

Skill Acquisition and Automatic Process Development after Brain Injury: A Holistic Habit Retraining (HHR) model for Community Reentry.

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I. INTRODUCTION

Persistent cognitive, emotional and behavioral dysfunction following brain injury present formidable challenges in the area of brain injury rehabilitation. This article reviews a model of community based neurorehabilitation, along with illustrative methodology, that conceptualizes brain injury sequelae in terms of disruption of previously established habits that are hierarchical, interdependent and underlie all efficient, adaptive living skills. In this paper, a Holistic Habit Retraining (HHR) model and methodology of neurorehabilitation (Martelli, 2003; 2003) is elucidated which issues from:

1. The "automatic learning" and "errorless learning" literature and recent supportive evidence of skills relearning after brain injury;
2. A task analytic examination of acquisition of relevant habits as a model for building skills retraining protocols;
3. Analysis of organic, reactive, developmental, and characterologic obstacles to, and facilitators of, strategy utilization; and
4. A strategy for promoting rehabilitative strategy use adapted to acute neurologic losses, an individual's inherent reinforcement preferences and coping style, and reliant on naturalistic reinforcers which highlight relationships to functional goals, utilize social networks, and employ a simple and appealing cognitive attitudinal system and set of procedures.

Holistic Habit Retraining (HHR: Martelli, 1999; 2002; 2003) offers a model and methodology for continuing community based neurorehabilitation that integrates psychotherapeutic strategies as necessary rehabilitation process ingredients. As such, HHR reduces the complexity of both doing

psychotherapy with persons with acquired neurologic disorders and identifying and facilitating accomplishment of meaningful individual goals through optimal learning procedures. HHR does this by simplifying and integrating the processes and methods of interdependent goal accomplishment in psychotherapy & rehabilitation. The HHR Model of Rehabilitation presents practical, utilitarian strategies for retraining adaptive cognitive, emotional, behavioral and social skills, as well as strategies for overcoming common obstacles to utilizing methods that promote effective habit acquisition.

II. Rehabilitation and the Holistic Habit Retraining (HHR) Model: Rehabilitation is Relearning.

Rehabilitation is the Systematic Process of Removing Obstacles to Independence & Accessing Opportunities for Achievements of Desired Goals in the areas of Love, Work & Play! ...The Purpose of Rehabilitation is to Change Destiny!
M.F. Martelli, PhD & Obstacle Busters Cope Group, 1994

The understanding of brain function may not be complete, but we do know that the ability to learn and store information and execute tasks related to that learning is dependent on intact brain cells. Damage to brain cells that occurs in acquired brain injury (ABI) can diminish or delete the stored knowledge and habits that sustain important human abilities.

Fortunately, even though damage to brain cells can erase the stored knowledge and habits associated with them, the ability to re-learn is seldom destroyed. Importantly, human beings are equipped with a highly evolved brain that makes them the greatest learning organisms ever to roam the earth. While animals are controlled by instincts, human behavior is driven by complex learning and the establishing of a network of complex habits. From the time of birth, human behavior is predominantly shaped by learning. Everyday functioning becomes increasingly sophisticated through the construction of a complex sequence of hierarchically arranged habits with more complex habits built on top of more basic

habits. The complex behaviors that make up the average persons everyday behaviors are performed efficiently and automatically because of the establishment of a hierarchy of habits acquired through incremental learning. The important role of habits was recognized by William James, the father of American Psychology, who referred to them as the flywheel of society (James, 1890).

The capacity of the human brain to convert repeatedly performed behaviors into habits is the mechanism of neural plasticity which allows the learning of complex behaviors that can be performed automatically. This ability of the human brain to manufacture habits and produce it's own learned instincts enables man to perform tasks automatically while concentration, energy and effort are freed up for other tasks. At the same time, damage to neural tissue can weaken or erase some of the most basic acquired habits of adaptive living. Everyday abilities and routines can be seriously disrupted while efficiency is lost. What was once automatic can require an enormous amount of effort, as if the tasks were being performed for the first time, before efficient ways of performing the components of daily activities were learned. Fortunately, even if very basic and important learned habits are erased, newly learned habits can be developed as replacements.

Importantly, we know the primary requirements for both learning and relearning. Our emotional state, our attitudes and our expectancies constitute some of the most important variables relating to how much can be relearned, and how well habits can be replaced (e.g., Wood, 2004; Martelli, in preparation). Emotions and attitudes can either promote and guide re-establishment of new habits, or prevent their development. If we think or expect that we can not learn, if we think only the old learning/ way of knowing how to do things are sufficient, or if we think that only children can or should learn, we will undermine relearning. Such attitudes

contaminate relearning and are poisonous to rehabilitation.

In the HHR model, the essential ingredients for relearning and rehabilitation can be roughly summarized in three basic components, the 3 P's, or the Plan, Practice and Promoting attitude:

✓ The Plan component is a prescriptive strategy or design for stepwise progress toward relearning a desired task or behavioral sequence. Plans are derived from thorough functional task analyses. Functional task analyses are the most relied upon building block of relearning and involve breaking seemingly complex tasks down into simple component steps, and demarking them on a checklist that can be followed in a list wise fashion. Clearly, the more specific, concrete, and conspicuous the prescription for successful task completion, the more likely the plan can be effectively utilized.

✓ The Practice, or repetition component, involves repeated and consistent trials of practice, conducted over many weeks to months. It is the cement for learning that makes complex, challenging and cumbersome or boring tasks more automatic and effortless. This is the habit manufacturing process stage. With practice and repetition, even complex tasks become automatic and habitual. That is, a habit, or our automatic robots, can perform many tasks for us without special effort, energy, concentration, memory, or other cognitive demands.

✓ The Promoting attitude (or facilitative attitude) component fuels the prerequisite mobilization and persistence of energy for sustaining the repeated practice necessary for establishing reliable skills learning. Sustaining motivated practice over numerous repetitions, sometimes very many, and over a progressive series of challenging sequences, is required to achieve automaticity in performance of adaptive task sequences and behavioral habits. The promotional attitude facilitates and shapes continued practice, incremental (baby step) expectancies and self-reinforcement for incremental gains. It

fosters resistance to such adaptive attitude challenges as significant anger, frustration, depression, fear, pessimism, feelings of victimization, self pity and, importantly, the kind of low grade chronic despair that is frequently left over from the early post-injury experience of being confronted by overwhelming deficits.

Perhaps the greatest obstacle to learning or relearning is the redirection of energy away from sustained goal directed activity and toward debilitating activity. Some of the most potent relearning or rehabilitation debilitating attitudes, or poisons, are depression, anger and resentment, feelings of victimization, fear, and inertia. These are the obstacles that not only redirect energy away from relearning, but inhibit it. They reflect the catastrophic emotional reactions following brain injuries that represent significant internal obstacles that must be removed as barriers before the very challenging process of relearning can be optimally achieved (Miller, 1998, 2000; Martelli, 2003).

II. The Catastrophic Reaction

Central postulations in the HHR model are that significant emotional reactions typically follow neurologic injuries, that these reactions often exert persistent negative influence, and that they require treatment to optimize rehabilitation. Early after injury, the discovery of traumatic loss of loss of abilities and accustomed aspects of the self can be overwhelmingly devastating to the affected individual. The sudden loss of function in a limb, the inability to stand or the inability to control one's bowels or express a need through speech or understand another persons words can produce a powerful reaction characterized by incredible despair and distress. This response has been observed after left hemisphere stroke, other strokes, brain injury and other neurologic insults and was labeled the "catastrophic reaction" by Kurt Goldstein (1939, 1995). The acute despair that is initially experienced usually becomes less acutely

manifested over time, although much of it can remain just below the surface. For example, it can be expressed in significantly reduced frustration tolerance (Prigatano, 1987) and aggravated by fatigue and metabolic changes (Sbordone, 1990).

The catastrophic reaction described by Goldstein was best captured in the extreme catastrophic emotion he observed in patients after left- hemisphere lesions. When faced with unsolvable tasks, states of ordered behavior decompensate into catastrophic reactions showing all the characteristics of acute anxiety. He viewed this as the person struggling to cope with the challenges of the environment and his/her own changed body. Goldstein argued that the person could not be divided into "organs" or "mind" & "body", and defined disease as a changed state of adaptation with the environment versus tissue damage. This early biopsychosocial conceptualization posited that "healing" came from adaptation to conditions causing the new state of person-environment interaction, and not through "repair".

As previously noted, passage of time is accompanied by decreased acuity of the catastrophic reaction. Although "adaptation" may explain decreased salience of catastrophic reactions, observations of patients over long periods of time suggests that less visible catastrophic emotional reactions can continue to operate on persons long after injury and even interminably. The catastrophic reaction can be frequently maintained or recapitulated through the continued confrontation of injury related deficits and requirement for chronic compensatory efforts (e.g., Hopewell, 2001; Prigatano, 1997; Prigatano, 1999; Martelli, 2003).

Clearly, continued confrontation of residual deficits and the chronic compensatory efforts that follow injuries, even though less overtly expressed, can create the kind of anxiety, frustration and resignation that converts progress inspiring hope and energetic efforts to

feelings of powerlessness, helplessness and being overwhelmed by the challenge of coping. In the HHR model, the remnants of early catastrophic reactions are seen as frequently underlying the negative, energy consuming emotions that deplete the precious energy, hope and persistent goal directed effort necessary for successful goal achievements.

