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How am I?

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Need caffeine
So bored !

This is chill
Life is good

Too much info
Out of my mind

Cognitive Rehabilitation Training Clinical Applications of Evidence-based Cognitive Rehabilitation

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Improving lives through interdisciplinary rehabilitation research

Disclosures

Keith D. Cicerone, Ph.D. has no interest to disclose.

PESG and ACRM staff have no interest to disclose.

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Learning Objectives

- Participants will discuss the evidence concerning the effectiveness of cognitive rehabilitation in the selection and implementation of specific, individualized interventions for cognitive disability.
- Participants will identify patient's neurocognitive profile as well as other factors influencing treatment selection.
- Participants will describe case examples that illustrate the clinical implementation of interventions, with an emphasis on the remediation of attention and memory impairments.
- Participants will discuss the application of interventions based on principles of holistic neuropsychological rehabilitation.

Why evidence-based rehabilitation?

- I will apply all measures required...
avoiding those twin traps of overtreatment and
therapeutic nihilism

What is evidence-based rehabilitation ?

- Application of interventions based on the ***best available evidence*** from the scientific literature
- Clinical judgment regarding the relevance and utility of EBR to the individual patient
- Consideration of the patient's beliefs and values

Cognitive rehabilitation is a system of therapeutic activities, based on brain- behavior relationships, directed to achieve functional change by:

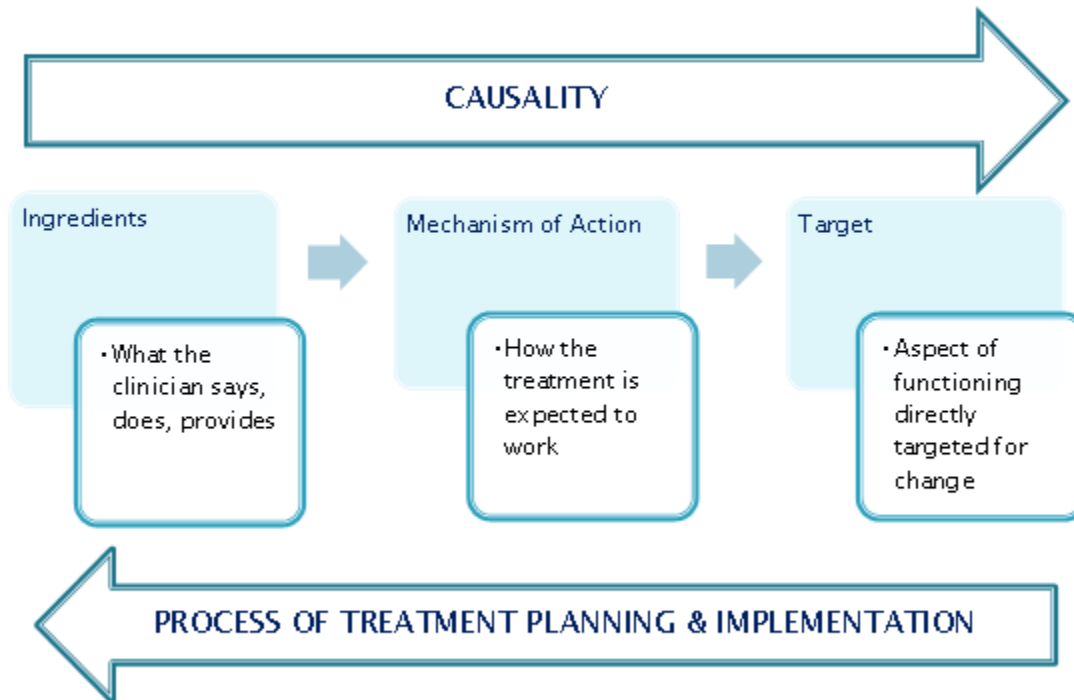
- Re-establishing or reinforcing previously learned patterns of behavior
- Establishing new patterns of cognitive activity through compensatory cognitive mechanisms
- Enabling persons to adapt to their cognitive disability to improve overall functioning

Ecological validity of cognitive rehabilitation

- **Acontextualized**: process specific remediation of impairments with little explicit relation to real-life demands
- **Quasi-contextualized**: therapist makes explicit the relation between meta-cognitive awareness and compensations and real-life demands
- **Contextualized**: functional training of skills with explicit relevance to real-life demands

The tripartite structure of treatment theory.

Adapted from Hart, T., Tsaousides, T., Zanca, J. M., Whyte, J., Packel, A., Ferraro, M., et al. (2014). Toward a theory-driven classification of rehabilitation treatments. Archives of Physical Medicine and Rehabilitation, 95(1 Suppl), S33-44 e32



Recommendations for Attention Training

Practice Standard

- Remediation of attention is recommended during post-acute rehabilitation after TBI. Remediation of attention deficits after TBI should include direct attention training and metacognitive training to promote development of compensatory strategies and foster generalization to real world tasks.

What mechanisms underlie the remediation of attention?

- Re-establishment of neuronal systems
- Practice, practice, practice
- Direct instruction (and more practice)
- Metacognitive strategy training
- Adaptation of the person-environment to accommodate limitations

What mechanisms underlie the remediation of attention?

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- Direct instruction (and more practice)
- Metacognitive strategy training
- Adaptation of the person-environment to accommodate limitations
- *Pharmacologic intervention*

Practice Guideline for Direct Attention Training

Sohlberg et al., 2003

- Direct Attention Training
 - Repeated stimulation of attention will improve impaired neurocognitive systems
 - Improvement is not dependent on strategies
 - No explicit instruction related to real world tasks

Attention Process Training

Sohlberg & Mateer

- Specific cognitive components are addressed through analysis of test performance
- Ability to divide cortical functions into distinct entities are assumed
- Therapy tasks are practiced repetitively in order to restore original function
- Therapy tasks are hierarchically organized
- Generalization probes used to assess treatment
- Individualized treatment delivery

Attention Process Training

Sohlberg et al, 2000

- Improvements apparent on executive aspects of attention
- Improvements on self-reported lapses of attention
- **Patients with relatively intact levels of vigilance more likely to benefit from specific attention process training**
- Minimal psychosocial benefits compared with brain injury education

Direct Attention Training of Working Memory

- Working memory tasks require maintenance and updating information during periods of delay compared with general stimulation

Remediation of Working Attention: Post-acute Treatment

Westerberg et al., 2007 (Class I)

- Automated computer training for working memory after stroke
- Weekly telephone feedback (no other therapist involvement)
- Improvement on untrained attention and working memory tasks as well as self-rated cognitive symptoms

Remediation of Working Attention: Post-acute Treatment

Serino et al., 2007 (Class III)

- Intervention based on *PASAT*
- Working memory vs. general stimulation
- Improvement on tasks accessing Central Executive but not processing speed or sustained attention

Principles of Neuroplasticity

NIH Blueprint for Neuroscience Research

- Functional plasticity and recovery is use-dependent
- Requires pairing of sensory input with feedback (top-down modulation) & training-related learning
- Plasticity depends on availability of sufficient residual neural resources
- Motivation and attention can be critical modulators of plasticity

Recommendations for Attention Training

Practice Option

- Computer-based interventions may be considered as an adjunct to clinician-guided treatment for the remediation of attention deficits after TBI or stroke. Sole practice on computer-based tasks without *some* involvement and intervention by a therapist is NOT recommended.

Active Components of Computerized Attention Training

- Use of adaptive interventions to adjust task difficulty & maintain challenge
- Feedback inherent in training structure
- Training is “intense, demanding & tiring”
- More effective for patients with relatively preserved cognitive functioning
- Patient motivation and compliance appears to be critical

Table III. Likert scale ratings of participants' enjoyment of and willingness to continue performing APT-3 and Lumosity tasks independently. (Zickfoose, 2013)

Participant	<u>APT-3</u>		<u>Lumosity</u>	
	Enjoyment	Willingness to Continue	Enjoyment	Willingness to Continue
OE	5	4	5	5
NG	1	1	4	3
KX	5	5	4	3
KS	1	1	5	5

Clinical Improvement on Tests of Everyday Attention

	<u>APT-3</u>	<u>Lumosity</u>
Phase B	50%	44%
Phase C	31%	31%

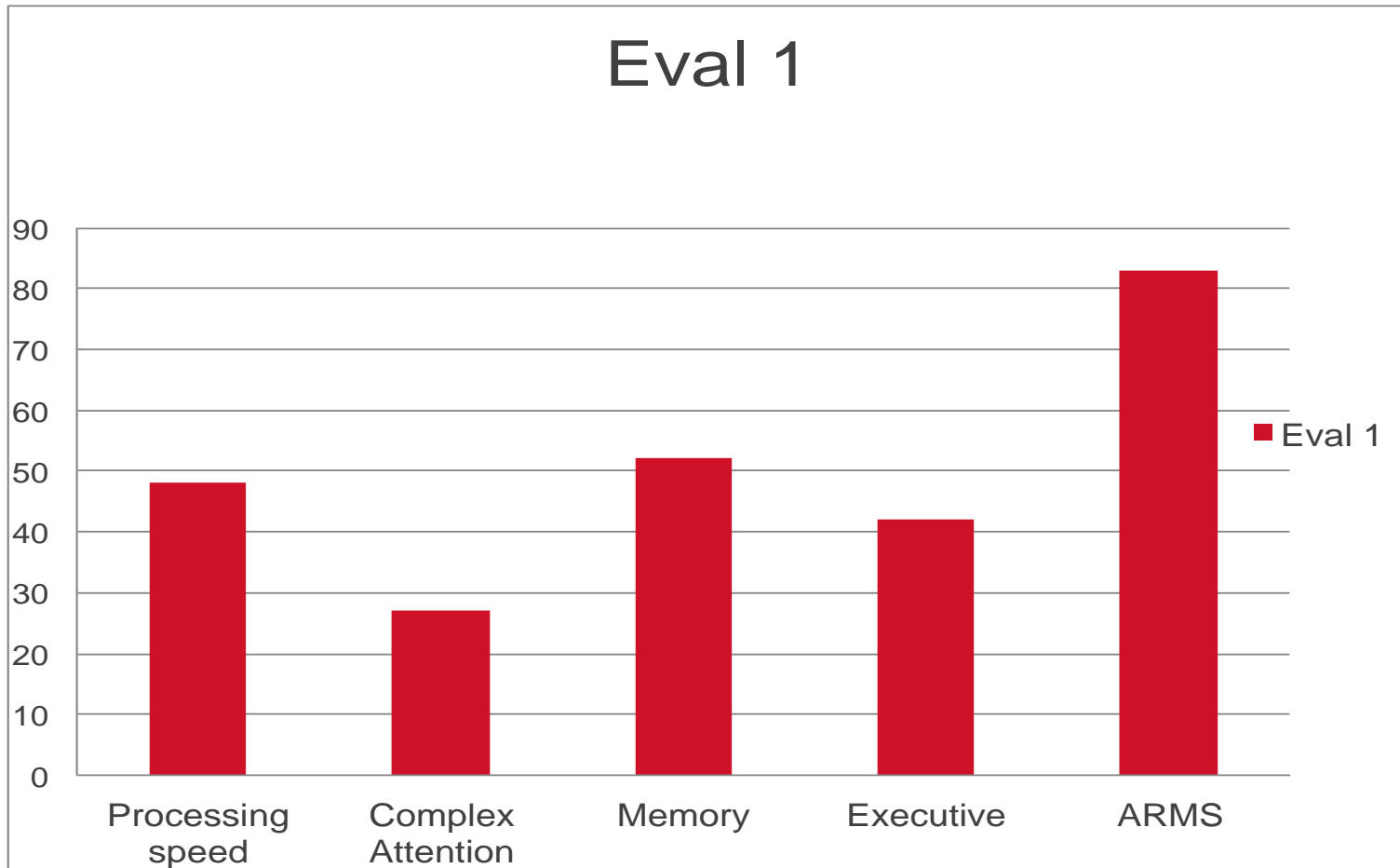
Case Illustration 1

- 44 year old female
- 16 years education
- 3 months s/p complicated mild TBI
 - Initial GCS = 14
 - Right frontal contusion
- History of using internet-based computer games to “strengthen cognition” due to family history of dementia

