Integrative approaches to Cognitive Rehabilitation in TBI: Evidence from RCT

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This seminar will begin with a discussion on brain reorganization after TBI and will proceed to present an integrative theoretical model of cognition and rehabilitation. The presentation will conclude with research data (including a RCT) supporting the use of systematic categorization training in patients with moderate to severe TBI.

Introduction

Moderate to severe TBI can produce cognitive deficits preventing a survivor’s return to pre-injury vocational, educational, and social activities. Consequently, cognitive retraining is typically an important component of comprehensive rehabilitation following TBI.

Constantinidou, Thomas, and Best (2004) discussed contemporary theoretical models of cognition and identified categorization as one of the most fundamental cognitive processes, crucial to other cognitive skills, and, hence, could influence cognitive rehabilitation outcomes. Deficits in categorization could interfere with the successful execution of activities of daily living because categorization skills are integral to memory and learning of new information, and are essential processes for decision making and successful problem solving. Given the fundamental importance of categorization to all of intelligent behavior it is surprising to observe the scarcity of investigation specific to the rehabilitation of classification behavior after TBI. This is in contrast to other domains such as attention and memory for which a substantial body of work can be found.

This seminar will present data from two research studies designed to fill some of the gaps in knowledge and provide support for the use of categorization training in brain injury rehabilitation.

The presentation will begin with a discussion on how the brain reorganizes after TBI. It will proceed to present an integrative model of human cognition, including human organization and categorization principles. It will then provide evidence to demonstrate that: 1. Systematic categorization training, the Categorization Program (CP) is an effective method to improve categorization abilities in patients with moderate-severe TBI. 2. Post-acute rehabilitation is beneficial to patients with moderate to severe TBI as evidenced by improved functional outcome and neuropsychological performance.
Treatment evidence will be drawn from two published studies in our lab on categorization training: 1. Constantinidou, Thomas, Scharp, Laske, Hammerly, and Guitonde (2005), and 2. Constantinidou, Thomas, and Robinson (2008).

Research Hypotheses

1. Post acute rehabilitation will result in improved functional performance in TBI.
2. Patients receiving the CP training will improve categorization abilities to a greater degree than TBI controls.
3. Patients receiving the CP training will demonstrate generalizability of new skills to new tasks as compared to TBI controls.

Methods

The studies included experimental TBI groups that received the CP training, normal participants who received the CP training, and TBI subjects in the control group did not receive the CP training. TBI controls received cognitive tasks traditionally used in their facility. Subjects were monitored in order to receive similar amounts of cognitive treatment. Subjects received about 12 weeks of post-acute rehabilitation. Ss were assessed before rehabilitation and at the end of their treatment.

All participants received extensive neuropsychological testing before and after their treatment assessing executive abilities (Wisconsin Card Sorting Task, Trails A & B, Woodcock Johnson-III subscales), working memory (WMS-III subscales, California Verbal Learning Test), verbal fluency (COWAT), speed of processing (SDMT, Woodcock Johnson-III subscales, SCATBI subscales), and language abilities (BNT and WJ-III subscales). In addition, functional outcome measures (MPAI-3 and CIQ) were included in the pre-post assessment and categorization tasks (CP Tests 1 & 2). Probe tasks, designed to test the ability to generalize skills into new tasks were also used as dependent measures.

Results

MANOVA yielded significant gains on both functional outcome measures. Specifically total post CIQ score improved for both groups (p = .0001). Pairwise t-tests showed significant changes on the 3 subscales for the experimental group. TBI controls only improved in Productivity subscale. MANOVA on the MPAI-3 resulted in significant improvement for both groups on all subscales. Experimental ss performed significant better on the categorization tests, CP 1 and CP 2 at the end of the study (p=.017, & p=.011). Also, TBI experimental ss improved across the 3 probe tasks (p=.006). Control Ss didn’t show improvement on the probe tasks indicating difficulty in generalizing (p=.888).
In addition to categorization and functional outcome measures, participants improved on neuropsychological measures. All participants demonstrated improvement, but participants who received the CP demonstrated improvement on 12 neuropsychological tasks as compared to the participants in the control group who improved on only 6 measures.

Conclusions

All subjects enrolled in post acute rehabilitation demonstrated improvement in functional performance. However, those who received the CP training demonstrated greater improvement on categorization skills and on certain aspects of functional cognitive abilities and neuropsychological performance. Performance of experimental ss approximated the baseline performance of normal ss on some tasks. These findings support the use of systematic categorization training in post acute rehabilitation. The seminar will conclude with implications for rehabilitation.

References