The most critical tenet of the habit retraining model is the postulation that persistent catastrophic emotional reaction is a frequent but often subtle impediment to adaptation that must be resolved in order to optimize rehabilitation. Further, considerable observational data and as yet unpublished case reports collected by the authors, along with emerging research reports in related areas (e.g., Taub, Uswatte & Morris, 2003; Taub, Crago & Uswatte, 1998; Sbordone, 1990) indicate that the gains that can follow resolution of the catastrophic reaction, when combined with the most facilitative retraining, can be impressive improvements in functional status and adaptation even many years after injury.

The conceptualization of many mental health and rehabilitation syndromes as reflecting problems in adaptation and coping with injury is certainly not new. Miller (1998; 2000) has nicely summarized the empirical and theoretical work in the area of post traumatic accidents that produce long-term demoralizing disability and conceptualized the group of traumatic disability syndromes as “neurosensitization syndromes”. Disorders such as persistent postconcussion syndrome, chronic pain, posttraumatic stress disorder, depression, and others, share common pathophysiological mechanisms and are hypothesized to develop as the result of progressively enhanced sensitivity or reactivity of central nervous system (CNS) mechanisms causing persistent CNS changes. These syndromes are frequently comorbid and can create vicious cycles of impairment and reduced quality of life. A primary mechanism in the perpetuation of disability in these disorders is an avoidance of

stimuli that evoke anxiety and emotional distress.

The idea that persistent emotional distress must be reduced in order to improve functional adaptation in many mental health and rehabilitation disorders is also not a new idea. For example, Miller (1998; 2000) notes that the same classes of psychotropic medications are usually the first stop gap measures for most of these disorders, while psychotherapy is usually the treatment of choice. Dubovsky (1997) describes that the psychotherapy relationship “splints” neurophysiological regulatory mechanisms and provides a repeated corrective stabilization that eventually allows normal functioning. Ben Yishay (2000) has devised a system of holistic neuropsychotherapy which is the central part of his rehabilitation program and Prigatano (1987, 1999) has strongly articulated the importance of psychotherapy for facilitating post injury adaptation. In the HHR model, resolving the persistent catastrophic reaction is seen as a prerequisite to rehabilitation and is integrated into the rehabilitation training process.

The HHR rationale and method for resolving the persistent catastrophic reaction comes largely from the research literature on learning (e.g., Schachter, 1996), cognitive-behavioral psychotherapy, and coping with anxiety, especially procedures involving graduated exposure and cognitive restructuring (Masters, Burish, Hollon & Rimm, 1987). In HHR methodology, resolving the persistent catastrophic reaction involves three integrated components:

- ✓ 1) Confronting deficits in an incremental manner in order to prevent being overwhelmed by distressful emotion, through graduated exposure.
- ✓ 2) A supportive conceptual framework and rehabilitation methodology that bolsters hope and includes self-instruction to reinforce graduated successes in very incremental goal achievement toward desired goals
- ✓ 3) A rehabilitation methodology that emphasizes errorless learning and task

analyses, as described below, in order to simplify reacquisition and habitualization of many basic adaptational skills while minimizing anxiety and distressful emotions associated with failure.

The HHR methodology is designed to promote learning through calming the central nervous system and decreasing the significant anxiety and negative emotional states which are consistently shown to be disruptive to performance and learning (e.g. Ormod, 1999). It specifically focuses on decreasing the catastrophic emotional, cognitive and neurophysiologic reactions that would block optimal relearning. At the same time, it is designed to counter residual learned avoidance responses that may have been conditioned in the remote past when catastrophic reactions were more potent and conspicuous

The summary of many years of attempts to identify adaptive, rehabilitation promoting attitudes characterized by rehabilitation patients who were able to achieve remarkable progress despite seemingly insurmountable odds, is included in the "Five Commandments of Rehabilitation". These commandments serve as a primary prescription for countering the catastrophic emotional reactions that block optimal rehabilitation achievement. They are integrated in a model that prescribes that the optimal confrontation of deficits must occur: (a) incrementally, to reduce being overwhelmed by their magnitude; (b) with a methodology that promotes graduated successes through incremental expectancies, accurate self monitoring and incremental self reinforcement and is necessarily integrated with a supportive conceptual framework that reduces debilitating emotional reactions and allows adaptive reinterpretations of experience to promote hopefulness, self efficacy and self-esteem.

Importantly, the envisioning of a progressively more desirable future is the guiding principle and psychoemotional magnet in HHR that pulls persons toward their goals. Incremental movement toward desired goals can be

achieved to the extent that a person focuses on the vision of a desirable future, breaks expectancies and goals into small, progressive steps, and develops rehabilitation habits that facilitate persistent and stepwise, goal directed efforts. Patterns of interpreting events and expectancies about how things will turn out represent predictions of the future. Habitual patterns of expecting failure or dissatisfaction, or mistreatment, and habitual patterns of becoming depressed, angry, fearful and/or resigned are energy depleting debilitating habits that reinforce disability and failure.

In contrast, the single best remedy, or antidote, is a habit that reinforces self-esteem through graduated successes. This facilitative habit is summarized in the "Five Commandments of Rehabilitation" (Martelli, 1999). Making accurate comparisons, learning new ways to do old things, building one self up and employing positive self-coaching, and viewing rehabilitation as a series of small steps each requiring celebration, are some of the important attitudinal prescriptions offered by "the commandments".

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TABLE 1: Five Commandments of Rehabilitation
(see Appendix)
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The antidotes included in the "Five Commandments of Rehabilitation" are the medicines that interrupt the rehabilitation poison cycles. Importantly, energy tends to be self propagating in a cyclical fashion. If it proceeds in a negative direction, in catastrophic negative interpretations and expectations, more and more energy will be expended nonproductively. This direction of energy depletes it and redirects it away from allocation toward adaptive relearning and rehabilitation accomplishments. For example, a habitual depressive response to physical losses can reduce activity, prevent adaptive relearning, and reinforce more depression by depletion of brain chemicals associated with positive mood and energy. More depression, in turn, leads to poorer progress and more reason to be depressed.

Antidotes like the "Five Commandments", a positive vision of a gradually improved future, and planning and practicing compensatory behavioral self-control strategies serve to protect the rehabilitation reserve by inoculating persons against depression, anger, and destructive emotion. This ensures that energy and motivation will be available for the persistent pursuit of desired goals, with each step of progress adding new hope, self-efficacy, energy, and effort for the next step. With the addition of task analyses and scheduling to help promote routines, energy is increasingly turned toward protecting the rehabilitation energy reserve through adaptive interpretations and expectancies. Consistent repeated practice turns these rehabilitation promoting strategies into increasingly automatic habits that allow achievements that further strengthen them.

To reiterate, anything that is consistently repeated will become a habit. Therefore, the HHR model promotes the attitude and activity routines that will produce facilitative habits that turn energy toward protecting attitudes, taking antidotes, and letting healing reserve help nudge patients toward their goals.

III. Neuroplasticity, Rehabilitation and Relevance of the Catastrophic Reaction

In an editorial in the British Medical Journal, Richard Greenwood (2001) summarized the recent explosion of research into the three "R"s of restorative neurology: how Retraining reorganizes neural circuits and networks; the Replacement of cells and chemical messengers; and Regrowth of axons, dendrites, and synaptic connections. From both animal and human research, it is now known that remodelling of the cortex and other parts of the brain and spinal cord after brain lesions is not only possible, but use-dependent and task-specific. This remodelling explains why functionally useful rehabilitation and retraining techniques can work. It is the basis for his call for hastening the incorporation of such treatments as constraint induced movement therapy into clinical practice, for increased research efforts

exploring treatment induced plasticity in the nervous system and for guiding the training of neurologists and other practitioners. Its relevance to the HHR model relates to

Some of the most powerful evidence relating neural plasticity and rehabilitation efficacy comes from recent research on constraint induced movement therapy (CIMT). CIMT grew out of animal research that has been expanded to humans (Taub, 1977; Taub, Crago & Uswatte, 1998; Kunkel, Kopp, Müller, Villringer et al, 1999; Taub, Uswatte, Morris, 2003). CIMT techniques induce patients with stroke, brain injury and other types of injury to practice using an affected limb on an intensive, concentrated or massed practice basis for consecutive weeks, usually ≥ 6 hours/day for approximately 2 weeks) while constraining use of the less-impaired arm (for 24 hours/day). Demonstration in controlled studies show substantial functional improvements in the actual amount of use of the more-impaired arm in activities of daily living coincident with a large use-dependent cortical reorganization that substantially increases the size of the cortical motor control areas for the affected limb. Continuing research indicates that the concentrated intensity of retraining efforts is the most critical component in CIMT.

Further, the demonstration of improvements in humans many years after injury, along with creative research on monkeys, indicates that a significant portion of disability is explained by "learned non-use". Taub (Taub, Crago & Uswatte, 1998) notes that in the early period post injury, initial inability to use a body part produces failure and punishment for use attempts versus rewards for using other body parts. Subsequently, after resolution of original acute organic damage and return of potential for retraining and regrowth for body part use, the powerful learned inhibition of movement persists, and usually permanently. CIMT has demonstrated that this learning can be reversed.