Subjective Complaints (ARMS)

- Doing more than one thing at a time
- Concentrating in busy or noisy situations, reading
- **Needs to slow down or repeat things to avoid mistakes**
- Irritability and feeling overwhelmed
- Fatigue associated with sustained attention or mental effort

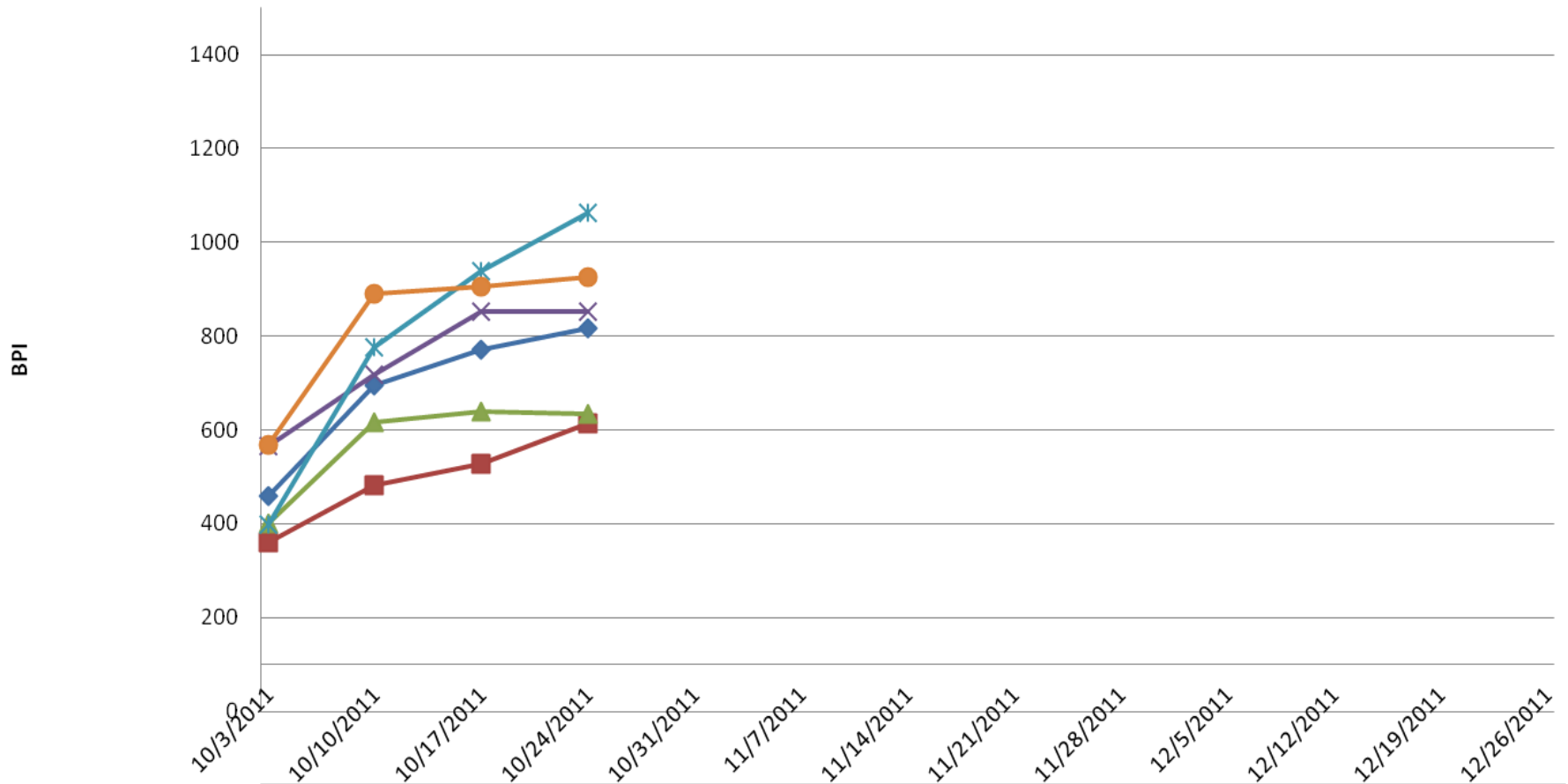
Neuropsychological Assessment Case 1





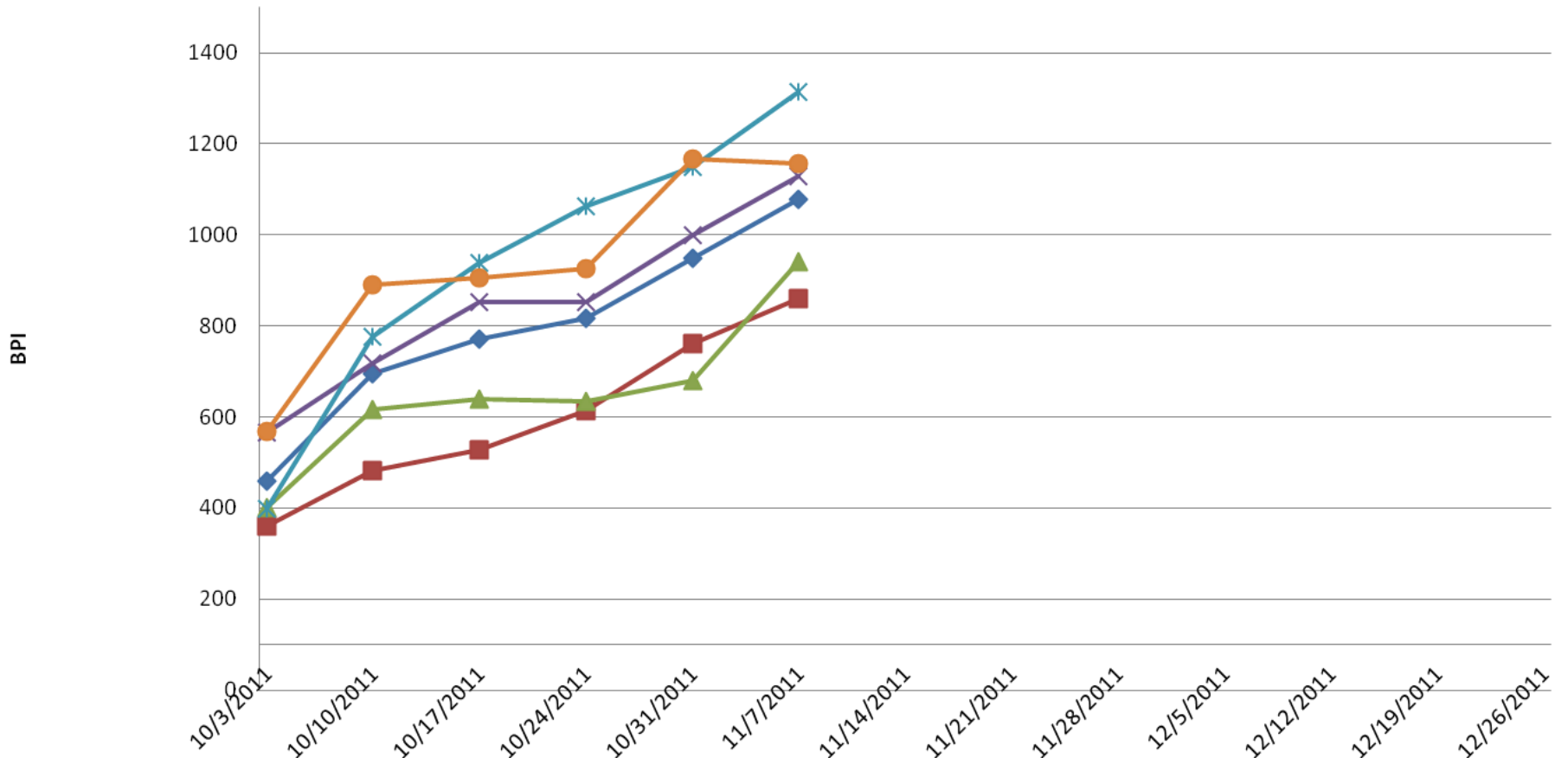
Case 1 Intervention

Lumosity Scores



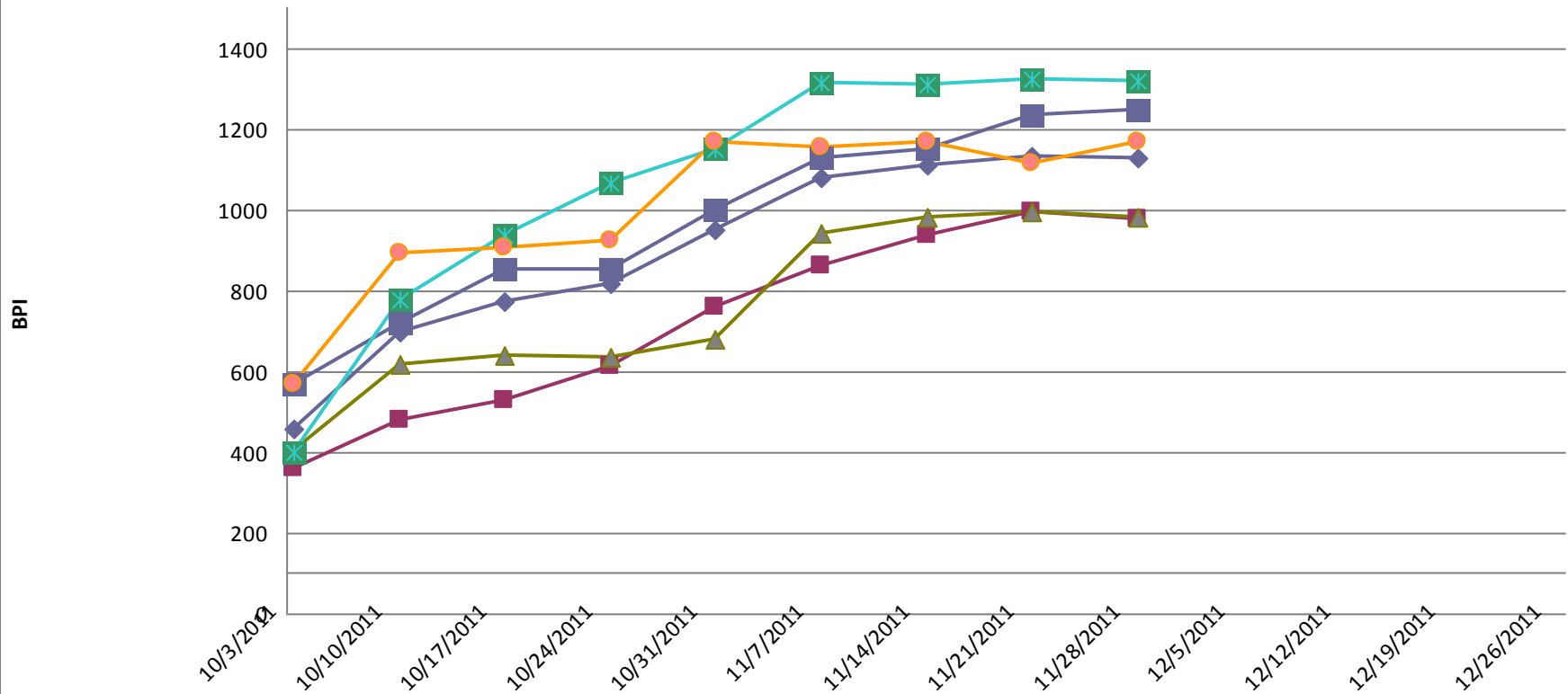
	10/3/2011	10/10/2011	10/17/2011	10/24/2011
Overall	459	696	772	817
Speed	360	481	528	614
Memory	402	616	640	633
Attention	566	718	853	853
FlexibilityProb Solve	398	777	938	1063
ProblemSolving	569	890	905	925

