Tutorial: Cognitive Intervention/Rehabilitation

(See Tutorials on <u>Cognition</u>; <u>Transfer/Generalization</u>; <u>Instructional Routines</u>; <u>Attention</u>; <u>Memory and Memory Problems</u>; <u>Organization</u>; <u>Problem Solving</u>; <u>Concrete versus Abstract Thinking</u>; <u>Cognitive and Learning Strategies</u>)

<u>WHAT IS COGNITIVE INTERVENTION/REHABILITATION?</u>

In the most basic sense, cognitive intervention or rehabilitation includes every procedure that can help people with cognitive impairments to successfully engage in activities that are rendered difficult by those impairments. In this broad sense, cognitive intervention/rehabilitation is a wide-ranging and important field, and includes all of the intervention and support procedures discussed in many of the Tutorials on this web site, including Attention, Memory and Memory Problems, Retrieval, Organization, Problem Solving, Concrete Versus Abstract Thinking, Instructional Routines, Executive Function/Self-Regulatory Routines, Transfer of Training, Cognitive and Learning Strategies, and others.

In schools, cognitive intervention may be implemented in ways that are not referred to explicitly as cognitive intervention. For example, comprehensive programs of classroom-based strategy instruction to improve reading comprehension or written composition can be considered cognitive intervention and, if implemented effectively, can have a powerful and positive effect on the student's development of cognitive and meta-cognitive abilities. In addition, special educators and therapists (e.g., speech-language pathologists, occupational therapists) often engage students in exercises and activities that would be classified as "cognitive rehabilitation" if implemented in a medical setting. These activities may or may not be helpful, depending on the evidence base of the activities, the skill of the therapist, and the extent to which therapy exercises are effectively integrated with classroom activities for transfer. Transfer of training (generalization) from training setting to application setting must always be highlighted as the most critical aspect of intervention if implemented outside of the context of everyday academic or social routines.

Many professionals use the terms "cognitive rehabilitation" and "cognitive (re)training" in a narrow sense to refer to cognitive exercises and activities designed to restore or strengthen underlying cognitive functions. Currently cognitive rehabilitation in this narrow sense is quite controversial. For example, there is no support for the use of "memory exercises" to improve memory functioning across domains of content or "reasoning exercises" to improve reasoning across domains of content. In general and special education, there is virtually no support for "critical thinking exercises" if delivered outside of the context of specific domains of academic content. In contrast, there is evidence to suggest that such exercises may have limited translation to functional improvement There is limited support for the use of attention exercises to improve attentional functioning across domains of content, particularly if those exercises are accompanied by efforts to help the students understand their difficulty in this area and acquire strategies to compensate for the difficulty.

In 2002 a joint committee of the American Psychological Association and the American Speech, Language and Hearing Association distinguished between two interestingly different paradigms, or ways of understanding cognitive rehabilitation: "Traditional Cognitive Retraining" and "Context-Sensitive Cognitive Intervention and Support". These two approaches were defined in terms of their understanding of the focus and goals of cognitive rehabilitation, relevant assessment procedures, treatment modalities and methods, organization of treatment, and setting, content, and providers of treatment. While many professionals combine aspects of these two approaches, it helps to understand the controversies in the field by contrasting the two approaches.

Focus and Goals

Traditional Cognitive Retraining: The focus of intervention is on the underlying neuropsychological impairment, with the goal of restoring cognitive functions (e.g., attention, organization, memory, reasoning, problem solving). In this approach, residual cognitive skills are often utilized to assist weakened abilities. Increasingly the focus of treatment has come to include the use of compensatory strategies to augment restorative interventions and maximize intervention techniques across areas of functioning for the

individual. Cognitive remediation is often done outside of the functional contexts or environments of the individual (e.g., in a hospital or clinical setting).

Context-Sensitive Cognitive Intervention and Support: The focus of this approach is translating the underlying neuropsychological impairments into their negative impact on the person's functional activities in everyday life, and/or the individual's participation in chosen life activities (e.g., school). Needed environmental adaptations and supports to make that participation possible and successful are of primary importance, along with compensatory strategies that might be of use to the student. The primary goal is to help individuals achieve their real-world objectives and participate in their chosen real-world activities that may be blocked by cognitive impairments. In contrast to traditional cognitive remediation approaches, this intervention is typically embedded within the person's natural environments (e.g., in the home or classroom setting).