Taub's research has described that an organism learns to discontinue use attempts early post

injury because of incoordination, pain and the punishing effects of repeated failures. Similar to Seligman's *learned helplessness* model of depression and coping (Seligman & Isaacowitz, 2000), this demonstrates that learning and expectancy are extremely powerful determinants of behavior and health.

Moreover, this demonstration provides strong evidence that the "catastrophic reaction" to impairments is a residual effect of injury and that emotional reactions and learning strongly influence the course of disability. Importantly, the CIMT research provides empirical support for Goldstein's observations and biopsychosocial model indicating that neurologic disability following an injury is more of an adaptational phenomenon than a simple reflection of diseased brain tissue. The adaptational nature of disability is also supported by a very recent research report that investigated and offered direct empirical support for anxiety-related avoidance of activities after brain injury (Riley, Brennan & Powell, 2004). Most important for the HHR model, CIMT and other emerging research provides strong and accumulating evidence that catastrophic reactive emotional distress following injury can suppress rehabilitation, and that this suppression can be reversed.

IV. Errorless Learning

There are a growing number of studies that consistently demonstrate effectiveness of errorless training methods for teaching skills to impaired individuals who were previously unresponsive to trial and error teaching. Evidence for errorless strategies was initially presented for persons with severe learning disabilities and dementia, but has recently emerged in the treatment of persons with aphasia, Parkinson's disease, schizophrenia, autism, and many other neurologic and neuropsychiatric disorders. This includes an increasing number of studies demonstrating efficacy and relative superiority over traditional trial and error methods in treatment of persons with significant memory problems following brain injury (Glisky and Schacter, 1989; Verfaellie, Cermak, Blackford and Weiss, 1990;

Leng, Copello and Sayegh, 1991; Schacter, 1996; Squires, Hunkin and Parkin, 1997; Clare, Wilson, Carter, Roth and Hodges, 2002; Kern, Liberman, Kopelowicz, Mintz & Green, 2002; Ducharme, 2003; Kessels and de Haane H, 2003; Masters, MacMahon and Paul, 2004; Schmitter-Edgecombe and Beglinger, 2001). Errorless learning strategies are straightforward and relatively simple. They involve preventing persons from making either most or all errors during learning trials. Necessary assistance and support is offered to ensure successful task completion. Assistive cues can take the form of task analytically derived checklists (see below) or through verbal instruction. For example, in the "method of vanishing cues", maximum cues are provided and progressively withdrawn only as not needed for successful task performance. The reduction in the number of competing memory traces and elimination of frustration and distressful emotional responses is associated with improvement in memory and learning performance.

In contrast, traditional learning methods include trial and error procedures and involve effortful supposition and guessing. Although errorful methods can be very effective for unimpaired learners, they can tax and overwhelm persons with compromised attentional, memory and/or executive skills. In persons with these deficits, failure recollections interfere with recall of successful efforts in a limited memory store, while learning can be further undermined by requirement for recalling and discriminating component task steps for memories of successes versus failures.

Further, failures typically produce frustration and distress that is especially inhibitory to learning in persons with brain injuries, given frequent reductions in attentional capacity and frustration tolerance and vulnerability to rekindling patterns of catastrophic reactions to deficits. In errorless learning, only correct and successful learning procedures are learned. This greatly simplifies the learning process.

V. Functional Task Analyses Model

Task Analysis involves breaking any task or chore or complex procedure into single, logically sequenced steps and, typically, recording the steps in a Checklist (Jonassen, Tessmer, and Hannum, 1999). The checklist allows checking off each step as it is completed. Task analyses always make task initiation, completion & follow through much easier. Performing a Task Analysis and generating a checklist can greatly improve ability to perform tasks in persons with limitations in memory, attention, energy, initiative, ability to sustain performance, organization, or almost any other difficulty (Martelli, 2003).

Task Analysis Checklists are also extremely useful in minimizing fatigue by reducing the demand for, and energy consumed by reasoning and problem solving associated with planning, organizing & having to recall, make decisions & prioritize appropriate steps and sequences for a task. Task analyses are useful for both basic and complex behaviors. Most importantly, Task Analyses allow re-establishing the efficient routines that make up normal everyday human behavior and activity. When the procedures assisted by Task Analyses are repeated consistently, they eventually become automatic [habits] and become as natural as tying a shoe. Samples of task Analyses are included in Table 2.

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 TABLE 2. Task Analysis Samples
 (See Appendix)
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Importantly, the ingredients for rebuilding these automatic habits are the 3 P's: Plan, Practice, Promotional Attitude. The result is rehabilitation, or removing obstacles to independence while achieving incremental progress toward important goals.

Further illustration of the conceptual differences between traditional rehabilitation models and methodologies versus newer neurorehabilitation models is offered in Table 3 (Martelli, 1999). Model 1 is based on education and physical rehabilitation models, while Model

2 represents the post acute neurorehabilitation models from which HHR is generated.

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 TABLE 3: A comparison of Traditional Rehabilitation versus Newer Neurorehabilitation Models (see Appendix)
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VI. Application of HHR Principles and Strategies

An especially illustrative example of the early development of HHR comes from the example of JF, a 39 year old woman who was first seen 2.5 years status post craniotomy for resection of a very large pituitary adenoma that resulted in complete blindness, amnesic syndrome and numerous vegetative-metabolic disturbances. This former architect showed severe memory problems at 2.5 years post injury, was unable to recall the route out of the bathroom in the house in which she grew up and returned to be taken care of by her parents, was only able to conduct over learned activities of daily living with assistance. She had just been discharged from the state school for rehabilitation of the visually impaired due to inability to show any benefit from training. Virtually all health and rehabilitation professionals had deemed her incapable of new learning and recommended that her elderly parents institutionalize her. JF was seen at that time for a more focal and supportive approach to memory rehabilitation screening. Previously unable to demonstrate recall of any new information after 10 to 20 seconds, her memory was assessed in a relaxed atmosphere during discussion invoking her more intact remote memory. Numerous repetitions of the examiner's name were conducted while recall was subsequently prompted after one minute with calming self talk and the following repeated phrases: "Patience, persistence, coax it out gently, build yourself up, don't beat yourself up...if it comes it will come in calmness and that will be okay, and if it doesn't, that's very, very good too, because you persisted without quitting and you have the best persistence I've ever seen", along with lots of support, encouragement and instruction to breath slowly and deeply. Notably, this patient demonstrated her first documented

successful recall of new information at about five minutes. Her second documented recall was that her memory had worked and that she had been able to eventually recall something, even if she couldn't recall what. Over the next two years, with only twice weekly outpatient group attendance, and once to twice a week tutoring from a humorous and friendly volunteer, and instruction of volunteer and mother in repetition (e.g., "Three-Peat" - a timely term after the Chicago Bulls had won three consecutive NBA championships) and association enhancement strategies and "tiny step" expectations with positive shaping and liberal praise, she slowly showed increasing recall for more and more information. Increasing social activities were especially facilitative as they seemed to reawaken this previously very gregarious woman. During outpatient group attendance, she contributed to development of the "Five Commandments of Rehabilitation" by offering inspirational one liners which she coined or borrowed from Sunday television preachers. At four years post injury, she was re-accepted at the state school for the visually impaired for a one week evaluation for ability to benefit from a typing recording device. She essentially learned the basics of the device during the evaluation, to the staff's true amazement. Two years later, she was typing 60 words a minute and had learned to use adaptive text-voice equipment and was volunteering and applying for jobs with the assistance of a job coach.

JF's case was conceptualized in terms of the suppression of memory by the subterranean catastrophic emotion experienced every time she attempted to recall information. JF was undoubtedly sensitized to distressful emotion by her blindness and in her repeated confrontations with it due to amnesic syndrome. JF could not be expected to endure the continued excruciating distress that must accompany repeated failed recollection efforts without expectation of success. However, when recollection efforts were incremented for a single, simple piece of socially relevant information and strongly supported through

emotionally calming talk, it was discovered that she did possess at least some memory storage capacity with ability and some slow retrieval capacity after about five minutes. She subsequently recalled that her memory could work given patience, and this experience ushered in a hope that undoubtedly transformed JF through application of hopeful self talk that is now transcribed in the "5 Commandments" that she contributed to.

In addition to JF, a couple of other illustrative HHR case studies are included on the VillaMartelli Disability Resources webpage, including an especially interesting one involving rehabilitation of severe dorsolateral frontal lobe based initiation problems (Martelli, Siegal and Zasler, 2002). Although space limitations do not allow review or discussion of other case studies, or even many specific HHR strategies, an instructive introduction to building rehabilitation protocols using the "3 P's" approach is included in Figure 1. The included protocol segments illustrate samples of application of task analytic derived, errorless learning based skills building protocols (the Plan), individually adapted reinforcement via a palatable cognitive attitudinal approach for countering inherent resistances to strategy utilization and practice (the Practice and Promotional attitude components) and promoting incremented goal achievement and reinforcement from graduated successes. Complete protocols and a larger sample of illustrative adapted strategies can be downloaded from the Villamartelli Disability Resources website (Martelli, 1999; 2000-2004).