Lumosity Scores



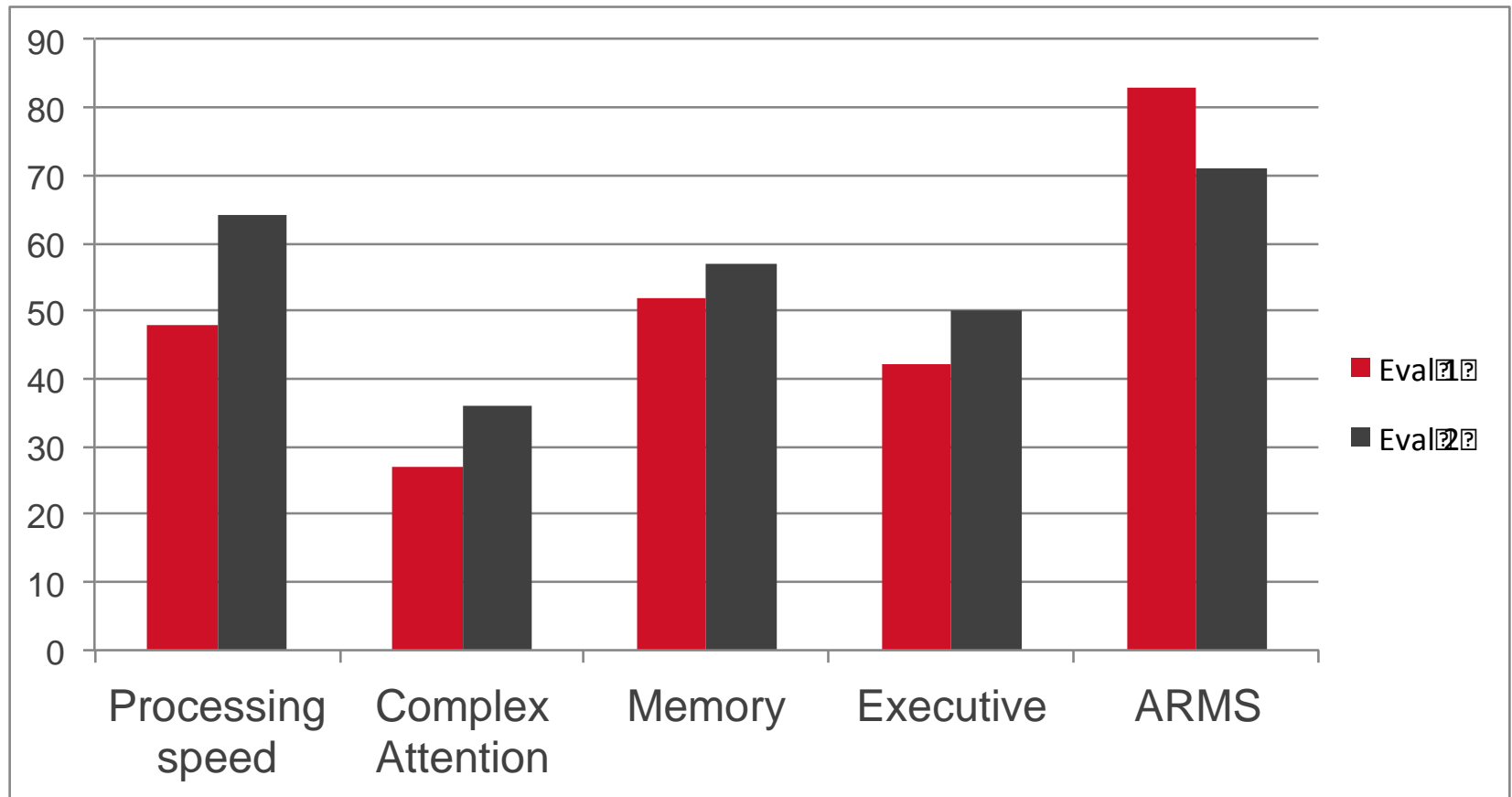
	10/3/2011	10/10/2011	10/17/2011	10/24/2011	10/31/2011	11/7/2011
Overall	459	696	772	817	950	1079
Speed	360	481	528	614	761	860
Memory	402	616	640	633	679	941
Attention	566	718	853	853	1000	1128
FlexibilityProb Solve	398	777	938	1063	1148.00	1314
ProblemSolving	569	890	905	925	1166	1156

Lumosity Scores

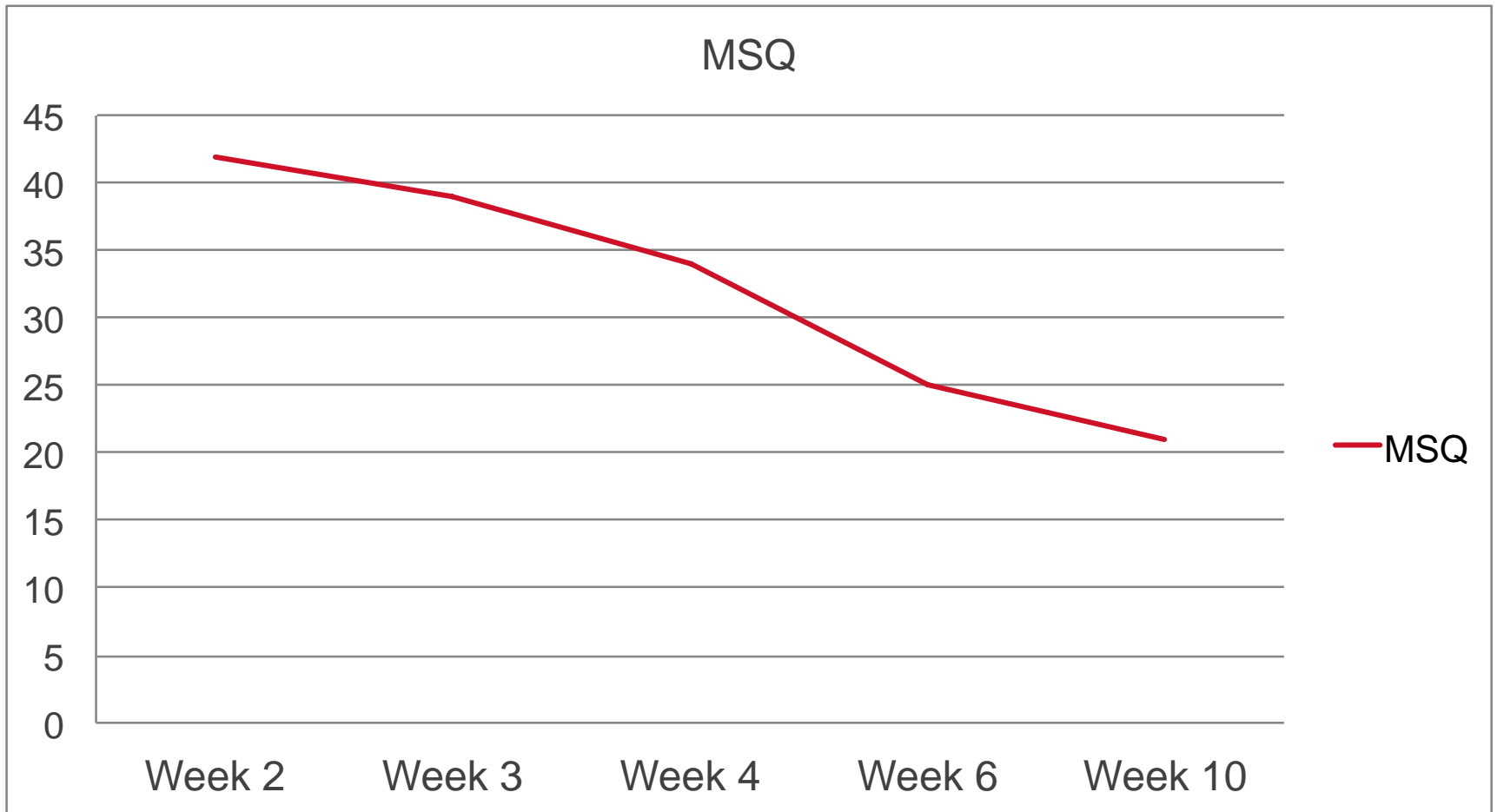


	10/3/2011	10/10/2011	10/17/2011	10/24/2011	10/31/2011	11/7/2011	11/14/2011	11/21/2011	11/28/2011
Overall	459	696	772	817	950	1079	1108	1132	1126
Speed	360	481	528	614	761	860	935	996	976
Memory	402	616	640	633	679	941	979	996	981
Attention	566	718	853	853	1000	1128	1151	1235	1245
FlexibilityProb Solve	398	777	938	1063	1148.00	1314	1311	1324	1317
ProblemSolving	569	890	905	925	1166	1156	1166	1112	1166

Neurpsychological Assessment



Mental Slowness Questionnaire



Subjective Complaints (MSQ)

- I make mistakes or forget things if I do things too quickly
- Difficulty doing two things at the same time
- I make mistakes if I do things at the same time
- I make mistakes if I am busy and get interrupted

Metacognitive Strategy Training of Attention

- Interventions targeted at specific impairment
 - Working memory
 - Processing speed
- Emphasis on the deliberate and conscious use of compensatory strategies

Remediation of Attention: Attention Process Training During Post- acute Rehabilitation

Tiersky et al., 2005

- APT provided in conjunction with memory and problem solving
- Incorporation of metacognitive strategy training as essential to training
- Intervention package characteristic of clinical practice

Remediation of Attention: Attention Process Training During Post- acute Rehabilitation

Tiersky et al., 2005

- Improvement on NP measures of attention but not other cognitive processes
- Improved symptom report
- No improvement in community integration

Remediation of Attention: Post-acute Treatment

Remediation of Working Attention

- N-back training at varying levels of complexity and simultaneous task demands
- Emphasis on allocation of attention resources, management of sequential and multiple task demands in daily functioning

