some individuals require more time than others to regain baseline functioning in the wake of a psychotic episode. It is further evidenced in the finding that people sometimes experience slow but significant improvement in personal and social functioning over protracted periods of neurophysiological stability, suggesting this improvement is made possible (at least in part) by improved neurocognitive functioning. The most important evidence for a post-acute recovery factor in neurocognition comes from studies of direct treatment of neurocognitive impairment, using environmental or psychological interventions. A number of interventions, ranging from a highly structured therapeutic

[2] Intelligence is equally distributed by design; i.e. psychometric definitions of intelligence assume that the average level of performance within any particular subdomain is "normal" for that domain. This is arbitrary in a sense, but to the degree that a subdomain of intelligence corresponds to specific neurocognitive processes, it provides a standard by which the relative severity of impairments in neurocognitive processes can be quantitatively characterized.

milieu to training and practice on laboratory tasks, appear to bring about improvements in neurocognitive functioning, especially in the executive domain. Improvement on laboratory tasks can be explained away as the result of ordinary learning, but more generalized changes, or changes in response to a therapeutic milieu, are more feasibly explained as acceleration of a natural recovery process that for some individuals is so slow as to be indiscernible.

Mechanisms of Post-Acute Recovery

At least three mechanisms have been proposed to explain how post-acute recovery could be influenced by environmental manipulations or psychological interventions. The first is a conventional learning process, wherein the affected individual learns "microskills" that help compensate for deficits in other areas. For example, to compensate for deficits in sustained attention and vigilance, a person might learn to take frequent breaks, use self-talk as a cue to pay attention, and avoid situations where attentional deficits are especially detrimental.[3] The second mechanism involves a behavioral response organization process thought to be supported by dopaminergic neuronal subsystems in the limbic system, basal ganglia and primitive frontal cortex. This mechanism monitors the environment and organizes the person's behavioral repertoire to most efficiently meet environmental demands. The mechanism is temporarily disabled in the dopaminergic firestorm of an acute psychotic episode. After the episode is neurophysiologically resolved, experience with the environment over time is required to reorganize the behavioral repertoire. The structure of a therapeutic milieu or a psychological intervention condenses the environmental factors that reorganize the repertoire, and so behavioral functioning shows more rapid improvement. The third explanatory mechanism is neuroendocrine. A loss of the activating effects of the stress hormone cortisol appears to be associated with chronic mental illness. Cortisol acts directly upon cortical neurons to mediate cognitive activity. The predictable routines of a therapeutic milieu may help reestablish cortisol rhythms and enhance cortical activation.

Assessment of Neurocognitve Impairment

The 3-factor model elucidates the important questions to be raised about neurocognition in the context of rehabilitation:

1. Is the person's current functioning and recovery potential limited by second factor neurocognitive impairment, i.e. impairment that would be reduced or eliminated by resolution of a psychotic episode?
2. Is the person's current functioning and recovery potential limited by third factor neurocognitive impairment, i.e. impairment residual to psychosis that would be reduced or eliminated by a structured milieu and/or psychological interventions?
3. Is the person's current functioning and recovery potential limited by first factor neurocognitive impairment, i.e. baseline impairment that will not respond to any

[3] This is arguably not really a model of post-acute recovery, as one could learn compensatory skills any time, not just in the post-acute phase. On the other hand, baseline deficits tend to appear in the wake of acute episodes, so the post-acute phase would be the period in which the preponderance of such learning would take place.

available treatment, and if so what must be done to minimize the impact of the impairment?

Assessment and intervention at the neurocognitive level are organized by these questions.

The rehabilitation team's hypotheses about the acute, post-acute or baseline status of a recovering person's neurocognitive impairments have straightforward implications for intervention. Baseline impairments, being refractory to all known technologies for improvement, require compensatory strategies and environmental prosthetics. The permanence of baseline impairments gives special importance to the particular pattern of the person's neurocognitive strengths and weaknesses, and so they must be articulated in detail. Acute and post-acute impairments demand trials of corrective interventions. Treatment of acute neurocognitive impairment is essentially treatment of acute psychosis. Post-acute impairments can be addressed with combinations of therapeutic milieu and specialized individual- and group-format therapies.