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 Figure 1. Sample HHR Protol samples
 (See Appendix)
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VI. CONCLUSION

HHR proposes a "habit" (instinct replacement) model of brain function and a "habit retraining" model of rehabilitation. It postulates that a major learning function of the brain involves "habit" manufacturing - that is, converting repeated behaviors that are

functionally adaptive into efficient habits. For example, it is adaptive to remember how to walk, so the sequences involved in walking are chained together in a task analysis that makes it automatic so that performance requires minimal thought and energy. The same conversion occurs when such habits as attentional focusing, memory and multi-tasking are acquired and automated through chaining of the component steps. Through learning, tasks such as internally incorporating the tasks involved in getting dressed, or remembering what to take with us when we leave the house, or "who, what, when, where, how and why" in reading, or the "where we are going, what we are taking with us", are acquired as habits through natural task analysis that sequences behaviors as if we were learning automatic task inventories. The same is true for self control habits ranging from initiation and awareness to inhibition, which involve the very complex chaining of multiple tasks to produce the highest level executive skills habits. Brain injury can significantly disrupt these previously acquired habits. It can remove general efficiency, greatly tax attention, sequencing, memory, reasoning and energy. It can decompensate adaptive functioning across a wide range of previously automatic skills. The "habit retraining" model posits that by performing and repeating the task analytically derived protocols for these functions, effective learning chains can be reestablished and automaticity achieved. In HHR, retraining methodologies are essentially task analysis derived (<http://go.to/MFMartelliPhD>) and these constitute the Plan of rehabilitation. Practice is the retraining vehicle for rehabilitation, and the most effective learning procedures are required. Finally, significant emotional responses to losses are conceptualized as the primary obstacle to relearning and rehabilitation. Hence the incorporation of psychotherapeutic principles is posited as an integral component for emotional desensitization and optimizing participation and benefit from rehabilitation strategies. Models similar to HHR allow an almost endless number of individualized facilitative attitudinal

protocols to be designed to help optimize rehabilitation process and outcome.

HHR parallels other holistic neuropsychotherapy models, but bears some notable distinctions. It is a parsimonious model – it is relatively simple to understand and apply and can even be summarized in this short paper. It offers an uncomplicated and intuitively appealing model and method for devising and individualizing specific retraining protocols. Protocols exist for a broad range of relevant skills areas that afford utilization of intuitively appealing internal and external prompts and posters. Most importantly, HHR extends recognition of the importance of neuropsychotherapy by synchronizing it to compatible learning methods, integrating it as an integral and inseparable part of the rehabilitation process and exporting it to rehabilitation therapists and family members. HHR empowers therapists and family members as agents armed with highly potent neurorehabilitation specific learning and psychotherapeutic strategies. Finally, HHR's purpose is to expand neuropsychotherapeutic rehabilitation beyond simple emotional adjustment and functional compensation to include promotion of neuroplastic based rehabilitation of cognitive, behavioral and physical capabilities.

VII. REFERENCES

- Ben-Yishay, Y. (2000). Postacute Neuropsychological Rehabilitation, in Christenson and Uzzell (eds.), International Handbook of Neuropsychological Rehabilitation, Kluwer Academic/Plenum: New York.
- Clare, L, Wilson, B.A., Carter, G., Roth, I., Hodges, J.R. (2002). Relearning face-name associations in early Alzheimer's disease. *Neuropsychology*, 16(4), 538-547.
- Ducharme, J.M. (2003) . "Errorless" rehabilitation strategies of proactive intervention for individuals with brain injury and their children. *Journal of Head Trauma Rehabilitation*, 18, 88-105.
- Greenwood, R. (2001). The future of rehabilitation Lies in Retraining, Replacement, and Regrowth. *British Medical Journal*, 323, 1082-1083.
- Hopewell, C.A. (2001). The Neuropsychological Assessment of Personality and Emotional Changes after Traumatic Brain Injury. Sparks, NV: IMH-Network, Limited.
- James, William. 1890. *The Principles of Psychology*. 2 vols. New York: Henry Holt and Co.

- Jonassen, D.H., Tessmer, M. and Hannum, W.H. (1999). *Task Analysis: Methods for Instructional Design*. Mahwah, NJ: Lawrence Erlbaum Associates
- Kern, R.S., Liberman, R.P., Kopelowicz, A., Mintz, J. and Green, M.F. (2002). Applications of Errorless Learning for Improving Work Performance in Persons With Schizophrenia. *American Journal of Psychiatry*, 159, 921-1926.
- Kessels, R.P., de Haane H. (2003). Implicit Learning in Memory Rehabilitation: A Meta Analysis on Errorless Learning and Vanishing Cues Methods. *Journal of Clinical and Experimental Neuropsychology*, 25(6), 805-814.
- Kunkel A, Kopp B, Müller G, Villringer K, Villringer A, Taub E, Flor H. (1999). Constraint-induced movement therapy for motor recovery in chronic stroke patients. *Archives of Physical Medicine and Rehabilitation*, 80:624-628.
- Leng, N.R.C., Copello, A.G., and Sayegh, A. (1991). Learning after brain injury by the method of vanishing cues: a case study. *Behavioural Psychotherapy*. Volume 19. p. 173-181.
- Martelli, M.F. (1999; 2000-2004). *Villa Martelli Internet Disability Resources: A Comprehensive Listing of Some of the Most Useful Information and Links for Professionals and Persons Who Assess, Treat, or Cope With Physical and/or Neurologic Injury and/or Impairment [Comprehensive Website]*. Richmond, VA: Author. World Wide Web: <http://villaMartelli.com>.
- Martelli, M.F. (2002). *Neurobehavioral Rehabilitation: Empirical Evidence for Habit Retraining*. Candlelight Presentation at the 21st Annual Symposium of the Brain Injury Association of America, Minneapolis.
- Martelli, M.F., Siegal, A.W. and Zasler, N.D. (2002). Grand Rounds: Frontal lobe syndromes following neurologic insult. *Bulletin of the National Academy of Neuropsychology*, 17, 1, 8-17.
- Martelli, M.F. (2003). *Integrating Psychotherapy with Brain Injury Rehabilitation for Rebuilding the Shattered Self*. Workshop presented at the annual meeting of the Coalition of Clinical Practitioners in Neuropsychology (CCPN), Dallas.
- Martelli, M.F., Zasler, N.D., Tiernan, P.J. (in preparation). *Practical Approaches to Neurobehavioral Rehabilitation: A handbook of coping strategies*.
- Masters, J.C., Burish, T.B., Hollon, S.C., Rimm, D.C. (1987). *Behavior Therapy: Techniques and Empirical Findings*. New York: Harcourt College Pub
- Masters, R.S., MacMahon, K.M., Pall, H.S. (2004). Implicit Motor Learning in Parkinson's Disease. *Rehabilitation Psychology*, 49(1), 79-82.
- Miller, L. (1998). *Shocks to the System: Psychotherapy of Traumatic Disability Syndromes*. New York: Norton.
- Miller, L. (2000). Neurosensitization: A model for persistent disability in chronic pain, depression, and posttraumatic stress disorder following injury. *Neurorehabilitation*, 14, 25-32.
- Ormrod, J E (1999) *Human learning (3rd edition)*, Sydney, New South Wales: Merrill, Prentice Hall Australia Pty Ltd.
- Prigatano, G.P. (1987). *Psychiatric aspects of head injury: Problem areas and suggested guidelines for research*. In H.S. Levin, J. Grafman, & H. M. Eisenberg (Eds.), *Neurobehavioral Recovery from Head Injury* (pp. 215-231). New York: Oxford University Press.
- Prigatano, G. (1999). *Principles of Neuropsychological Rehabilitation*, Oxford: New York.
- Riley GA, Brennan AJ, Powell T. (2004). Threat appraisal and avoidance after traumatic brain injury: why and how often are activities avoided? *Brain Injury*, 18(9):871-88.
- Sbordone RJ (1990). Cognitive rehabilitation of the traumatic brain injured patient in the year 2000. *Psychotherapy in Private Practice* 8(2), 129-138.
- Schacter, D. (1996). *Searching for Memory*, Basicbooks: New York, New York.
- Schmitter-Edgecombe M, Beglinger L. (2001). Acquisition of skilled visual search performance following severe closed-head injury. *Journal of the International Neuropsychological Society*, 7(5), 615-30.
- Seligman M.E.P., Isaacowitz D.M. (2000). Learned helplessness. In G.Fink (ed), *Encyclopedia of stress*. San Diego: Academic Press
- Squires, E.J., Hunkin, N.M., and Parkin, A.J. (1997). Errorless learning of novel associations in amnesia. *Neuropsychologia*. Volume 35, Number 8. p. 1103-1111.
- Taub E. (1977). Movement in nonhuman primates deprived of somatosensory feedback. In: *Exercise and Sports Science Reviews (Vol.4, pp.335-374)*. Santa Barbara, CA: Journal Publishing Affiliates.
- Taub E, Crago JE, Uswatte G. (1998). Constraint-induced movement therapy: A new approach to treatment in physical rehabilitation. *Rehabilitation Psychology*, 43:152-170.
- Taub E, Uswatte G, Morris DM. (2003). Improved motor recovery after stroke and massive cortical reorganization following Constraint-Induced Movement therapy. *Phys Med Rehabil Clin N Am.*, 14(1 Suppl):S77-91, ix.
- Verfaellie M, Cermak LS, Blackford SP, Weiss S. (1990). Strategic and automatic priming of semantic memory in alcoholic Korsakoff patients. *Brain Cognition*, 13(2), 178-92.
- Wilson, F.C. And Manley, T. (2003). Sustained attention training and errorless learning facilitates self care functioning and chronic ipsilesional neglect following severe traumatic brain injury. *Neuropsychological Rehabilitation*, 13(5), 537-548.
- Wood, R.L. (2004). Understanding the 'miserable minority'; a diathesis-stress paradigm for post concussional syndrome. *Brain Injury*, 18, 11, 1135-1153.