Remediation of Attention: Post-acute Treatment

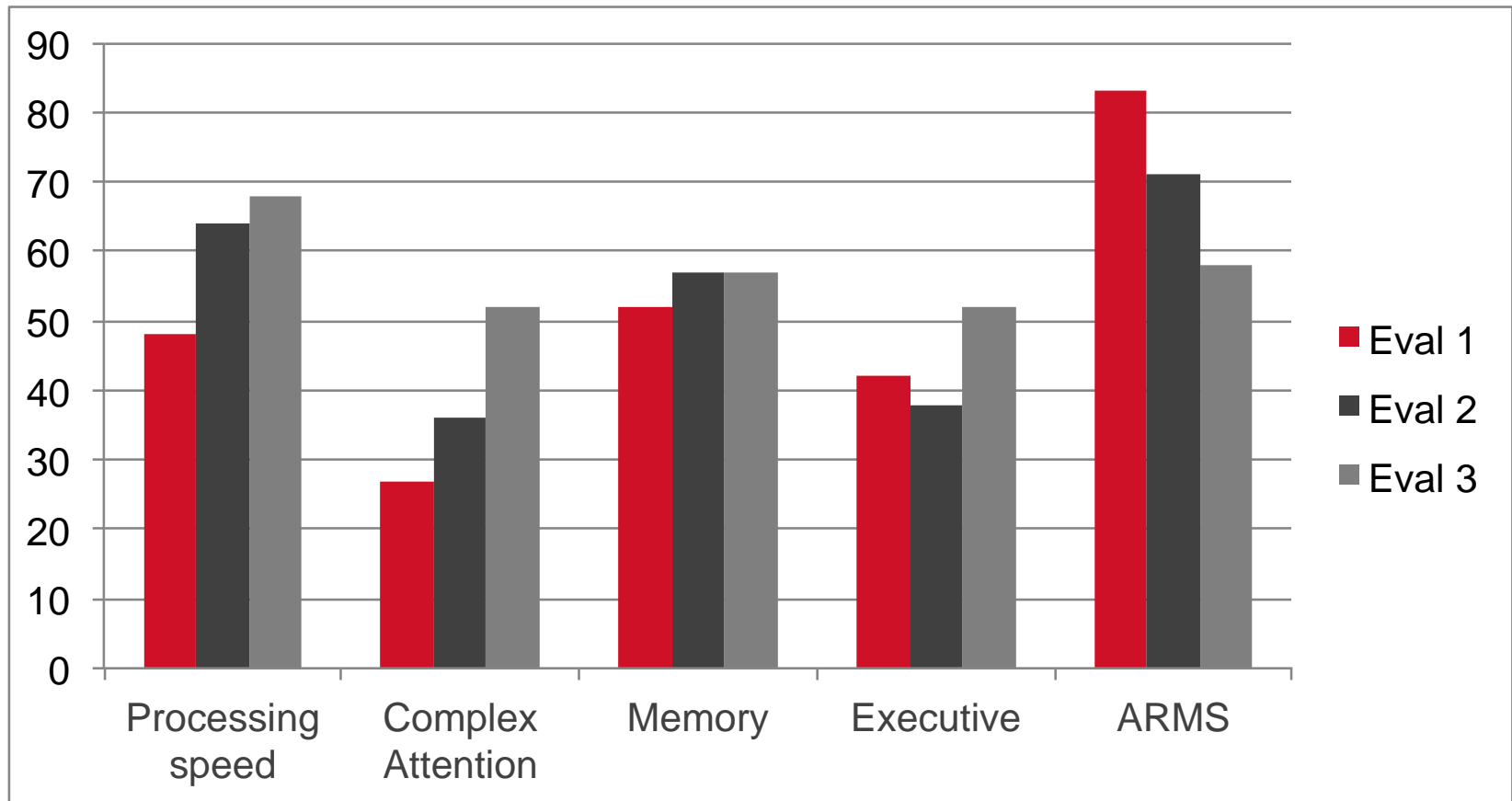
Time Pressure Management

- Increase awareness of errors and relation to slow processing
- Compensation for slowed information processing through anticipation and self-management
- Reduce experience of 'information overload' in daily tasks

Time Pressure Management

1. Enhance the patient's awareness
2. Acceptance and acquisition of TPM Strategy
3. Generalization

Neurpsychological Assessment



Subjective Complaints (MSQ)

- No change in frequency of problems
 - I make mistakes if I do things too quickly
 - Mistakes if I do 2 things at the same time
 - Mistakes if I am busy and get interrupted
 - Fatigue associated with mental effort, noise
- Reduction on how “bothersome” difficulties are in daily functioning

Meta - Recommendation

ATTENTION

Cognitive rehabilitation for TBI should incorporate direct attention training and metacognitive training, promote development of compensatory strategies, and foster generalization to real world tasks.

Remediation of Memory Deficits

Memory Strategy Training

Recommendations for Memory Remediation

8 Class I studies with 231 subjects support compensatory memory strategy training for persons with mild memory impairments due to TBI

Remediation of Memory Deficits

- Class II and III studies support effects of compensatory strategy training for mild memory deficits but not for persons with severe memory deficits

Recommendations for Memory Remediation

Practice Standard

- Memory strategy training is recommended for mild memory impairments from TBI, including the use of internalized strategies (e.g., visual imagery) and external memory compensations (e.g., notebooks).

Compensatory Memory Training

Internal Strategy

Internal Control

e.g. Berg et al.; Kaschel; Ownsworth;
Hildebrandt; Dou

Internal Strategy

External Control

e.g. Acker

External Strategy

Internal Control

e.g., Schmitter-Edgecomb

External Strategy

External Control

e.g., Wilson

Practice, Learning & Extinction

- Rehearsal practice
- Errorless / Errorful Learning
- Effortless / Effortful Learning
- Error recognition & error utilization



Case Illustration 2

Case Illustration 2

- 44 year old female
- 12 years education
- 1 year post MVA rollover, thrown from vehicle
- LOC with 3 weeks PTA
- extensive contusions involving left frontal, temporal and parietal lobes

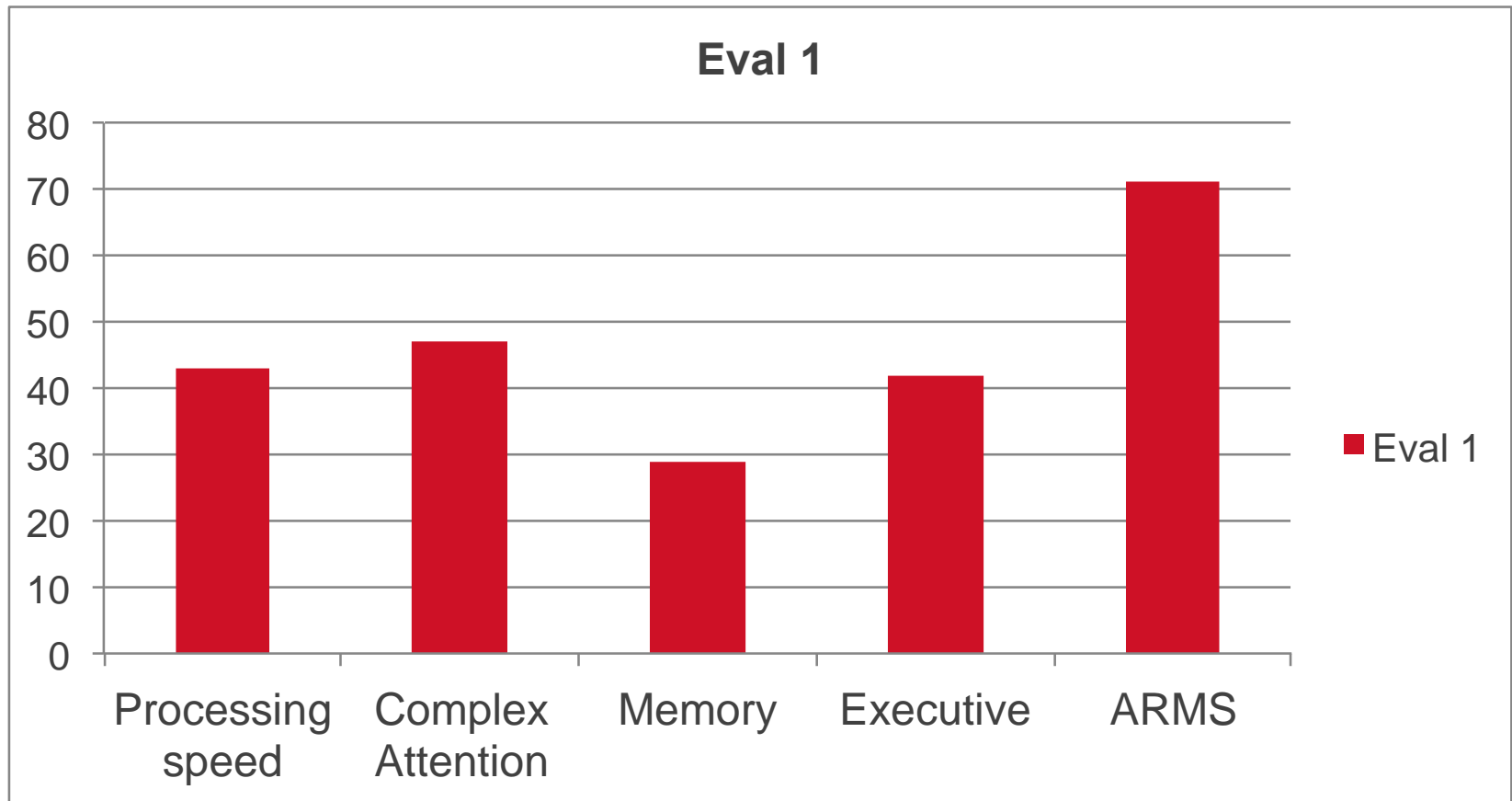
Subjective Complaints

- Forgets things her husband tells her
- Has to write everything down when she goes shopping, makes appointments
- Reading takes longer and she has to keep going over the same material
- Loss of smell
- “Shuts down” by evening

Subjective Complaints (ARMS)

- Constant difficulties starting to do something and forgetting what she meant to do
- Frequent difficulties remembering what she has been told
- Easily distracted and difficulty to maintain her train of thought
- Mistakes during familiar activities (e.g. checkbook – has to visualize calculations)
- Irritated and easily overwhelmed

Neuropsychological Assessment Case 2





Case 2 Intervention

Remediation of Memory Deficits

Kaschel et al (2002)

- **Visual imagery Training**
 - Benefits compared with “standard memory training”
 - **Extensive training provided in use of the visual imagery strategy**
 - **Specific benefits apparent on verbal narrative recall**

Visual Imagery Training

- Difficult to apply for people with cognitive limitations
 - adynamia, poor self generation
 - slow processing
- Difficult to apply in everyday functioning
- Limited transfer

Visual Imagery Training

- Two training periods
- Standardized skill acquisition
 - Ability to generate visual images to verbal information
- Individualized skill transfer
 - Remembering verbal information or prospective actions in everyday life

Visual Imagery Training

- Skill acquisition
 - Motivation for visual imagery (use of autobiographical memories)
 - Rapid generation of visual images of objects
 - Generation and retrieval of images of simple actions