Assessment of Pervasive Impairment

Instruments for comprehensive assessment of intellectual functioning, e.g. the WAIS III, are useful for assessing the severity of first factor impairment. Overall summative test scores such as a WAIS IQ provide useful information about the rate at which a person can acquire new skills, a central concern in rehabilitation. Similarly, a WAIS IQ contributes to formulation of general expectations about the nature of a person's functioning after maximal recovery. The pattern of WAIS subtest scores also provides a picture of the individual's relative strengths and weaknesses. In this particular sense, pervasive baseline neurocognitive impairment, as measured by IQ tests, is comparable to the concept of intelligence. However, IQ's and subtest patterns do not provide sufficient measurement of executive dysfunction and related impairments associated with hypofrontality. Assessment of baseline impairment should therefore routinely include additional instruments to measure frontocortical functioning. There is no generally accepted battery for this purpose, especially for assessment of severe mental illness. New instruments are currently being developed at a rapid pace, so practically any recommendation in this regard may be quickly dated. Generally speaking, however, a reasonably complete battery for assessment of frontal functioning should at least include measures of concept formation and manipulation, working memory, inhibitory functioning and simple problem solving. Neuropsychological instruments often used to assess hypofrontality in mental illness include the Wisconsin Card Sorting Task, verbal fluency tasks (thought to measure inhibitory functions), Trailmaking, Halstead Categories and backward digit span (thought to measure working memory). The next few years will probably see development of instruments and batteries specialized for measuring baseline hypofrontality in severe mental illness.

Indications of additional, discrete neurocognitive impairments in the residual phase may necessitate further assessment. Such indications may include a history of head trauma, significant variability across WAIS subtests and/or measures of hypofrontality, behavior indicative of memory failure, or difficulties in behavioral performance that are not accounted for by low IQ or executive dysfunction. At this point, assessment becomes

indistinguishable from traditional neuropsychological assessment, the primary purpose being to develop a complete profile of the recovering person's neurocognitive strengths and weaknesses. The consulting services of a traditional neuropsychologist should be available to the rehabilitation team, as the assessment of individual constellations of impairments, and their functional implications, requires skills different from those usually required of rehabilitation professionals.

Theoretically, first factor cognitive impairment is not subject to change, so its assessment is not directly relevant to evaluating rehabilitation progress. Nevertheless, progress must be continually interpreted in light of what is known about baseline impairment. A rate of progress slower than that predicted by baseline impairment may indicate that other, undetected factors are creating barriers. A rate of progress faster than that predicted by baseline impairment may indicate that the impairment wasn't really baseline, which in turn suggests that the recovering person was not in a fully stable residual state when assessed. This may mean the person is experiencing undetected fluctuations, possibly undetected psychotic episodes. This would be corroborated by a change in test performance during ostensibly stable periods. Little is known about the prospects for long-term improvement in cognitive functioning in mental illness, so nothing can be taken for granted in this regard. Periodic reassessment of baseline neurocognitive functioning is necessary to prevent mistaking slowly improving impairments for permanent ones.

Assessment of Episode-Linked Impairment

The purpose of second factor assessment, determining the consequences of episode-linked impairment for other aspects of rehabilitation, is essential to efficiency and timely progress. Episode-linked impairment may severely compromise response to an array of rehabilitation modalities, especially those involving acquisition of new skills. It may be a waste of time and resources, and a needless stress on the recovering person, to attempt some rehabilitation activities while episode-linked impairments are active. At the same time, many individuals do not experience severe changes in neurocognition during acute psychosis. Some rehabilitation activities are amenable to modification in order to compensate for neurocognitive impairments, and this may be a better option than postponement for some individuals. The severity and nature of episode-linked impairment must be individually assessed to determine its immediate implications for rehabilitation.

The episode-linked neurocognitive impairments most likely to interfere with rehabilitation interventions are gross disruption of continuous attention and vigilance. The behavioral consequences are readily observable when the impairments are especially severe; people are unable to attend to even simple tasks or function in skill training groups. As resolution of the episode progresses, it may be more difficult to determine how much behavioral performance is being compromised by these impairments. Abatement of extreme agitation and anxiety may make a person appear more able to attend, when in fact attentional impairment continues to be severe. Simple laboratory measures such as the Continuous Performance Task (CPT) provide quantitative measurement of continuous attention and vigilance, and are probably not greatly affected by practice. Repeated use of such measures is thus a useful adjunct to the traditional

means of evaluating resolution of psychosis, such as behavioral observation and structured interviews.

Assessment of Post-Acute Impairment

Little is known about the nature of post-acute neurocognitive impairment. All indications are that it is qualitatively similar to episode-linked impairment, and indeed may be produced by the same etiological processes. Treatments directed at neurocognitive impairment appear to exert their most definitive effects in the executive domain. Therefore, the transition from post-acute to residual is generally characterized by a differential improvement in executive cognition, relative to other domains. The WCST, Halstead Categories and tests of verbal learning have proven sensitive indicators of third factor neurocognitive recovery.