Assessment

Traditional Cognitive Retraining: Both diagnosis and treatment planning are based on standardized neuropsychological tests, possibly combined with customized laboratory tasks. Testing identifies both cognitive strengths and weaknesses, upon which interventions are based. Outcome tends to be measured by similar tests at a later point in treatment. More recently practitioners working within the traditional framework have begun to add measures of changes in functioning in real-world activities to their test batteries. Recommendations are made to improve performance across other areas of functioning

Context-Sensitive Cognitive Intervention and Support: Assessment takes place across three levels of functioning:

Impairment: Standardized neuropsychological measures are used, with possible expansion of tasks to isolate the underlying processes that are affected in poor performance.

Everyday Activities: Assessment includes systematic behavioral observations of everyday activities (static assessment) and exploration of variables that affect functional performance of everyday activities (dynamic assessment).

Participation and Context: Surveys and reports of real-world participation may be used (static assessment) along with exploration of context variables that affect functional participation (dynamic assessment). The latter includes systematic behavioral observations of the competencies of those individuals providing the student with everyday supports (e.g., classroom assistants) as well as systematic attempts to improve those competencies.

Treatment Modalities and Methods

Traditional Cognitive Retraining: Retraining relies largely on focused cognitive exercises designed to restore impaired cognitive processes or skills. These restorative exercises may be combined with the use of compensatory cognitive strategies to bypass deficits and augment cognitive functioning in daily activities. Family members or others may be involved in treatment to help generalize and practice techniques learned in remediation to the home and community setting.

Context-Sensitive Cognitive Intervention and Support: Intervention and support includes flexible combination of cognitive exercises (if indicated and supported by evidence), task-specific training of relevant everyday skills, and intervention for strategic thinking and compensatory behavior in functional contexts. A critical intervention modality in this approach is environmental modifications, including changes in the support behaviors of relevant people in the individual's natural environments (e.g., in home or school).

Organization of Treatment

Traditional Cognitive Retraining: Cognitive exercises are normally ordered hierarchically in three respects:
Sequence 1: Exercises for basic components of cognitive functioning are mastered before more complex components of the same task are introduced.
Sequence 2: Mastery of skills in acquisition tasks is facilitated before generalization tasks are introduced.
Sequence 3: Reduction of underlying cognitive impairments is addressed using impairment-oriented exercises first, with gradual generalization of skills to everyday activities using compensatory strategies if necessary.

Context-Sensitive Cognitive Intervention and Support:
Sequence 1: Improvement in areas affected by cognitive impairments need not be approached hierarchically.
Sequence 2: Generalization is promoted from the outset by practicing skills in functional tasks.
Sequence 3: The traditional progression is possibly reversed, with real-world participation first facilitated with environmental supports. Next everyday activities are improved with practice and possibly with compensatory behaviors and equipment, and finally underlying cognitive functions improve with internalization of well rehearsed strategies and behaviors.

Setting, Content, and Providers

Traditional Cognitive Retraining: Treatment is typically offered in clinical rehabilitation settings using specialized equipment, materials, and tasks (e.g., specialized cognitive retraining computer software) focused on specific cognitive domains, with a gradual shift to more contextually appropriate materials in the person's life; cognitive retraining specialists (e.g., psychologists, occupational therapists, speech-language pathologists) generally deliver the service.

Context-Sensitive Cognitive Intervention and Support: Interventions may be offered initially in a clinical setting using personally relevant content (e.g., academic materials and tasks). The service is then delivered in personally relevant settings (e.g., classrooms) with personally relevant content. The service may be designed and monitored by a cognitive rehabilitation specialist who then trains and recruits the support of everyday people (e.g., parents, teachers, educators, teaching assistants).

WHY IS COGNITIVE INTERVENTION/REHABILITATION IMPORTANT FOR MANY STUDENTS WITH TBI?

For many individuals, it is during the school years that the greatest demands are placed on cognitive functioning. Students need to pay attention effectively, organize information for thorough comprehension and effective expression (e.g., reading books, writing essays), remember the information and retrieve it for tests, reason effectively, and apply strategic thinking to the many academic problems that arise in school. Thus effective strategies to enhance cognitive functioning within academic settings are critical for all students.