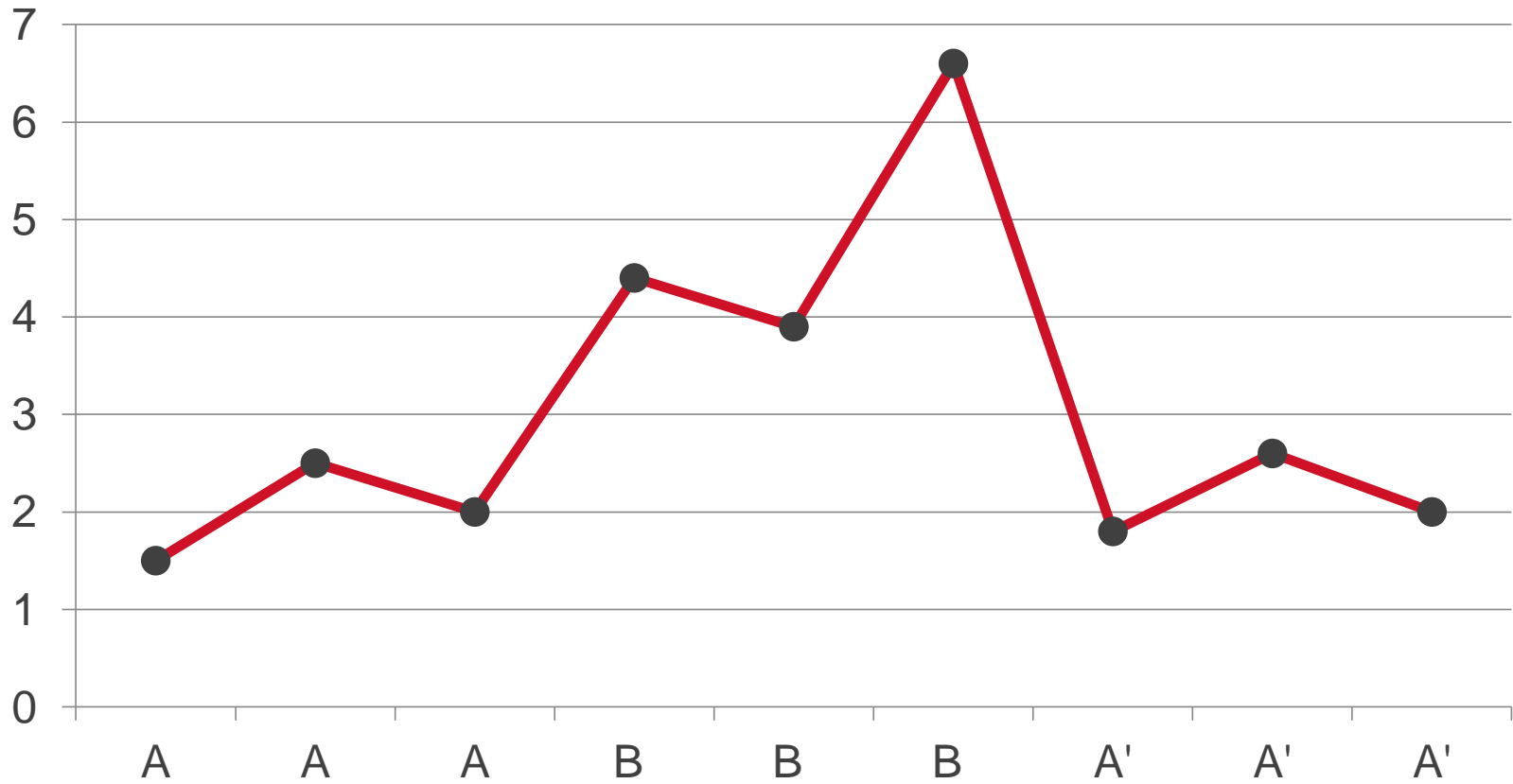
Visual Imagery Training

- Individualized skill transfer
 - “copy’ visual image
 - Verbal self-instruction of action
 - Perform action sequence with visual image
 - Gradual reduction of presentation times
 - Withdrawal of external image and formation of image to concrete word stimulus
 - Simple actions stored and retrieved using visual images

Remediation of Prospective Memory Deficits

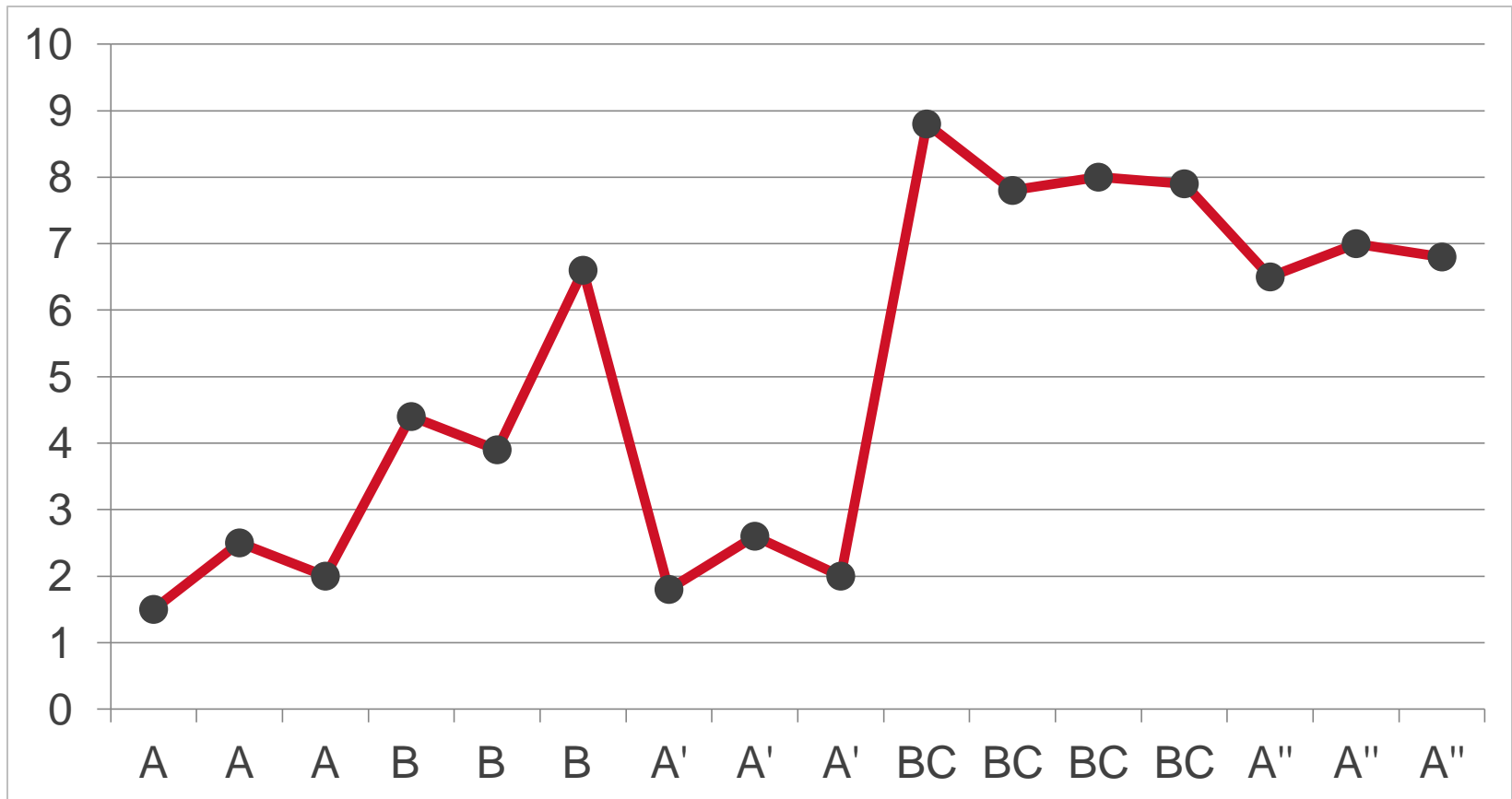
- Visual imagery Training for Prospective Memory Deficits
Potvin et al, 2011; Grilli & McFarland, 2011
 - Mental images associating a prospective cue with an intended action
 - Applied to progressively more complex and natural tasks
 - Use of self-imagining and implementation intentions

Initial Acquisition of Visual Imagery Strategy

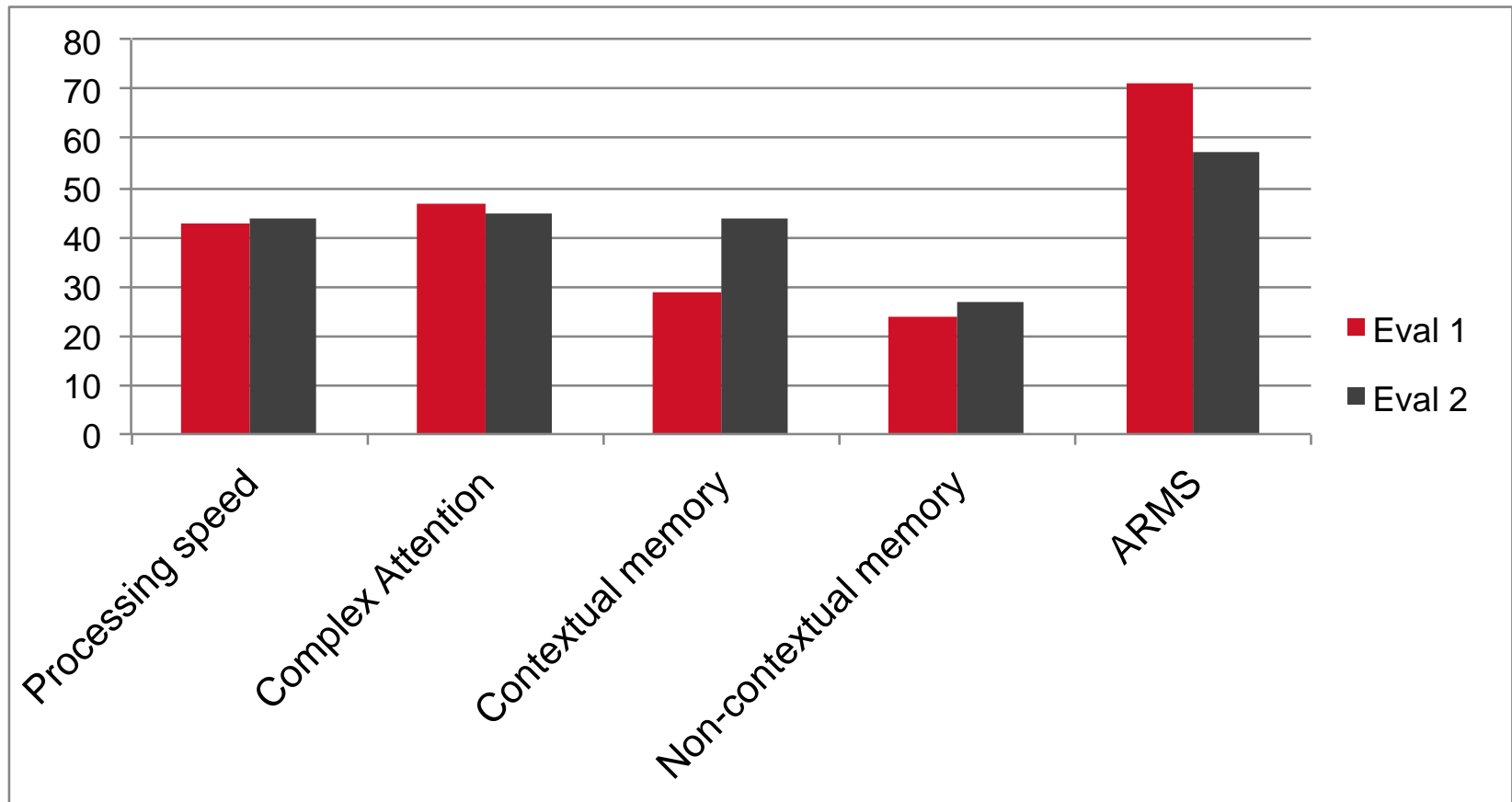


Treatment Accommodation

B = Visual imagery training
C = Personal imagery



Neuropsychological Assessment Case 2



Subjective Complaints (ARMS)

- Occasional difficulties starting to do something and forgetting what she meant to do
- Occasional difficulties remembering what she has been told
- Mistakes during familiar activities (e.g. shopping – remains more effortful)

Remediation of Memory Deficits

Ownsworth & McFarland (1999)

- Standard “Diary Only” condition
 - Diary entry, checking, using information
- versus*
- Diary and Self-Instructional Training
 - Self-management strategy for use of diary in everyday situations