Neurocognitive Interventions

In the first large scale controlled trial of neurocognitive intervention (Spaulding, Reed et al, 1999) it was clear that the intervention produced better progress in social functioning, compared to intensive, comprehensive rehabilitation without the neurocognitive intervention. However, *all* the participants in the study showed substantial improvement in their neurocognitive functioning, whether they received the explicitly neurocognitive treatment or not. In fact, the degree of improvement was substantially greater than the additional improvement added by the neurocognitive intervention. This was unexpected, as previous studies had shown little or no neurocognitive improvement associated with conventional treatment or rehabilitation. The only feasible explanation was that the extraordinarily intensive rehabilitation program produced nonspecific neurocognitive benefits that less intensive programs do not produce. A complete model of neurocognitive treatment effects thus needs to explain the nonspecific benefits of comprehensive rehabilitation, in addition to the specific benefits of explicitly neurocognitive treatment.

Neurocognitive interventions include specific procedures for activating and exercising the executive microskills associated with performance microskills relevant to rehabilitation. The nonspecific treatment effects of the intensive rehabilitation milieu accrue from its demand for and reinforcement of the executive microskills associated with performing activities of routine daily functioning, (e.g. self-care, being at the right place at the right time, responding to other people).

The model of neurocognitive failure and recovery in mental illness described above generates some general principles for constructing a treatment strategy:

1. Recovery of executive and memory functions, which mediates subsequent recovery of personal and social functioning, is enhanced by an environment rich in salient reinforcing events, with clear and consistent relationships between individual behaviors and their environmental antecedents and consequences, and where behavior associated with appropriate attention to routine environmental demands is heavily and differentially reinforced.

2. Recovery of the neurocognitive abilities that support basic social and interpersonal functioning is enhanced by an environment that provides frequent opportunities and support for appropriate social behavior, with consistent and perceptible reinforcement of effective and/or appropriate behavior and minimal inadvertent reinforcement of ineffective or inappropriate behavior. The relatively nonspecific effects of an orderly, consistent, prosocial and contingency-rich environment are further enhanced by specific interventions that explicitly invoke the neurocognitive microskills that underlie performance of social and interpersonal skills.
3. The relatively nonspecific effects of an orderly, consistent, prosocial and contingency-rich environment are further enhanced by specific interventions that explicitly invoke the neurocognitive microskills that underlie performance of social and interpersonal skills.
4. For both specific and nonspecific interventions, the ability to identify specific situations requiring specific microskills, and to allocate resources to perform those microskills, are as important as performance of the microskills themselves. Exercising the ability to recognize various task demands, and to modify one's cognition (i.e. activation of microskills) in response to changing demands, is as important as exercising the ability to perform a particular skill.
5. Although executive and memory functioning mediate subsequent recovery, they are not strict prerequisites. Identifying situational demands, allocating capacity and activating the appropriate microskills are complex cognitive activities, some of which are highly specific to particular situations and skills. As recovery progresses, restoration of advanced executive functions may require intact performance functions. This requires a cyclic rather than linear approach to neurocognitive intervention. Exercise of fundamental microskills should be preceded by exercise in detecting relevant situational demands, but treatment should then address detection of more complex situations and demands, followed by exercise of more complex skill performance, and so on.

Neurocognitive interventions can be understood to be of two types, those that address post-acute impairments and those that address residual impairments. In the sense that residual impairments are by definition not amenable to change, interventions for residual impairments are generally *prosthetic* in nature. That is, they are designed to compensate for the functional disabilities that the neurocognitive impairment produces, rather than change the neurocognitive impairment itself. Interventions for post-acute impairments are designed to facilitate recovery from the neurocognitive disorganization that accompanies acute psychosis.

Interventions for Post-Acute Impairment

Nonspecific intervention for neurocognitive impairment in the later post-acute phase is basically an extension of intervention in the earlier phase. Maximum neurocognitive benefit is expected from comprehensive rehabilitation at the highest intensity the recovering person can comfortably tolerate. Specific interventions enhance the nonspecific benefits of intensive rehabilitation, and should be provided whenever possible. For heuristic purposes, specific neurocognitive interventions can be categorized

as dyadic vs. group in format. The optimal format, or combination of formats, is expected to be jointly determined by the needs and preferences of the individual recipient, and the resources and capabilities of the mental health service system.

All specific interventions for neurocognitive impairment have in common some procedure(s) for isolating hypothetical neurocognitive abilities ("microskills" in the terms of this discussion) and "exercising" those abilities by engaging the recovering person in activities designed to invoke their use.