TABLE 1: Five Commandments of Rehabilitation

<p>Commandment 1: Thou Shall Make Only Accurate Comparisons. Thou shall not make false comparisons.</p>
<p>That is, it is only fair (and adaptive) to compare oneself to persons with similar injuries, illnesses, disabilities and stress. It is unfair to compare ourselves to others without similar challenges, or to ourselves before we were challenged, as this makes us look poor by comparison. It is fair, however, to compare ourselves to others of similar injury, challenge, age, etc., as this comparison allows us to accurately measure ourselves.</p>
<p>Commandment 2: Thou Shall Learn New Ways to Do Old Things.</p>
<p>Learning new ways, or finding another way to do desired tasks, vs. giving up & feeling hopeless because the old way doesn't work, is the key to Challenging obstacles and overcoming them.</p>
<p><i>...Overcome Thinking that the old way is the best way (i.e., Stinking Thinking)</i></p>
<p>Commandment 3: Thou Shall Not Beat Thyself Up...Instead, Thou Shall Build Thyself Up!</p>
<p>We clearly understand that when we have a physical injury, such as a broken leg, getting mad, yelling at, or hitting (i.e., beating up) the leg only delays recovery, increases symptoms and pain, and makes us and the leg function worse. We know that pampering the leg, massaging it and coaxing it along gently & patiently will help it recover. Unfortunately, we too often forget that our brains are similar. An injured brain will perform poorly when we get mad with it, or get frustrated. Instead, understanding it, pampering it, being patient, using pacing & coaxing it along in a supportive way will help us function our best, and help our recovery and rehabilitation. Talking to ourselves in supportive and understanding ways (vs. getting mad at ourselves for being injured) and coaxing things out gently is a good way of building ourselves up in order to face the challenges of rehabilitation. Rewarding ourselves for efforts and each small step of progress, despite tremendous obstacles & challenges, is the best way to build ourselves up!</p>
<p><i>...Child & Spouse Abuse are recognized as illegal and immoral....Self Abuse is just as bad!</i></p>
<p>Commandment 4: Thou Shall View Progress as a Series of Small Steps.</p>
<p>Rehabilitation is appropriately viewed One Step At a Time - by focusing on the gains over where we were when we were one step behind where we are now, we can focus on the Graduated Successes and feelings of accomplishment (despite giant obstacles) which will leave us feeling proud and hopeful and enable us to focus and reach the next small step ahead, and make progress through the many small steps necessary to make substantial progress. Focusing on our current gains and small steps of progress (compared to where we were earlier in rehab and when we were at our worst) will build hope and a sense of challenge and growing victories (versus comparing ourselves to before the injury, which only makes us feel sad & depressed.</p>
<p><i>Inch by Inch & It's a Cinch. Meter by Meter, Life is Sweeter.</i></p>
<p>Commandment 5: Thou Shall Expect Challenge & Strive to Beat It.</p>
<p>By Converting Complaint (I don't want) To Challenge (I want), We Can Shape Our Future Through Our Vision and Driving Thoughts. We will actively shape our future by focusing on a vision of hope, challenge, control & satisfaction. By changing our focus from complaint and feelings of victimization & helplessness & pessimism, we can avoid giving up and giving in to a pessimistic prophecy of dissatisfaction and doom. (cf. "Thou Shall not Pretend to Have a Contract Guaranteeing Freedom from Injury, Disease, Illness or Unfair circumstances or Significant Stress!")</p>

TABLE 2. Task Analysis Samples

TA Samples: Single Tasks

'Making A Bed' Cheatlist

- 1. Strip sheets, blankets and pillow cases
- 2. Put blankets and pillows on table
- 3. Take break
- 4. Get sheets and pillow cases from closet
- 5. Put on fitted sheet
- 6. Put on top sheet, evening it out
- 7. Put on blankets and tuck in corners
- 8. Put pillow cases on pillow
- 9. Put comforter on bed

time, doing with Mom:

At This

Vacuum Cleaning Task Analysis

1. Remove Cleaner and Parts From the Closet
 - _ canister _ handle _ floor brush _ hand brush, _ crevice
2. Unwind Power cord
3. Decide task
 - _ carpets
 - _ wood/vinyl floors
 - _ hand dusting
 - _ change dust bag
4. For Carpets
 - _ attach power handle
 - _ adjust carpet level on canister
 - _ turn on power
 - _ vacuum first in main traffic paths and then to the sides
 - _ turn off power
5. For Hard Floors
 - _ attach long handle brush
 - _ turn on power
 - _ vacuum from the center outward
 - _ turn off power
 - _ remove handle
 - _ clean brush head with vacuum power
6. For Hand Dusting
 - _ attach brush head to hand grip
 - _ turn on power
 - _ carefully dust all surfaces
 - _ turn off power
 - _ remove brush and clean it with vacuum handle
7. Change Dust Bag
 - _ when red light on canister comes on, or check monthly
 - _ when bag supply is low, purchase more at Sears. Bring code# to store.
 - _ open canister, carefully pull bag off attachment.
 - _ place dirty bag carefully into the trash
 - _ put new bag following reverse procedure
8. After Cleaning
 - _ recoil power cord into canister
 - _ store all parts in the closet

TA Sample: Daily Habits & Routines

AT's Initiative/Energy Retrainer

MORNING

- Wash Face
- Shave
- Apply medication to face if needed

- Brush Teeth
 - Comb Hair
 - Dress before "morning" nap
 - Check finger nails & toe nails; trim when needed
 - Check hair length and get a haircut as needed
 - Shower and wash hair
 - Perform an Activity/Chore (Choose from Menu)
 - Check Schedule (e.g., M,W,F=Y; Tues=RedX)
 - Check your appearance before leaving the house
- AFTERNOON**
- Fill Out Chart (Behavioral Activity Monitor & Points)
 - Eat Lunch
 - PowerRelaxationNap (PRN; Use Tape)
 - Perform Activity or Chore (Choose from Menu)
- EVENING**
- Eat Dinner
 - PRN (PowerRelaxationNap; Use Tape)
 - Engage in Evening Activity
 - 10:00pm: Complete Chart (Behavioral Activity Monitor & Tally Pts)
 - Shower (if not done in am; or, again?)
 - Watch TV News
 - Prep for Bed (PJ's, Brush Teeth, etc.)
 - BedTime

TA Samples: Cleaning Routines

Tom's Female Friendly Formula

CLEAN APARTMENT

A. KITCHEN

- Fill Out Chart (Behavioral Activity Monitor & Points)
- CLEAN COUNTERTOPS DAILY
- SWEEP FLOOR DAILY
- ORGANIZE CABINETS & WIPE OFF ICE BOX
- EVERY WEDS MOP FLOOR & WIPE WALLS

B. BEDROOM

- FOLD CLOTHES OR HANG THEM UP AND STORE WHERE APPROPRIATE. DAILY
- SWEEP AND VACUMN FLOORS WHEN APPROPRIATE OR PRN
- ORGANIZE COMPUTER AREA
- EMPTY CAT BOX DAILY
- MOP FLOORS WHEN APPROPRIATE PRN

C. DEN

- SWEEP FLOOR
- VACUUM DAILY ETC...

Single Male Professional Chores CheatList

BATHROOM

- Dust around the Mirror and Light and Window, including the tops of the light and mirrors and window sills.
- Dust, with a damp cloth, around the windowsills, on the front of the blinds and the back (reverse sides by adjusting slats up and down), and along the tile division.

Tub and Toilet

- Wipe down the bathtub walls, going to the ceiling.
- Use cleanser and a brush to quickly wipe grime in the tub, and scum stains on the wall.

TABLE 2. Task Analysis Samples

- Use soapy brush to quickly wash and rinse the inside shower curtain.
- With a soapy disinfectant, clean the toilet top, seat, behind the seat, and under the seat, along the walls to the floor
- Fold all tiles neatly on the tile racks

Floor

- Sweep the floor, including behind the toilet.
- Take out the rug and shake it off of the porch vigorously to remove dirt and dust.
- Remove and empty the garbage can.
- Mop the floor, using ammonia or Clorox and be sure to get behind the toilet.
- Use a rag to get the floor behind the toilet. Be sure to get in all the nooks and crannies along the edges of the floor, near the tub, etc.

LIVING ROOM

- Dust Furniture, including all shelves
- Use broom/duster to dust along all baseboards, window sills, ceiling molding & fireplace mantle
- Sweep and Vacuum Under Rugs
- Sweep and Vacuum Floors
- Vacuum the couch, love seat, and chair

KITCHEN

- Empty Trash Can
- Clean Top of Refrigerator and Microwave (Wet Soapy Cloth)
- Clean Inside Refrigerator and Microwave
- Wash Any Dishes and Clean Sink with Cleanser
- Clean Sink and Surrounding Countertop
- Sweep, and then Mop Floor

STUDY/OFFICE

...