Remediation of Memory Deficits

Ownsworth & McFarland (1999)

- All participants reported increased use of strategies and reduced distress over memory problems
- DSIT related to better maintenance of strategy use, greater decline in memory problems, and greater ratings of 'helpfulness' of memory strategies
- Benefits were apparent despite chronic deficits

Meta - Recommendation

MEMORY

- Emphasis on independent strategy use for patients with mild memory impairment
- Increase cuing and structured learning for more severe memory problems
- Externally-controlled compensations for severe memory impairment

Recommendations for Remediation of Executive Dysfunction

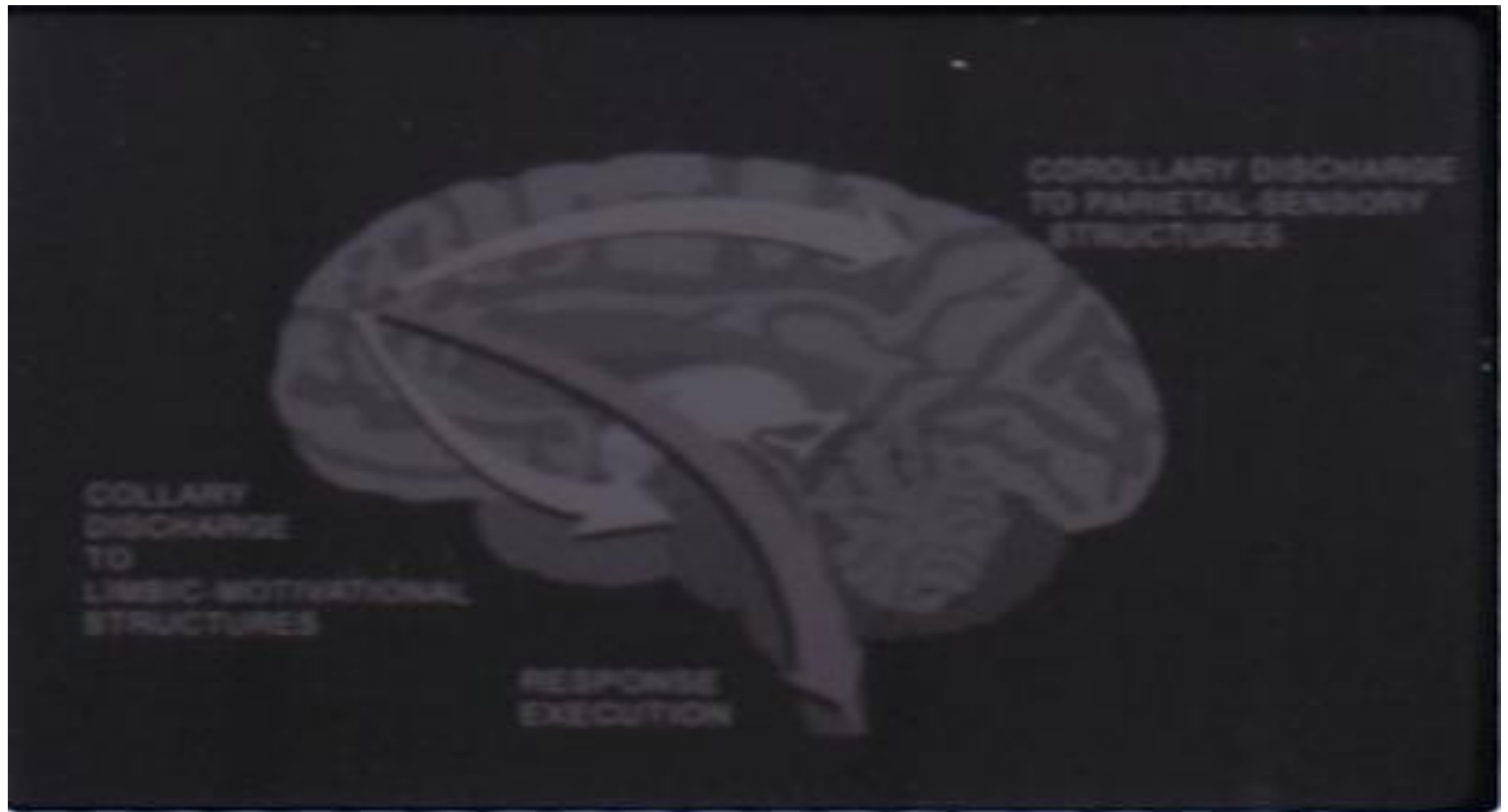
Practice Standard

- Metacognitive strategy training to promote internalization of self-regulation strategies (self-instruction, self-monitoring) is recommended for treatment of executive functioning, including emotional regulation, after TBI

*Behavioral Regulation after
Frontal Lobe Damage*
H. – L. Teuber, 1964

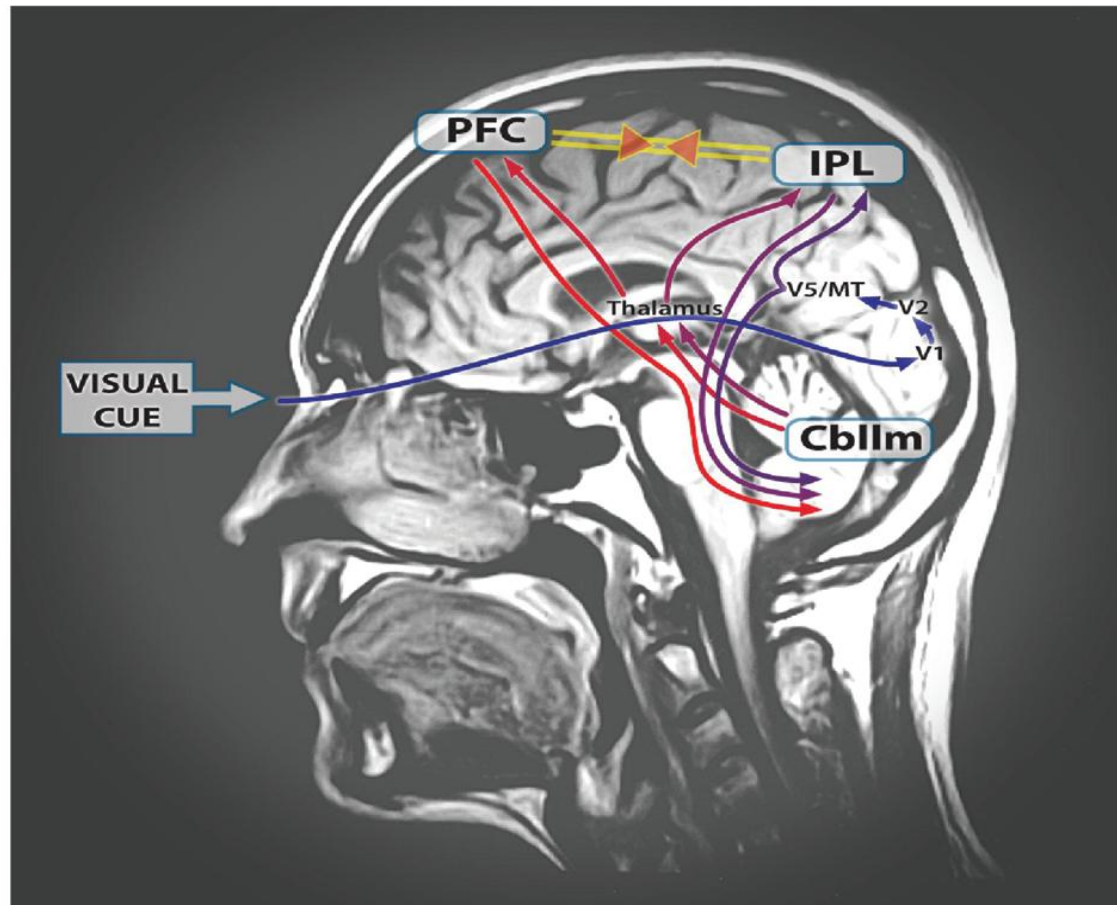
- “It is not in the reaction to incoming stimuli, *but in the prediction of them...* that the significance of frontal structures lies”
- “corollary discharge serves as the basis for *voluntary* aspects of behavior”

The role of corollary discharge



Anticipatory Neural Network

Ghajar & Ivry, 2008

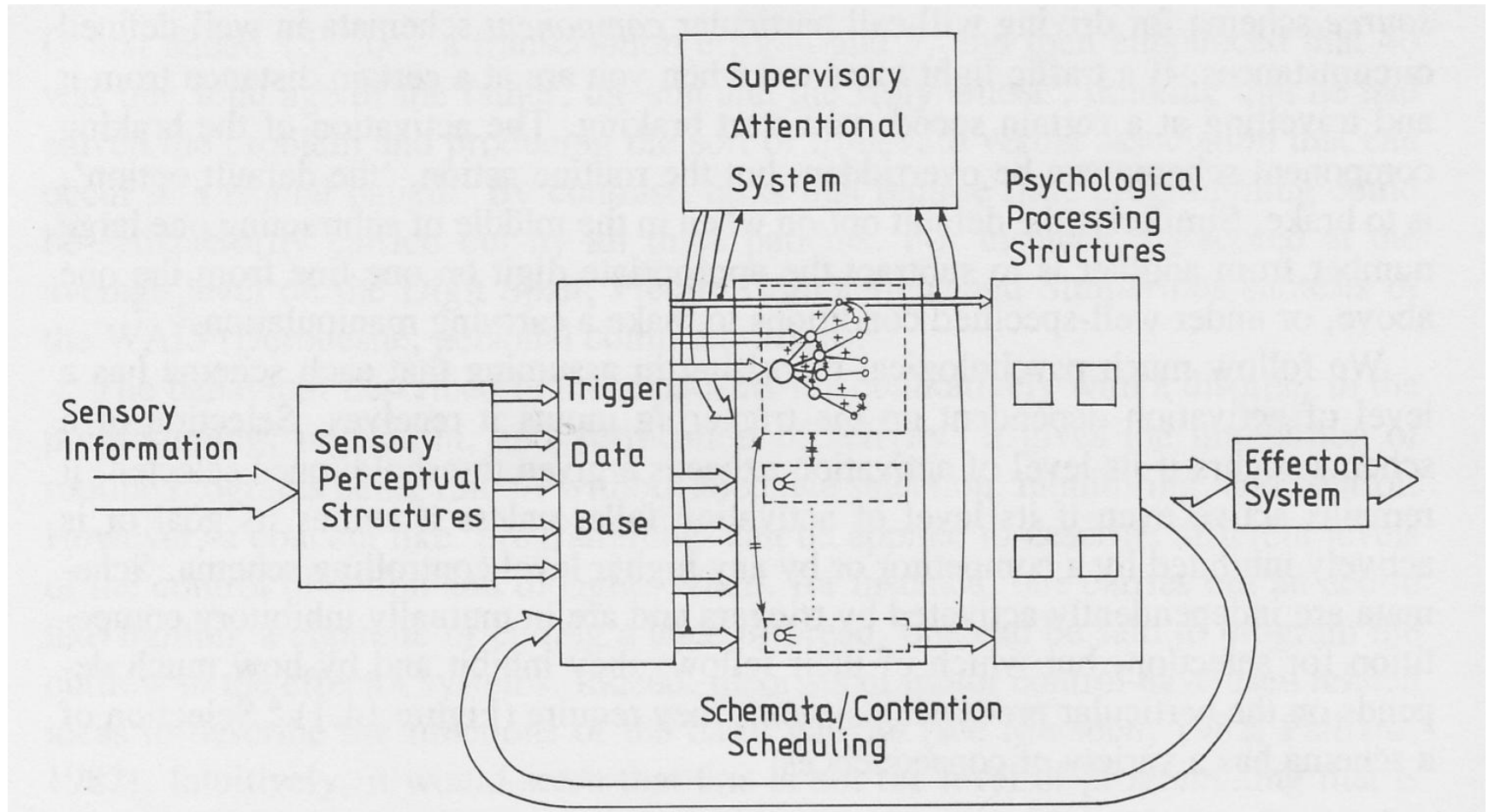


General algorithm for re-mediation of executive functioning

- Anticipate, predict & plan
- Execute and self-monitor
- Evaluate and revise

Dual Process Theory of Behavioral Selection and Regulation

Norman & Shallice



Remediation of Planning Disorder

Cicerone & Wood, 1986

- 20 year old male
- Severe TBI (18 days LOC)
- Multiple contusions, Right frontal intracerebral hemorrhage
- Brief physical therapy for left weakness
- 4 year after injury with 'good recovery