Dyadic therapy techniques: The literature provides procedural descriptions of specific techniques easily adapted to a dyadic psychotherapy-like format (e.g. Spaulding et al, 1986; Reed, Sullivan, Penn, Stuve, & Spaulding, 1992; Corrigan & Storzbach, 1996; Medalia et al 1998; vanderGaag et al., 1994, Wykes, et al 1999; vanderGaag, 1992). In this approach, exercises are constructed in an ad hoc manner, derived from the results of laboratory testing, direct observation and functional assessment. Progress toward short-term treatment goals is typically assessed with laboratory tasks adapted to measure the specific impairments targeted for treatment. Generalization of treatment effects and progress toward longer-term goals are assessed through measurement of changes in performance of ecologically significant skills and abilities hypothesized to be affected by the targeted cognitive impairments. For example, when performance in a work setting is hypothesized to be compromised by distractibility and deficits in continuous attention, improvement on laboratory measures of attention and vigilance is expected following neurocognitive treatment, followed in turn by improvement on in vivo measures of work performance. Multiple-baseline quasi-experimental designs capable of detecting the separate effects of medication, neurocognitive treatment and other interventions are generally well suited to this purpose.

Individualized neurocognitive treatment is usually provided by including the specific exercises in a broader, dyadic rehabilitation counseling and psychotherapy context. The exercises are accompanied by collaborative formulation of relevant treatment and rehabilitation goals, discussion of the role of the abilities addressed by the exercises in naturalistic settings, assignment and review of "homework" (in vivo applications of the exercises), and review and evaluation of overall rehabilitation progress. For example, "better interactions with people" may be identified as a treatment goal. Functional and laboratory assessment may indicate that the problem derives from social skill deficits, to which distractibility, poor interpersonal problem solving and a rigid, stereotypic way of analyzing complex social situations all contribute (the assessment would also indicate that these do not derive from a transient, acute psychotic state). Exercises demanding focused attention, resistance to distraction, and conceptual flexibility would be included in dyadic sessions, accompanied by interpersonal problem solving and social skills training in group formats. In addition to the neurocognitive exercises, the dyadic sessions include review of performance data in therapy and in vivo situations, discussion of the role of neurocognitive factors in ongoing experiences relevant to social competence and comfort, review of objective measures of social performance, and appraisal of overall progress toward the goal.

In addition to a dyadic psychotherapy-like setting, individualized neurocognitive exercises can be integrated with occupational and recreational therapy, work, and other

rehabilitative activities. The optimal setting varies with individual needs and rehabilitation goals.

Group Formats: At least two comprehensive, systematic approaches to treatment of neurocognitive impairments in schizophrenia have evolved over the past two decades, Integrated Psychological Therapy (IPT; Brenner et al., 1994) and Cognitive Enhancement Therapy (CET; Hogarty & Flesher, 1999a, 1999b). They share the strategy of identifying, isolating and exercising specific cognitive abilities typically impaired in chronic schizophrenia. They use somewhat similar procedures, including a diversity of specific exercises, formatted as group activities, targeting specific abilities. Both combine a primary focus on cognitive *process*es, i.e. emphasis on strengthening information processing, with didactic provision of factual information, the *content* of cognition, pertinent to personal and social functioning. Both are highly manualized, and the IPT manual is commercially available (Brenner et al, 1994). There have been no studies of therapist skills or qualifications required for effective provision of these modalities. However, considerable clinical judgment is required to determine when to persist with a particular exercise, when to provide special assistance to group members, and when to move on. It is probable that considerable experience with neuropsychological assessment, functional assessment and group skill training is necessary.

There is arguably a theoretical difference between the two approaches. IPT was developed from classical ideas in experimental psychopathology that predate contemporary interest in distinctively social cognition. CET also draws heavily from experimental psychopathology and neuropsychology, but in addition is heavily influenced by developmental theories of social cognition. This theoretical difference implies two different types of treatment effect mechanisms. In IPT, treatment effects are thought to accrue in a stepwise fashion. Molecular cognitive processes are exercised first, so that later those strengthened molecular processes can enhance acquisition of more molar abilities. Therefore, the rehabilitation process progresses from process-focused therapy to more conventional social skills and interpersonal problem solving training.

CET is less linear and stepwise. It draws heavily on the theory that a crucial problem in schizophrenia is deficient apprehension of the "gist" of social problems and situations. "Gistful" social cognition is not a gradual compilation of information from more molecular processes, e.g. the gradual synthesis of "the big picture" from informational elements, but a rapid and conceptual apprehension. "The big picture" is inferred from a relatively small amount of information about a situation, when that information correlates with specific social schemata (declarative relationships, social roles, procedural scripts, etc) stored in memory and acquired in the course of development. The CET approach is guided by the hypothesis (among others) that impairment of processes for identifying and using the "gist" of social situations and interactions is a key limiting factor in schizophrenic social performance.