Unfortunately, cognitive impairments are among the most common long-term challenges after TBI in children of all ages. Virtually any cognitive function or combination of cognitive functions can be negatively affected by the injury. However, because certain parts of the brain are more vulnerable than others, there are common profiles of cognitive impairment. Vulnerable parts of the brain include the frontal lobes (especially prefrontal areas), the limbic system (especially the hippocampus associated with memory and learning), and interconnections between the frontal lobes and limbic system structures.

Damage to the frontal lobes can impair control of attention, even in students who appear to be quite alert. Attention span may be short, distractibility may be severe, and shifting and dividing of attention may be difficult. **(See Tutorial on Attention.)** Controlled memory/learning and retrieval of information may also be difficult. Thus, studying (i.e., trying to put information into memory) may be inefficient and deliberate retrieval (e.g., searching memory during a test) may be weak. **(See Tutorials on Memory; Retrieval.)**

Organizing information and events may also be difficult. This includes relating pieces of information for purposes of deeper comprehension, paying attention to the most important parts of a story or text book, and effectively planning and organizing information when reciting in class or writing essays and stories – and then being flexible with these plans. **(See Tutorial on Organization)**

Damage to the frontal lobes also reduces the effectiveness of problem solving and strategic studying and learning. Thus students whose cognitive processes may be weak also have specific difficulty compensating effectively for that weakness. This deficit requires intensive efforts to teach compensatory strategies so that the student can succeed at school. **(See Tutorial on Cognitive and Learning Strategies.)** Students with frontal lobe injury may also be impulsive, so they do the first thing that comes to mind, which may not be strategic. They may also think and say or write the first thought that comes to mind and therefore make many errors in their school work. The student's impulsiveness may also block her from checking her work (self-monitoring) and making necessary adjustments in response to errors. **(See Tutorials on Impulsiveness/Disinhibition; Self-Monitoring)**

Damage to vulnerable parts of the limbic system – especially the hippocampus – impairs those processes involved in *declarative memory* (i.e., remembering that such and such is the case) and *episodic memory* (i.e., remembering events in ones life). In contrast, procedural memory (i.e., remembering/learning how to do something), routine learning (e.g., developing habits of thought or action), and implicit memory (i.e., certain memories "stick", but the student has no awareness of the memory) may be well preserved even if the hippocampus is damaged. **(See Tutorials on Memory; Retrieval; Explicit and Implicit Memory; Errorless Learning)**

Finally, damage to the frontal lobes may not be evident shortly after injury for the child who is young at the time of onset. For many children injured early in life, these frontal lobe problems begin to emerge later in childhood or during adolescence at a time when these skills are expected to be established.

WHAT ARE THE MAIN THEMES IN COGNITIVE INTERVENTION/ REHABILITATION AND SUPPORT?

Please see the following tutorials for guidance in helping students with specific cognitive impairments:

- Tutorial on Attention
- Tutorial on Memory and Memory Problems
- Tutorial on Retrieval
- Tutorial on Organization
- Tutorial on Advance Organizers
- Tutorial on Problem Solving
- Tutorial on Concrete versus Abstract Thinking
- Tutorial on Cognitive and Learning Strategies
- Tutorial on Errorless Learning
- Tutorial on Instructional Routines
- Tutorial on Learning Trials
- Tutorial on Slow Processing
- Tutorial on Transfer
- Tutorial on Reading Comprehension
- Tutorial on Written Composition
- Tutorial on Self-Regulation Routines

General Comments about Cognitive Rehabilitation/Intervention

Scope of the Service

Teachers and therapists need to remember that helping students with impaired cognition can take the form of (1) making environmental and instructional accommodations, (2) teaching compensatory strategies, and (3) training specific cognitive functions.

1. Environmental and Instructional Accommodations: Each of the cognitive tutorials lists environmental and instructional compensations and accommodations. For many students, this is the most critical aspect of cognitive intervention. As with all support-oriented interventions, the environmental and instructional supports must be systematically withdrawn as the student gains competence.