Remediation of Planning Disorder

Cicerone & Wood, 1986

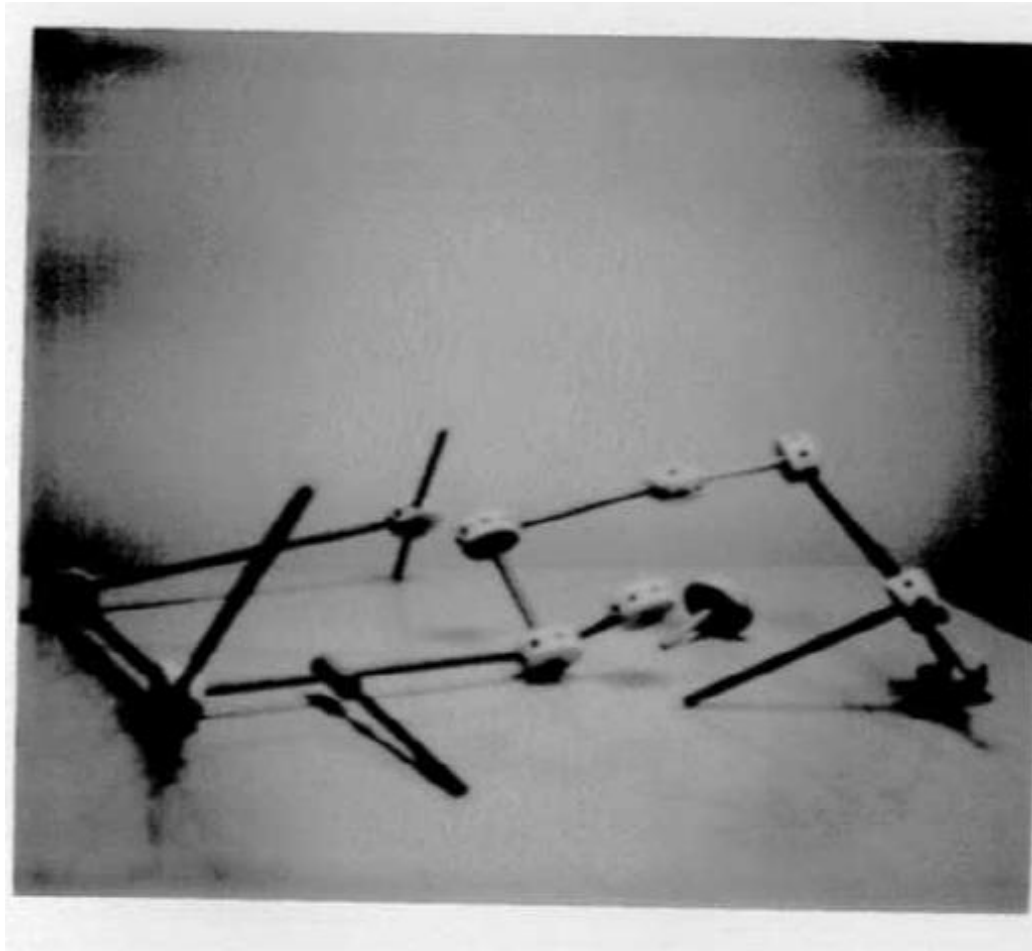
- Family noted interpersonal difficulties
- Frequently interrupted conversations
- Speech was often expansive and circumstantial
- Marked impulsivity
- “It is like he doesn’t think before he does something”

Remediation of Planning Disorder

Cicerone & Wood, 1986

- Significant verbal-performance discrepancy
- Intact rote memory
- Planning measures equivalent of 7 year old
- Poor organization on copying
- Frequent errors on conditional motor responses
- Impaired 'sensorimotor integration' (imitation of postures)

Pre-Intervention



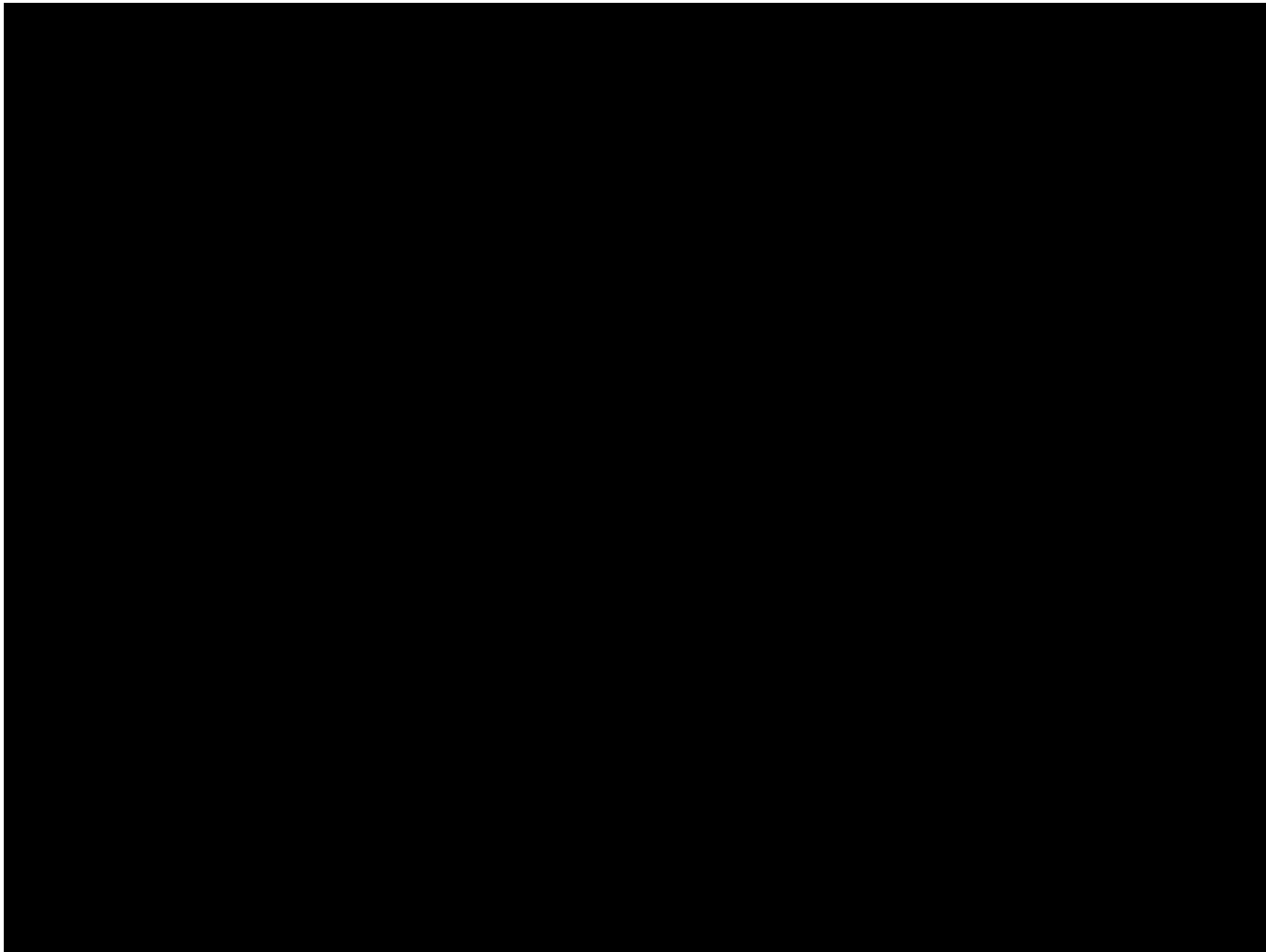
Self-Instructional Training

Cicerone & Wood, 1986

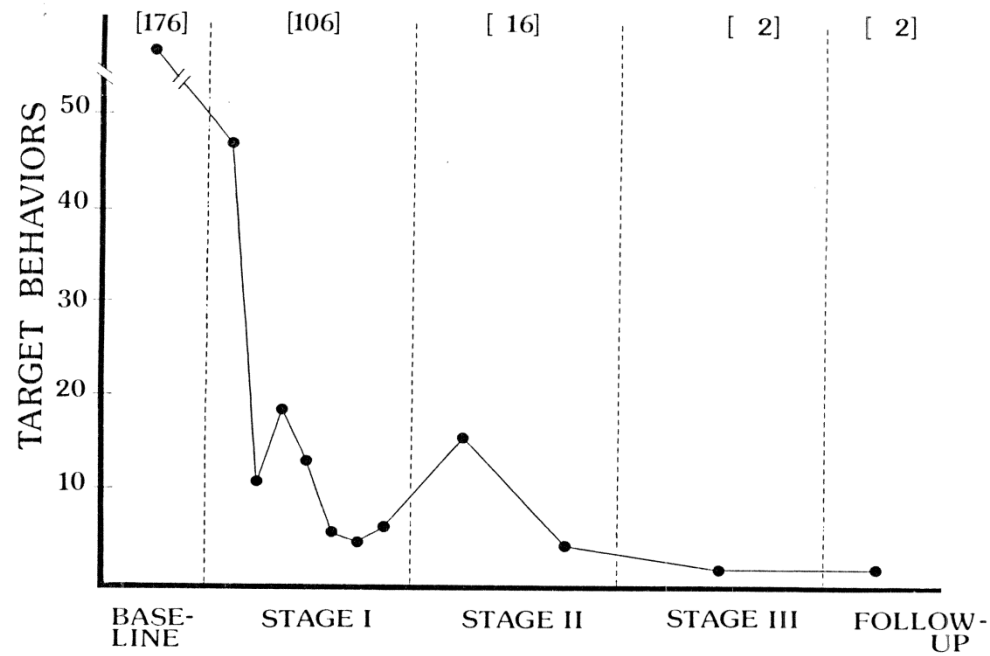
- **Overt verbalization** prior to and during task performance
- **Faded (whispered) verbalization** prior to and during task performance
- **Silent verbalization** prior to and during task performance