Both IPT and CET have been shown to be effective in enhancing social competence and performance, in controlled outcome studies (Spaulding et al,199b; Hogarty & Flesher, 1999b). So far, there is insufficient data to conclude whether the mechanisms of their respective treatment effects are as different as their respective

theoretical premises. Indeed, the actual procedural differences between the two approaches have yet to be systematically assessed.[4] The subject samples in the two studies were quite different (the IPT participants were severely disabled and involuntarily institutionalized, while the CET participants were less severely disabled voluntary outpatients), and any differences in outcome or treatment effect mechanisms are potentially attributable to that. In addition to sheer severity of impairment, the two samples could have been at different points in the continuum from "acute" to "post-acute" to "residual." Systematic comparative studies of the two approaches, across a range of subpopulations, will be necessary to sort this out.

The original developers of IPT recommend providing this modality separately to recipients with higher and lower overall cognitive functioning. The therapy procedures do not differ, but the rate of progress through the modality is expected to be slower with lower-functioning groups. Comprehensive neuropsychological assessment is not required for group assignment, but a reliable overall evaluation of baseline cognitive and neurocognitive functioning, taking into account episodic psychosis, is necessary. Such assessment capability should be in the repertoire of any program or agency that serves people with severe and disabling psychiatric disorders.

The IPT subprograms proceed as a sequence of structured group activities, each demanding various combinations of cognitive abilities and operations. The therapist introduces each activity, guides the participation of the participants, and evaluates their responses. The therapist is given some flexibility to repeat specific activities when patients have difficulties which further practice may overcome. All the activities are designed to include social interaction between patients, and the therapist selectively facilitates social interaction relevant to completion of an activity. The Cognitive Differentiation subprogram includes activities designed to exercise concept manipulation and related operations. A representative activity is a sorting task that engages the group in alternative strategies for sorting objects of different color, size and shape. The Social Perception subprogram includes activities designed to exercise the processing of social information. A representative activity involves systematic examination and description of pictures of individuals involved in social situations. The Verbal Communication subprogram is designed to exercise the cognitive substrates of verbal interaction, including attention and short term memory. A representative activity engages participants in carefully listening to each others' verbal statements, then repeating verbatim, then paraphrasing. Across all the subprograms, the activities are graduated in complexity and amount of required social interaction.

To manage group dynamics, the therapist follows a set of interaction rules. These include maintaining a friendly but matter-of-fact social atmosphere, never telling patients they are wrong or factually incorrect, but rather eliciting group feedback and discussion, empathetically reflecting emotional expressions when they occur, clarifying participants'verbalizations, and encouraging participation by all group members. Bizarre behavior may be met with a brief reflection of its affective component (e.g. "Mr. Smith, it appears you find this topic distressing"), but is otherwise ignored. Disruptive behavior is met with a request to desist, and if it continues the person is excused from the session.

[4] As noted previously, research on IPT arguably militates for revision of its assumptions about the linear, hierarchical nature of its treatment effects. There may be even less difference between the CET theoretical model and updated version of the IPT model.

When participant populations include individuals who are involuntary recipients of treatment, or who otherwise have difficulty engaging in treatment, a contingency management system may be a necessary adjunct to IPT (Spaulding et al, in press).

Implementation of Treatment and Dosage Considerations: In lieu of reliable tracking measures, neurocognitive intervention must be conducted on the basis of dosages and time frames reported in outcome research. The Spaulding et al (1999) study provided three hours per week of the cognitive subprograms of IPT, for six months. For a severely disabled recipient population, this dosage and time frame should probably be considered the minimum required for a fair trial. A shorter or less intensive trial period may be justifiable for less severely impaired recipients. Regardless of the time and dose of specific interventions, neurocognitive impairment should be considered truly residual only after sufficient exposure to intensive rehabilitation. As with the specific interventions, 6 months is a minimal trial period.