DINING ROOM

...

BEDROOM

- Dust dresser tops, around doors and windows, and along baseboard and ceiling molding

LAUNDRY

- 9:00am Saturday: Take Clothes to Dry Cleaners before 10:am
- 5:00pm Saturday: Pick up clothes from Dry Cleaners and Arrange in closet
- 10:00am Sunday: Launder socks, underwear, bathroom towels, bed sheets, etc.
- 11:00am Sunday: Use Dryer & Fold & replace clothes when done. Hang Dry other clothes
- 11:20am Sunday: Steam mist to refresh any pants, shirts in need
- Sunday 9:00pm: Fold, hang, put away dry clothes

❖*CLEANING SCHEDULE:

- A: DAILY DUTIES: STRAIGHTEN UP EACH ROOM**
- B: Calendar: Bathroom and Floors on Tuesday pm__ ; LR, Kitch on Wed pm__ ; Study, Dining, BR on Sat am__**

TA Samples: Daily Activity Trainers
DH's Daily Plan Checklist

MORNING

- Wake 6:00 AM to the Alarm Clock
- Take Medication
- Make Bed
- Shower
- Get Dressed
- Comb Hair
- Make and eat breakfast
- Clear, rinse, stack breakfast dishes (for pm wash)
- Wipe counter, table stovetop if needed
- Feed animals
- Brush teeth
- Gather items to take for the day
- Leave house at 7:00; go to Grandma's

REHAB CENTER

- Arrive between 7:30-8:00Am by van
- Follow Morning Schedule (In Rehab SchedBook)
- Lunch at 11:30, Take medication
- Follow Afternoon schedule
- Leave for Grandma's between 3:30-4:00

LATE AFTERNOON

- Dinner at Grandma's & take medication
- Home between 6:00-7:00PM
- Get mail, read & sort; put bills on microwave

EVENING: PREPARE FOR THE NEXT DAY

Laundry if needed (clothes, sheets,bath/kit towels)

- separate colors and whites
- set water level
- put soap in
- put clothes in and turn on
- put clothes in dryer - set timer for 45min
- Listen for Buzzer - fold when dry
- PUT CLOTHES AWAY: Drawers/Closets**

Kitchen

- wash dishes
- wipe off countertops, stovetop;
- rinse out sink
- sweep floor; mop if needed
- Change or empty cat litter if needed
- Vacuum Carpet/Rugs if needed
- Dust Furniture if needed

Bathroom if needed

- clean sink, tub, countertop
- put toilet cleaner in toilet
- clean floor, mirror
- wash toilet inside and out
- change towels, mat, washcloths
- Check off things needed on list; write out list when going shopping -Keep list in kitchen drawer
- Pick & lay out clothes to wear for the next day

Relax/Free Time

Prepare for Bed

- Floss/Brush Teeth
- Wash Face
- Shave
- Put away clothes (in hamper or drawer/closet)
- Set Alarm for 6:00AM

TABLE 3: A comparison of Traditional Rehabilitation versus Newer Neurorehabilitation Models

FEATURE	MODEL 1	MODEL 2
Treatment Theory Base	<ul style="list-style-type: none"> • Acute Rehabilitation • Outpatient Rehabilitation • Day Rehabilitation • Physical / Industrial Rehabilitation • Traditional Education 	<ul style="list-style-type: none"> • Post-Acute Neurorehabilitation • Transitional / Community Reentry • " " Neurobehavioral Rehabilitation • " " Executive Skills Rehabilitation • Progressive Special Education
Treatment Targets	Isolated Component Behaviors	Complex Behaviors
Treatment Goals	Restoration of Absent/ Deficient Behavioral Components	Compensation - Emphasis is with Integrating Complex Behaviors and Executing Complex Sequences
Treatment Method	Stepwise Component Skills Building	Task Analysis Based Compensation
Treatment Model	<i>Simple</i> - Assumes Sufficient Patient Skills, Participation & "Motivation" - Primary Determinants of Outcome are Patient Variables	<i>Complex</i> - Assumes Neurobehavioral & Executive Deficits, Catastrophic Reactions, Deficient Coping; Requires Specialized Behavioral Treatment Skills - Primary Outcome Determinants are Program, Therapist Variables
Therapist Role	Expert: Instruct, Direct, Teach Patient, Family Members	Reference/Collaborator: Guide & Shape Behavior of Client, Family Members, Life Skills Tutors (LST's), Liaisons, etc.
Prerequisite Therapist Skills	Technical Skills Competence in Physical Medicine & Rehab Disciplines	Technical & Behavioral Skills Competence (with personal adjustment, emotional stability & flexible problem solving style)
Treatment Setting	Analog - Tx exercises mimic class room, often reflect remote simulations, and offer indirect rewards	Real Life - Realistic, relevant Tx exercises with rewards that mimic life & are inherently rewarding <i>to Client</i>
TX Schedule	Part-time, during the work day	24 hours/day, Everyday
Ecological Validity	Training Setting and Functional Goal Relationships are Often Indirect	Training Setting and Functional Goal Relationships are Direct & Apparent
Vocational Training	Train & Place - Assumes Generalizability; e.g. Traditional VocRehab, Work Hardening	Place & Train - Assumes Specificity of Learning; e.g., Supported Employment
Outcome Measures	<ul style="list-style-type: none"> ◆ Performance on: <ol style="list-style-type: none"> a. Training Tasks in the Rehab Center b. Standardized Neuropsych & Other Office Tests 	<ul style="list-style-type: none"> ◆ Performance on Everyday Activities: <ol style="list-style-type: none"> a. Home b. Workplace c. Community



Rehab Commandment VI: Rehabilitation Imperative

- ✓ **First - Want to Improve**
- ✓ **Second - Believe that You Can Improve**
- ✓ **Third - Set a Series of Gradual, Incremental Goals so that You Can Improve *in small steps!***
- ✓ **Finally - You can Only Get Better if You Want to Get Better More than You Want Anything Else!!!**

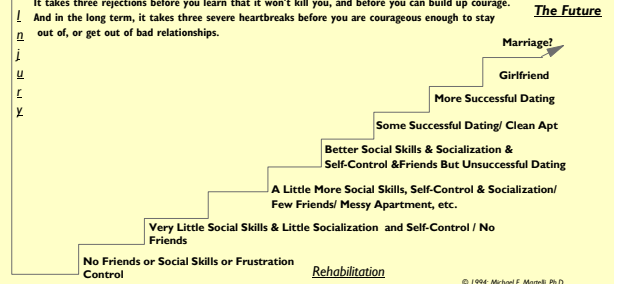


Stairway to Love Heaven

Single Persons Introductory Guide to Relationships and Dating

- Rule #1:** Don't Touch Anyone or Get Too Close or Friendly Before several dates. This means Anyone!
- Rule #2:** Never Attempt to Date, get fresh, flirt with, or Touch Any Possible New Friends you meet... Grow these friends to increase your contacts with friends. Only their friends should be considered for dates.
- Rule #3:** Compliment anyone you think you might want to date. Compliment everyone for practice to learn how to compliment usefully. Some things to compliment people about, include: Are Nice; are Bright; are Attractive; Have a Nice Personality; Are Fun to Be With; Are Witty / Funny; are Pleasant, etc.)
- Rule #4:** Don't go out looking for dates. The best dates sneak up when you are just trying to have fun.
- Rule #5:** Learn to Fast Dance, and dance more. Look for people to dance with and go out and dance with. Ask your friends out on a friendly basis. Ask What They Like to Do and then ask them to do something they like to do.
- Rule #6:** Take chances asking others out on dates - let them say no. Don't be too afraid of rejections. It takes three rejections before you learn that it won't kill you, and before you can build up courage.

Before
Good Friends and Relationships



M.F. Martelli, Ph.D.: 1999

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*Derived from Task Analysis



Compensatory Habit Retraining

- The use of strategies, self-talk, notes, log books, breaking things down into small steps, doing things one step at a time, using checklists, etc.
- It Feels Like a Pain in the Butt!
- Not Remembering, however, is a Colossal and Gigantic Pain in the Butt!
- So be aware, When Habit Retraining Strategies become Habitualized, they become Automatic and produce good memory and other skills, and are No Longer a Pain in the Butt!
- Think of Retraining with Strategies As a Temporary Pain in the Butt that is really an Opportunity to Get Rid of Permanent Gigantic Pains in the Butt.