2. Teaching Students Strategies to Compensate for Cognitive Impairments: The cognitive tutorials also highlight strategies that students can learn in an effort to compensate for their ongoing cognitive difficulties. Strategies in this domain should be considered as complements to and must be coordinated with more general classroom-based programs of strategy instruction (e.g., reading comprehension strategies), which are considered a standard of practice in fields like educational psychology and special education. **(See Tutorials on <u>Cognitive and Learning Strategies</u>; <u>Reading Comprehension</u>; <u>Written Composition</u>)**

3. Activities and Exercises to Improve Cognitive Functioning: The cognitive tutorials also address cognitive training exercises. Cognitive exercises should never be implemented without a plan for generalization to functional classroom tasks and activities.

Consultation from a Specialist in Cognitive Rehabilitation/Intervention

If a program of cognitive rehabilitation/intervention is initiated in the schools, it is important to seek guidance from an experienced specialist in cognitive rehabilitation. Experts able to interpret neurosurgical and neuropsychological assessment findings are often a useful starting point for creating an effective comprehensive program of cognitive intervention. School psychologists are typically not trained in neurocognitive assessment or in interpreting neuropsychological reports in a way that translates them into effective school programs of instruction and intervention.

Transfer of Training

Research has conclusively demonstrated that improvements on cognitive training exercises (e.g., practicing memory, organization, or problem-solving strategies) are unlikely to transfer to meaningful classroom settings and activities without well designed efforts to affect that transfer. For example, engaging students in organizational exercises in a therapy session (e.g., categorizing or sequencing exercises) will not transfer automatically to classroom reading, writing, or content area application where cognitive organization makes a difference. Therefore, if cognitive exercises of any sort are to be part of a therapy or special education program, they must be actively integrated with functional classroom application plans.

Strategy Instruction

Helping students acquire learning and other cognitive and academic strategies, from early elementary school through high school, has become a standard of practice and one of the most strongly evidence-based practices in the field of education. **(See tutorials on <u>Cognitive and Learning Strategies</u>; <u>Reading Comprehension</u>; <u>Written Composition</u>.)** Strategy instruction is known to improve performance on academic outcome measures for students with and without disability. When properly implemented, strategy intervention can also boost the cognitive functioning of students with a variety of learning profiles. Three critical themes have emerged from the strategy intervention literature: (1) Strategy instruction needs to be embedded within the educational curriculum (versus an exclusively therapy-based intervention); (2)

Strategy instruction needs to be explicit and intensive; (3) Strategy instruction needs to be long-term. In addition, teaching strategies is importantly complemented by explicit instruction in self-regulatory self-talk, including self-assessment, goal setting, self-instructing, self-monitoring, self-evaluating, and self-reinforcing. **(See Tutorial on <u>Self-Regulation Routines</u>)**

Cognitive Training Exercises

Cognitive training exercises (e.g., exercises designed to strengthen remembering, organizing, problem solving, and the like) continue to be popular in many special education and therapy settings. Unfortunately, studies of both adults with TBI and children with a variety of cognitive and learning disabilities have repeatedly shown that most cognitive exercises (e.g., repeated trials of remembering random information with no strategy component) are ineffective and should be avoided. In some cases it may be useful to introduce cognitive activities for purposes of helping students understand their own cognitive processes and what they can do strategically to be more effective (e.g., learning to use special procedures to focus attention or to memorize more effectively). To deal with transfer of training problems, classroom-based activities and materials are likely to be the most useful context for facilitating meta-cognitive awareness and for practicing strategies.

In some cases, attempts to train cognitive processes are inefficient or ineffective because the cognitive process is itself embedded in specific information content. For example, being able to categorize and sequence events is dependent on knowledge of the events in question, not on a "faculty of the mind" that is independent of content and therefore able to be "strengthened" with exercises. Therefore students who have difficulty sequencing or categorizing events need instruction in those relevant domains of content, not exercises in categorizing and sequencing. For example, a student who has difficulty sequencing the events of the American revolution needs instruction in American history, not sequencing exercises. Similarly "critical thinking" is known to be dependent on the domain of content in which the thinking is taking place. Therefore, critical thinking should be facilitated within specific academic domains (e.g., math, science, history) and across the entire curriculum.