Attentional Training Remediation Methods: Another suggested method of targeting neurocognitive deficits in treatment is to work on the remediation of basic information processing difficulties before beginning traditional skills training in order to remove these obstacles to effective learning (Thompson & Breakey, 1997). According to information-processing theory, more molar cognitive processes, such as planning and problem solving, are dependent on the effective functioning of more molecular functions, such as attention. Therefore, some theorists believe (e.g., Goldberg, 1994) that attentional training is essential in order to facilitate the effective functioning of other cognitive processes. A number of behavioral methods have been employed for increasing attentional functioning as well as reaction time with some success. Monetary contingencies have been found to increase attention span, although these effects have only been found for the stimulus that has been specifically reinforced. For example, if a participant was continually reinforced for paying attention to a computer for fifteen minutes for a number of sessions, he or she would most likely not exhibit the same attention span when engaged in a different task. However, one of the widely regarded theories of cognitive functioning, the limited capacity model, states that reinforcing contingencies that improve attention should also globally expand one's overall capacity for information and generalize to higher level processes that are affected by attention span, including encoding and memory (Storzbach & Corrigan, 1996). A method that was developed to increase the attention spans of brain-injured patients, Attention Process Training (APT; Sohlberg & Mateer, 1987), has been found to be extensively beneficial in a small sample of patients with schizophrenia. This comprehensive treatment addresses all areas of attending, including sustained, selective, alternating, and divided attention in a series of graduated stages of difficulty and complexity. Two participants who were administered these treatments demonstrated improvements in a wide range of areas, including auditory and visual memory and conversation skills (Goldberg, 1994). More extensive, controlled research is needed in order to further demonstrate the efficacy of this method.

Executive Functioning Remediation Methods: Wykes et al. (1999) conducted a study utilizing a treatment procedure aimed at remediation of executive functioning

deficits which is in line with this model. This treatment employs the use of errorless learning, immediate feedback, and non-didactic training using very simple tasks in three domains of executive functioning: cognitive flexibility, memory, and planning. These researchers found that both groups (experimental and control utilizing intensive occupational rehabilitation to control for nonspecific therapist contact effects) achieved some gains in cognitive functioning and symptom levels, although those of the experimental group were superior. The cognitive remediation group also showed improvements in self-esteem, and some generalization of cognitive processes was achieved (Wykes et al., 1999). The fact that the improvements made on the very simple treatment tasks generalized to the different tasks used to measure outcome points to the possibility of remediating impaired cognitive processes rather than simply improving performance on specific tasks through practice and repetition. Heinssen and Victor (1994) also developed a treatment modality to increase participants' *vocational* functioning through cognitive remediation. In this procedure, graduated steps working towards a final task were developed in order to ensure success while enhancing the cognitive processes that would facilitate appropriate task behavior. For example, in order to teach participants how to water plants, an explanation of the task and the skills sequence to be followed is given. Next, a sorting task is implemented, where patients sort plants into wet and dry categories. This type of gradual progression continues until the patients are watering the plants effectively on their own. Environmental manipulations were also used to decrease distractions and compensate for impaired memory and executive functioning. An unusual aspect of this treatment is that cognitive-behavioral therapy methods were utilized in order to address any maladaptive expectations or beliefs that the patients might have in order to avoid the negative impact of these cognitions on performance. This type of treatment was also shown to be very effective in the areas of job interest, work activity and behavioral performance (Heinssen & Victor, 1994).

Prosthetic Interventions to Address Residual Impairments and to Maximize Rehabilitation Effectiveness.

The literature on traumatic brain injury and other neuropathological conditions is rich in strategies for compensating for the neurocognitive consequences of those conditions. Living environments can be designed to compensate for memory impairments by locating key prompts (e.g. written signs) at key locations to support key activities. Individuals can be trained to make special use of personal calendars and date books. All such interventions are potentially useful for people with disabling mental illness, whose residual neurocognitive impairments are primarily in the memory domain.

Prosthetic Methods for Skills Training and General Rehabilitation: Cognitive deficits in schizophrenia have also been found to be related to poorer performance in skills training (Mueser et al., 1991; Kern et al., 1992; Bowen et al., 1993; Corrigan et al., 1994). Specifically, deficits in the areas of verbal learning have been found to be predictive of general knowledge and behavioral skill acquisition, while attention and verbal memory mediate learning of skills (Thompson & Breakey, 1997). One response to this has been

to develop "cognitively sensitive" methods of skills training. This includes orienting the skills trainer or therapist to be alert for attention and short-term memory problems, minimizing distraction in the training setting, employing overlearning and repetition, and carefully pacing the training procedures. Another method that has been posited regarding adapting traditional rehabilitative methods to accommodate cognitive deficits is categorization. It has been found that people with schizophrenia tend to be able to remember verbal and visual information more effectively when it is organized into meaningful categories or when items are placed on a continuum. These types of remediational methods serve as prostheses by which the automaticity of demanding cognitive processes is increased (Storzbach & Corrigan, 1996). Environmental methods have been used effectively for decreasing distractions and for helping to overcome memory impairments. Methods such as clearing unnecessary clutter out of group rooms, using posters to visually present information while teaching, and having patients' schedules, ward rules and other necessary information posted in various places could all enhance functioning and response to treatment. Heinssen (1996) also stated that the effectiveness of rehabilitation can be increased through environmental manipulations that would facilitate patients' attention, concentration and memory. Demands of rehabilitation can be adjusted based on individuals' cognitive deficits so as to avoid cognitive overload, while environmental manipulations would facilitate integration of information and limit distractions. In order to keep arousal levels low, which may be prone to excitation during learning of novel or difficult information, the therapist should keep voice tones calm, low and regular, and should also encourage motivation and effort through ongoing emotional support (Heinssen, 1996).