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Neurobehavioral Regulation: Graduated Exposure Programs in Rehabilitation

- Exposure to distressful emotional, physiological and sensory reaction situations
- Incremental increases in tolerance (and incremental compensatory learning, anxiety extinction, sensory interpretation distress) without experiencing significant anxiety or sensory distress.
- Requires person **Not** experience distressful reactions or experiences.
- Examples: anxieties, phobias & distressful emotions and sensory reactions related to the following:
 - ▶ Noise and/or light (when not mediated by headaches, etc.)
 - ▶ Crowds and public places (e.g., stores, malls, sporting events)
 - ▶ Overwhelming visual stimulation and patterns
 - ▶ Driving (especially in traffic)

METHOD: Schedule Gradually Increased Exposure / Assigned Activities, Incremented in Time and/or Distance and/or Intensity that are followed Exactly

Graduated Exposure Sensory Tolerance Programs

Level /Step	Activity	Time	Frequency	SUDS
1-1	Stand on stepladder or chair for 3 Sec's (s)	3 Sec.	3 X/day	
1-2	Perform a visuomotor scanning computer exercise	30 Sec	4 X/day	
2-1	Listen to radio while driving	1 Min	1-3 X/day	
2-2	Track 2 persons talking at same time	30 Sec.	1-3 X/day	
3-3	Visit Clover Mall (9-11am, 2-4pm, Main ent.)	10 min.	1-2 X/day	
4-1	Start Car, Back up slightly, then pull forward in driveway, going no further than is comfortable	<= 2 min	1-3 X/day	

Sample Rationale: "Like Breaking a Bronco, you can't learn to ride until you can get in the saddle. You can't get in the saddle until the horse believes it won't die if something gets on its back. Similarly, You can't increase your tolerance for (sounds, etc.) unless your system learns that it can tolerate some level of that (noise, etc.) without great (distress, pain, fatigue, etc.)."

M.F. Martelli, Ph.D.: 1999

Increasing Self-Confidence via Graduated Successes

(Decreasing Self-Consciousness, Anxiety, Low Self-Esteem, etc.)

- **Graduated Success Shaping**
 - Noncomplex tasks, successfully completable with Max. Support
 - Gradual increases in complexity (challenge) following successes
 - Diminishing Cues / Errorless Learning
 - Increasing Accuracy of: a) Self-Monitoring; b) Self-Evaluation and c) Self-Reinforcement (self-delivered praise, etc.)
- **Progress gauged through progression from:**
 - Initial stages: Maximal Cues, Errorless Performance & accurate self-monitoring, self-evaluation & self-reinforcement
 - Middle stages: increasing internal cueing & decreasing need for external assistance for task completion, accurate self-monitoring, self-evaluation & self-reinforcement, to
 - Later stages: independent task completion and independently conducted accurate self-monitoring, self-evaluation & effective self-reinforcement
 - Subsequent introduction of slightly more challenging tasks and reintroduction of the above noted process of maximum to gradually diminishing cues (method of diminishing cues)

Complexity	Required Amount of	External	Assistance Structuring/	/ Cueing
of	Low	High	Low	None
Task	Medium			
	High			



Self-Regulator for Involuntary Sadness!

1-Re-Label...*It's Not an Intended, or Legitimate Degree of Emotion...It's **Involuntary Sadness!***

2-Re-Interpret...*It's just Involuntary and Unintentional Sadness in which nerves connecting the brain's emotional experience centers to emotional expression muscles are weakened - resulting in decreased control & exaggerated release of emotion!*

3-Re-Focus...*Concentrate on something different, or pleasurable or funny, to distract myself and & restore control of expression ("Plop, Plop, Fizz, Fizz...")*

4-Re-Evaluate...*Decide that the involuntary sadness or teariness is Illegitimate and False Information. Decide to Dismiss This Information and Restore Control through re-focusing attention! Re-LIFE it!*

Re-LIFE it!

M.F. Martelli, Ph.D.: 1999
adapted from Schwartz (1996) OCD Procedure



Management of Emotional Reactions: Temporal Lobe Epilepsy (TLE)



To increase control of emotions and improve problem solving and general stress management and coping, we have developed a 4 step self-control procedure called Re-L.I.F.E..

Re:

- 1. L** - Label: re-label the feelings as illegitimate, hyper-intensified emotions
- 2. I** - Interpret: re- interpret them as emotional amplifications or hyperintensifications caused by electricity (i.e., kindling or hyperconnectivity) or B.S. (Between Seizure electrical amplification)
- 3. F** - Focus: re-focus on anything less distressing, more pleasant, different, in order to disrupt the developing escalation of electricity and intensified emotions
- 4. E** - Evaluate: re-evaluate the theme of electricity intensifying emotion as a component of epilepsy, as requiring that the primary red flags be monitored, and, when identified, re-interpreted more accurately, so that they can be controlled.

When this "self-talk" self-control procedure is used before the amplification of emotions progresses too far, it can counter amplification, preventing the escalation of emotions that leads to: psychic changes and increased emotional distress; increased fatigue and possible eventual exhaustion; and increased probability of eventual seizures - and a recurring pattern of poor emotional and/or seizure control.

Notably, posters, graphic representations, and songs, with personalized details, are typically employed to assist with learning and application of this self-control intervention.

M.F. Martelli, Ph.D.: 1999 cf., J.M. Schwartz, 1996 (BrainLock: Regan Books)

Concussion Care Centre of Virginia
Medical / Rehabilitation Neuropsychology

CRISIS SURVIVAL RULES: Emotional Control Strategies

- **Sponging:** absorbing/ catching others negative emotions; allowing them to control your emotions, reactions.
- **Mirroring:** reflecting negative emotions, with factual comment and without emotional reaction or obligation to "catch" the emotion or respond with it.
 - ▶ involves a slow, deliberate and open look at the others statements while Under reacting: prevents escalation, allows self control through control of response, allows keeping a cool head to help calm the situation, not let another persons problem become your own.

Rx: Be a Mirror (not a Sponge). Contract with partners to allow mistakes, not beat each other up when mistakes are made... learn and take into account the

"Rules of Crisis"

- Everyone will be at their worst!
- Our/Their behavior and communication will reflect our/their worst!
- We/They will hold others accountable and Excuse ourselves/ themselves!
- When we are hurting, we fail to appreciate other's hurt!
- Things will get better or worse after a crisis, but will not stay the same!

M.F. Martelli, Ph.D.: 1999
Derived from Task Analysis

Concussion Care Centre of Virginia
Medical / Rehabilitation Neuropsychology



EMOTION CONTROL HEADQUARTERS HOMEWORK

- Look for Opportunities to Think Suspicious Thoughts, Think Someone is Screwing You, and Get Angry, *and then:*
 - ▶ Practice re-interpreting them in a harmless, non-threatening, non-angering way!
 - ▶ Practice Saying "So What", "Who Cares" and "Who Says"
 - ▶ And, Remember the Stress Buster Rules:
 - Rule#1: Don't Sweat the Little Stuff!
 - Rule#2: It's All Little Stiff!

(it's just that your injury makes it seem bigger than it really is!)

M.F. Martelli, Ph.D.: 1999
Derived From T.A.

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* cf.: Vestibular Overload



Rehab N Pacing Imperative * Neurogenic Fatigue

- ▶ Remember to Leave Enough Reserve Energy For Brain Recovery, Strengthening & Building of Resilience/Increased Capacity in Brain Cells....
- ▶If You Go as far as Tolerance or Energy Will Let You (i.e., until fatigued and/or sick), you will Not Allow Continued Recovery and Brain Strengthening (...instead, energy will go toward recovery from sickness, which only returns you to where you were...without progressing!)

Pace it...Don't Race it!

Progress is a series of small Steps...Celebrate each one patiently!



M.F. Martelli, Ph.D.: 1999



ATTENTION REGULATION STRATEGY #1 Auditory Comprehension & Memory

- ▶ **TO REALLY CONCENTRATE, I MUST LOOK AT THE PERSON SPEAKING TO ME**
- ▶ **I Must Also Necessarily FOCUS ON WHAT IS BEING SAID, NOT ON Surrounding Sounds or Activities or OTHER THOUGHTS WHICH WANT TO INTRUDE**
- ▶ **ALTHOUGH IT IS NOT HORRIBLE IF I LOSE TRACK OF CONVERSATION, I MUST TELL THE PERSON TO REPEAT THE INFORMATION IF I HAVE NOT Fully ATTENDED TO IT**
- ▶ **I Must CONCENTRATE ON WHAT I AM HEARING AT ANY MOMENT BY REPEATING EACH WORD IN MY HEAD AS THE PERSON SPEAKS**



ATTENTION REGULATION STRATEGY #4 General Distraction Buster

- **TO REALLY CONCENTRATE, I MUST LOOK/ FOCUS ON THE TASK AT HAND**
- **I Must Also FOCUS ONLY On WHAT IS BEING Done, NOT ON Surrounding Sounds, Sights or Activity, or OTHER Stresses of THOUGHTS WHICH WANT to Intrude**
- **I I MUST CONCENTRATE ON WHAT I AM DOING AT EVERY MOMENT BY FOCUSING ON THE CURRENT STEP TOWARDS TASK COMPLETION**
- **IT IS NOT HORRIBLE IF I LOSE My FOCUS or CONCENTRATION. I will simply have to Repeat and Re-Focus ON THE ONGOING TASK AT HAND, THE NECESSARY STEPS TO COMPLETE IT, AND THE NEXT STEP TO WORK ON!**



Strategies For Remembering Names

- **Repeat the Name 5 Times**
Repeat to yourself and out loud in sentences - "So your name is ____..I know a ____, I like the name ____", etc.
- **Make Associations**
Between Name & Physical Features - e.g. Mike & mustache
- **Write Down the Name**
Write Name and Description (in your head and/or Logbook)
- **Review Your Memory Immediately Afterwards**
Replay Introduction in Memory and Repeat Five Times
- **Use a Tape Recorder** *as a memory fail safe aid*



Strategies To Keep Track of Tasks & Activities

- Always Review What You Have in Your Possession & Where You are Going With It & Where You Will Place it Beforehand ...*Where are you going & how will you get there & What Do You Have With You and What Are You Going to Do/ Where Will You Put It*
- Picture Where You Are Going and What You are Taking With You ...*See every landmark, item, room, building, etc.*
- When You Begin the Activity, Talk to Yourself to Monitor Where You are Going, Where You Place What, etc.