Shaping Approaches to Attentional Remediation in Skills Training: Regarding the shaping of attending behaviors, Silverstein and colleagues (Silverstein et al., 1998; Silverstein et al., 1999) have tested this method both before initiating typical rehabilitation modalities and during social skills training. In one study, it was found that severely attentionally impaired subjects were able to increase their attention spans from less than five to 45 minutes in a skills training class (Silverstein et al., 1998). It has also been found that shaping procedures to increase attention spans employed during a modular social skills training program, the Basic Conversation Skills Module of the UCLA Social and Independent Skills series (Liberman & Corrigan, 1993), can be effective for increasing the attention spans of participants while they are learning appropriate conversation skills (Silverstein et al., 1999). These shaping procedures could also be used during other types of activities, including work and other skills training modalities, to facilitate improved attention. However, large-scale controlled studies of this type of intervention are needed, as the current information is based only on a few small pilot studies.

Prosthetic Methods for Executive Function Deficits: Specialized neuropsychological interventions have been developed for people with specific impairments in the executive domain. Such impairments are ubiquitous in people with frontal head injury, as caused by hitting the dashboard in a car accident. Because of the predominance of executive impairment in severe mental illness, there has been special interest in these techniques in rehabilitation. An approach to compensating for severe frontal/executive impairment,

specialized for disabling mental illness, has been developed by Velligan and her colleagues (Velligan et al., 2000). The approach uses the distinction between disinhibitory impairment and attentional impairment to design individualized compensatory strategies. For example, severe disinhibitory problems are hypothesized to be instrumental in the problem of wearing inappropriate clothing, often observed in people with severe mental illness. The mechanism for this is hypothesized to be a failure to inhibit dressing behaviors when confronted with a varied wardrobe. A person who can't inhibit dressing behavior puts on whatever clothing they encounter, regardless of what they might have already put on. The solution is to package each day's clothing in a separate unit, so that the person has only to open the package and put on whatever it contains. So far research has suggested that this approach can be useful, for behavioral problems ranging from inappropriate dressing to nonadherence to a medication regimen. However, the research has not systematically separated post-acute from residual neurocognitive impairments, nor compared the results with interventions intended to resolve post-acute impairments. Further research will doubtless clarify the relationship between post-acute and truly residual impairments as they respond to this approach. For the time being, great caution is indicated so that prosthetic solutions such as these are not used where a rehabilitative approach to post-acute impairment would establish more normal behavioral functioning. Fortunately, therapeutic and prosthetic interventions are not inherently incompatible, and can be applied in complementary ways (Goldberg, 1994), as long as the individual's functioning is continually reassessed and adjustments are made in response to functional recovery.

Contingency management: Another traditional modality for severe mental illness, contingency management, also can serve as a prosthetic, as well as therapeutic, intervention. As the immediacy hypothesis indicates, people with neurocognitive impairments that prevent normal functioning in a natural environment can function in a therapeutic milieu where stimulus-response relationships are made more proximal, immediate and concrete. To the degree that those neurocognitive impairments are truly residual, a contingency management intervention may serve to sustain more normal functioning. Although contingency management is usually associated with rehabilitation in relatively restrictive settings, especially institutions, newer approaches are adaptable to more naturalistic settings and circumstances. Under these circumstances, formalized contingencies can be part of a "cognitive exoskeleton" that compensates for an individual's inability to respond to the most distant or abstract circumstances that normally motivate functional behavior (Heinssen, 1996).

Higher Order Cognitive Interventions for Serious Mental Illness

Social problem solving insufficiency is directly addressed by the problem solving approach in CBT (D'Zurilla, 1988). This is one of the oldest and most established of the modern cognitive-behavioral therapy approaches. A number of specific modalities and manuals have been produced over the several decades of its development. Problem solving therapy is usually done in a group format, although it works well in a dyadic format as well. In the widely disseminated skill training modules produced by the UCLA Center for Rehabilitation of Schizophrenia (see Kuehnel, Liberman, Storzbach, & Rose,

1990) the problem solving approach has been thoroughly integrated with behavioral social skills training.

Symptom-linked attribution problems. Delusions that interfere with personal and social functioning, that persist despite resolution of acute psychosis, and that are not resolved by education and skill training in management of one's mental illness, are appropriate targets for specialized sociocognitive interventions. Delusional behavior was often a target of early behavior modification efforts (Liberman, Teigen, Patterson, & Baker, 1973; Nydegger, 1972; Patterson & Teigen, 1973; Wincze, Leitenberg, & Agras, 1972). These met with some success, although it remained unclear whether there was actual sociocognitive recovery or simply a change in overt behavior. The last several years have seen considerable research on use of CBT specially adapted to address delusions and other attribution problems associated with severe mental illness (Alford & Correia, 1994; Alford, Fleece, & Rothblum, 1982; Bentall & Kinderman, 1998; Chadwick, Birchwood, & Trower, 1996; Haddock et al., 1998; Kinderman, 2001; Kingdon & Turkington, 1994; Kingdon & Turkingtron, 1991). These generally involved a combination of psychoeducation, interpersonal support and validation, and disputational interventions. Disputational interventions involve question-and-answer interactions designed to induce the recovering person to consider the factual basis of the delusion, to reflect on other possible explanations of real events involved in the delusion, to test the validity of the delusion by gathering more information, and to examine the consequences of accepting a delusional belief. This approach is generally similar to traditional individual psychotherapy approaches based on the psychodynamic concept of reality testing. In addition, CBT approaches are currently being developed that make use of cognitive dissonance and related concepts from attribution theory, in order to reverse the interpersonal and intrapersonal processes that sustain the delusion. These techniques show promise, but so far there is insufficient data to confidently conclude that sociocognitive interventions contribute uniquely to resolution of problematic delusional beliefs.

In conclusion, sophisticated and well-researched technologies are now available to address cognitive impairments in people with serious mental illness. These interventions are available for a variety of impairments that are associated with different factors of the disorder. Rehabilitation practitioners can utilize these interventions both to directly address impairments as well as to maximize rehabilitation effectiveness. A careful assessment and clinical understanding of the individual, the nature of their disorder and the impairments experienced in the various factors outlined above is crucial to the effectiveness of the interventions and rehabilitation efforts in general.

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Additional Resources

General Information Web Sites:

http://www.psychosocial.com/psr/assessment_treatment.html Journal article about current treatment approaches for Serious Mental Illness.

http://www.iop.kcl.ac.uk/main/Mhealth/CogRemed/ Information about cognitive remediation from the Institute of Psychiatry and the South London and Maudsley NHS Trust.

http://www.ncrrn.org/ Information from the Northeast Cognitive Rehabilitation Research Network

http://www.neuropsychologycentral.com/ General information about neuropsychology

Web Sites with Information about Assessment and Treatment Materials:

http://www.neuropsychworks.com/ Information about computer based cognitive assessment tools.

http://www.npi.ucla.edu/irc/index.html Information from the UCLA Center for Research on Treatment and Rehabilitation of Psychosis. Includes information on obtaining rehabilitation skills training materials.

Several neurocognitive rehabilitation interventions have utilized a computer based component (i.e., Bell et al. 2001). Listed below are some Web sites with commercially available cognitive training rehabilitation computer programs.

http://www.neuroscience.cnter.com/ (includes information about CogRehab software)

http://www.braintrain-online.com/ (includes information about "Captain's Log" software)

For a product list of assistive technologies that includes cognitive training software see the Center for Rehabilitation Technology Web site. The link below connects to their training archives page which includes a downloadable Adobe pdf product list under the September 13 2000 "Cognitive Disabilities in the Workplace" training session. http://www.techconnections.org/training/Archives.html

Books:

Brenner, H., Roder, V., Hodel, B., Kienzle, N., Reed, D., & Liberman, R. (1994). Integrated psychological therapy for schizophrenic patients. Toronto: Hogrefe & Huber.

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Assessment/ Monitoring Tools:

Controlled Oral Word Association Test (COWA): Benton, A.L., & Hamsher, K. (1976). Multilingual Aphasia Examination. Iowa City: University of Iowa.

Booklet Category Test- Psychological Assessment Resources, Inc.

Devis Kaplan Executive Function System (D-K EFS)- The Psychological Corporation, A Harcourt Assessment Company

Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)- The Psychological Corporation, Harcourt Brace & Co.

Wechsler Adult Intelligence Scale- 3 (WAIS-III)- The Psychological Corporation, Harcourt Brace & Co.

Wechsler Memory Scale- 3 (WMS-III)- The Psychological Corporation, Harcourt Brace & Co.

Wisconsin Card Sort Test (WCST)- Psychological Assessment Resources, Inc.

The above instruments can be used in combination as a comprehensive battery to assess cognitive functioning, with the primary emphases being in the areas of verbal memory and executive functioning, both of which appear to be the most pertinent to severe mental illness.