Strategies To Prevent Driving Lapses

- Review the Travel Route In Your Mind Before Beginning the Trip ...*Where are you going & how do you get there? (Include every landmark, exit, turnoff, etc.)*
- Picture The Travel Plan and Picture Yourself Driving the Route ...*See every landmark, exit, turn off, etc.*
- When You Begin the Trip, Talk to Yourself to Monitor Travel Route, Turns, etc
- Consider Making a Map of the Travel Route, Placing it on the Carseat, Marking the Major Exits, Turnoffs, etc. & Following & Checking It While Driving



Lisa's Habit Retrainer

3N's +1 = Necessary Nuisance

for iNdependence

iNventory: *Before you do anything!*

- **Set/Check Your Scheduler**
- **Evaluate Your Fatigue & Adjust Activities**
- **Reinterpret Negatives into Positives** (e.g., Convert Curses into Nurses; Focus on what you Can Do Despite Great Obstacles... instead of what you can't yet do or how big the obstacles are!)
- **Pace (start out slowly, build up slowly!)**
- **Before Leaving House:**
 - **Get Your Exec. Organizer**
 - **Get Your Glasses & Watch**

Practice Will Make it Automatic...!



Organization Strategies: Comprehension / Recall #1 & 2

5 W's

WHO

WHAT

WHEN

WHERE

WHY

SQR3

Survey (*Preview Content Areas*)

Question (*Formulate Questions*)

Read (*& Answer your Questions*)

Recite (*Main Points*)

Review (*and Rehearse*)



The Organization Imperative

Bottom Line

- Short, succinct, to the point...
- ...MAIN POINT...BOTTOM LINE!
- ...Give OUTLINE of BOTTOM LINE BEFORE elaborating DETAIL

One Thing at a Time

- STAY FOCUSED on One Thing at a Time & INHIBIT WANDERING
- Monitor Ongoing Activities & Conversations & Demonstrate TRACKING
- Use Multi-Tasking Monitor to Keep Track of other Things

TO DO List	6.
1.	7.
2.	8.
3.	9.
4.	10.
5.	Transfer incompletes to next day
Multi-Tasking Monitor	Multi-Tasking Monitor
Task 1:	
Left Off:	Left Off:
Task 2:	
Left Off:	Left Off:
Task 3:	
Left Off:	Left Off:
Task 4:	

and
sometimes
HOW

J's Executive (SOBER) Self-Control Habit

→ every day, and every Two Hours, to make it a habit:

☛ (1) Rate Current Impulsiveness & Executive Status!

- Have you been **Scattered** (>1 task or idea or topic at a time) in the last 2 hours?
- Have you Been an **Open Book** (i.e., Talking about You, Your Concerns, Your Life Story...Talking Like a Russian Novelist; Disclosing Too Much, Too Quickly...)
- Have you Felt **Excited** in any manner in the last 2 hours?
- Have your Thoughts or Speech **Raced** in the last two hours? (Don't underestimate)

☛ (2) Adjust your Daily Activities Accordingly!

- ▶ If Some Vulnerability (>= 1 'Yes' or unsure) Engage in Some Executive Renewing Activities and Closely Monitor and Reduce Executive Taxing Activities
- ▶ If High Vulnerability (>=2 'Yes'), Reduce all Executive Taxing Activities (that is, do few, pace and go very slowly) and Engage Mostly or Only in Executive Renewing Activities

Activity Effects on Executive Skills

Executive Renewing Activities

Pace / Slow / 1 Thing at a Time
 Planning/Organization
 Relaxation / Power Nap
 Q Reflex/ Deep Breathing
 Swimming / Moderate Exercise
 Music/Guitar/Singing Reading

Executive Taxing Activities

Overactivity
 Stimulating Situations
 Stress & Worry/ Rumination
 Working
 Walking / Prolonged Standing
 Meeting New Persons / esp. Women

M.F. Martelli, Ph.D.: 1999

Tom's Rules of the Road for Successful Relationships

- ☛ Brake on Touching, Getting Closer than Two Feet of a Woman Until After a Second Formal Date (Date means going out with MUTUALLY agreed upon possibility of becoming a relationship - boyfriend/girlfriend combo).
- ☛ Brake on Expressing Strong Emotions (affection, like, etc.) With Any Woman Until After a Second, Formal Date (using word 'love' in any context is proscribed until after 3 mos of formal dating!)
- ☛ Brake on Hugging of anyone other Than a Relative or Girlfriend (i.e. someone you have dated more than two times who wants to continue dating you)
- ☛ If Slow Dancing, No Touching within 6 inches of Butt, Crotch, or Breasts, Until After a Second Date.
- ☛ Always Maintain your Personal Space (2 ft.) around Women
- ☛ Always Attend by Looking (at face), Being Interested in What A Woman Says, and Keep Your Talking to a Minimum
- ☛ Work on Coming Across Gently (Vs. Usually Intense or Like a Ton of Bricks!)

M.F. Martelli, Ph.D.: 1999



TOM'S BRAKES



- ✓ Softer Voice
- ✓ Less Talking
- ✓ Less Inflection
- ✓ Less Movement, Hand Talk
- ✓ Swallow
- ✓ Track the other person more than attending to your own interests, needs, opinions, etc.
- ✓ RX: Plan a Test / Challenge Situation for Putting on the Brakes
- ✓ Self-Reward for "Putting on the Brakes"
- ✓ Accomplishments (& ID'ng Opportunitites for Practice)

M.F. Martelli, Ph.D.: 1999

The Rehabilitation

R_x Progress Imperative

Attack Incremental Rehab Goals, One Tiny Step at a Time! ...Remember, the Quality of Your Life Depends on it!

Do Nothing HALF-BUTT! ...That is, use strategies or do things half way, and then say "but..." *

- ◆ But I used to could.. ..But I didn't use to have to...
- ◆ But it's hard... But he said...But they don't understand
- ◆ ...But, What If...?...But my Butt hurts (from excessive butting!)....

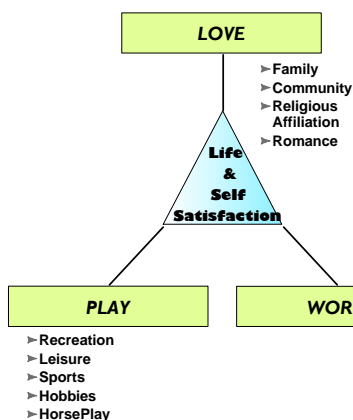
P.S.

Every Butt Leads to... Crap!

M.F. Martelli, Ph.D.: 1999

Concussion Care Centre of VAs
 Medical Psychology Service

Life Analysis

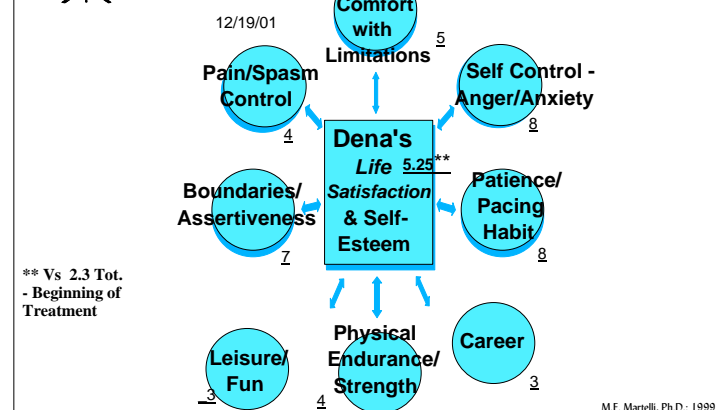


Procedure

- ▶ 1- Rate each Domain (Love, Work, Play) From 0 (Nothing, Zilch) Through 5 (Mixed) to 10 (Couldn't be better; Ideal)
 - ▶ 2- Interpret Data: If Overall Score is 15 or Less, or if Score for either of your two highest categories is less than 6, then action is needed!
 - ▶ 3- As needed, Employ the Rehab Imperative #4:
- ✓ First - Want to Be More Satisfied
 - ✓ Second - Believe that You Can Be More Satisfied
 - ✓ Third - Set a Series of Gradual, Incremental Goals so that You Can Increase Satisfaction in Small Steps!

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- ▶ 1) Devise a list of important Life Areas; 2) Rate Satisfaction in each area (0=None; 10=Ideal)
- ▶ 3) Add Area Satisfaction Score. Divide by "N" for "Average Life Satisfaction"
- ▶ 4) Add Goals to "Master Life Goal / Task Organizer" form. Complete Goal Attainment Scales (GAS) with steps for Increasing Satisfaction in each Life Area
- ▶ 5) Devise Plans for Moving Toward a More Desirable Future & Improving Status in relevant Life Areas. Focus on one area at a time, and smallsteps in each area (use Life Task Organizer)



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