Self-Instructional Training

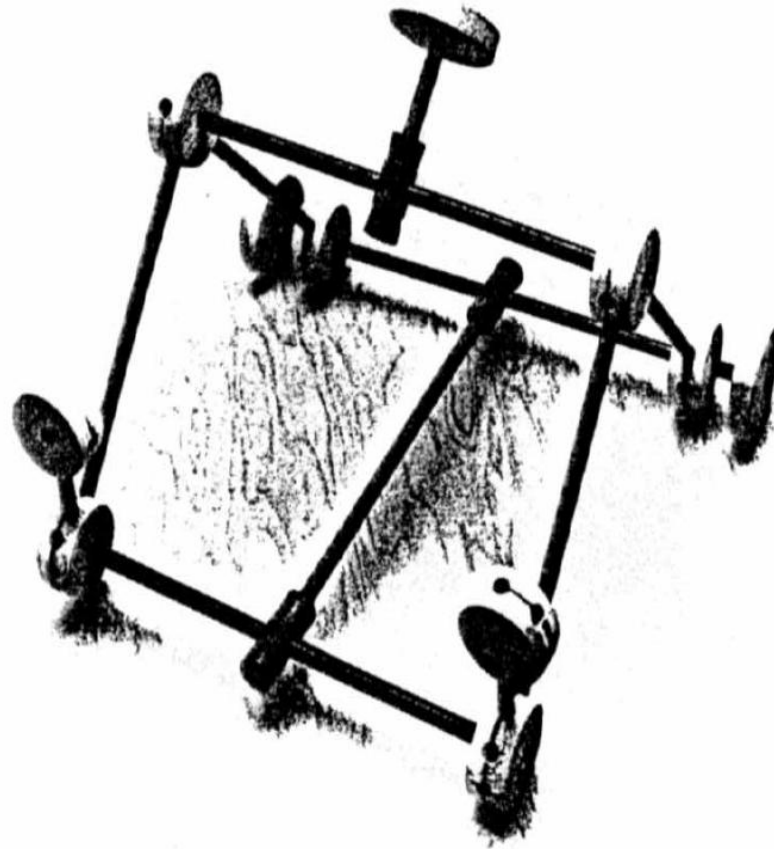
Cicerone & Wood, 1986



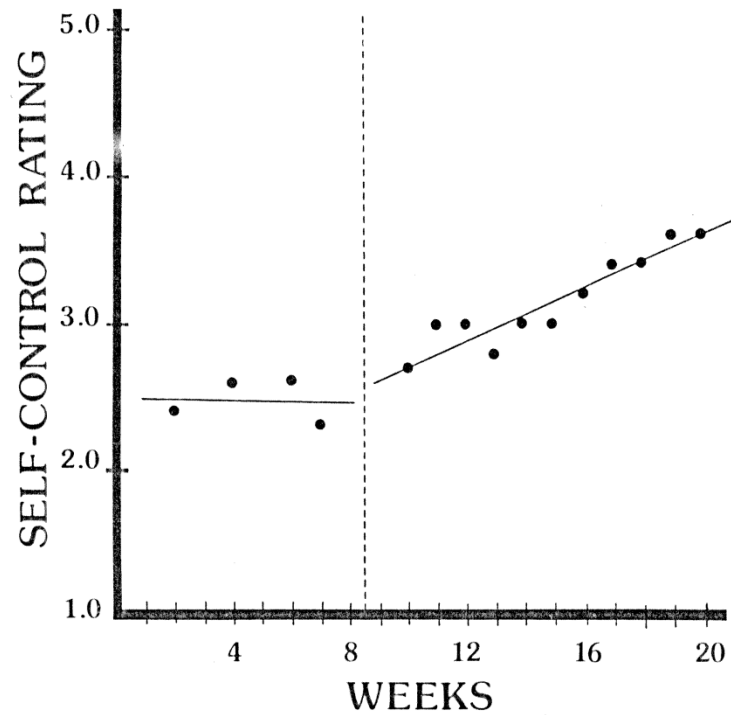
Effect of Self-Instruction on Planning Disorder



Post Intervention



Effect of Self-Instruction on Social Behavior

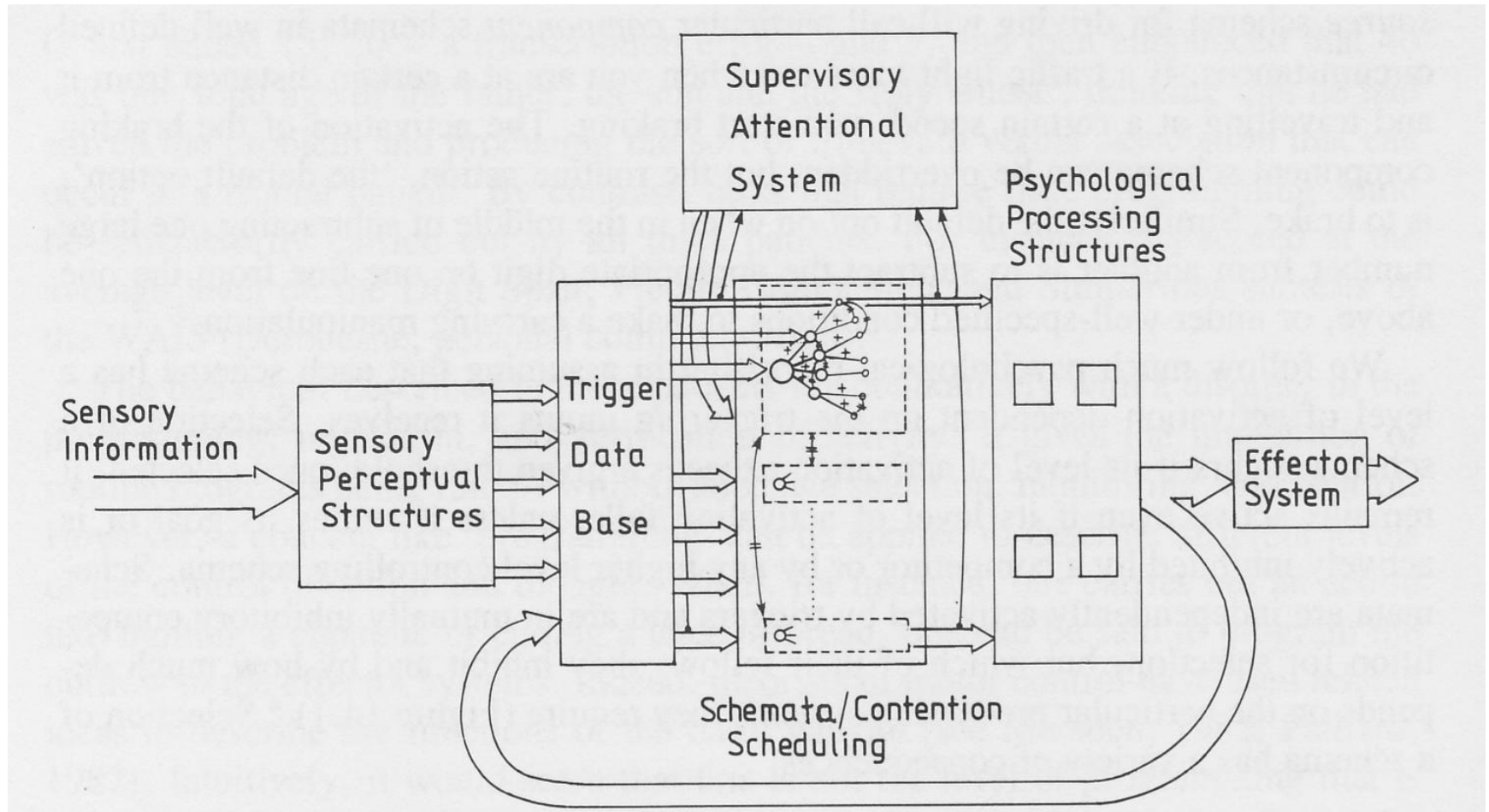


Generalization of Training

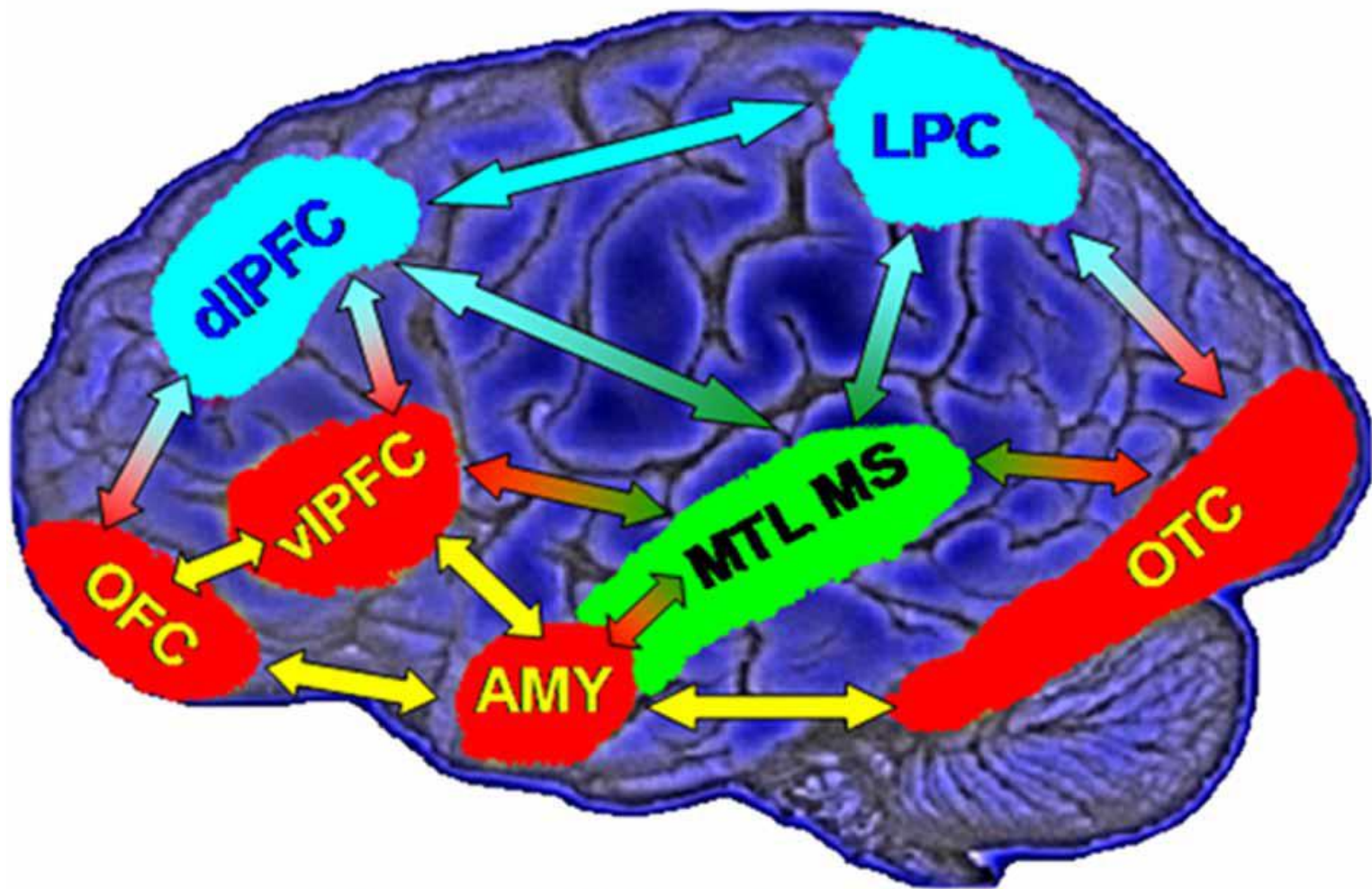
- Extended training is provided
- Client is given specific instruction and practice in functional application (*i.e. multiple examples*)
- Active self-monitoring and feedback on application in real-life situations
- Client is given increasing responsibility for implementation of strategies (*'plan to plan'*)

Dual Process Theory of Behavioral Selection and Regulation

Norman & Shallice



Dorsal Executive System



Ventral Affective System

How am I?

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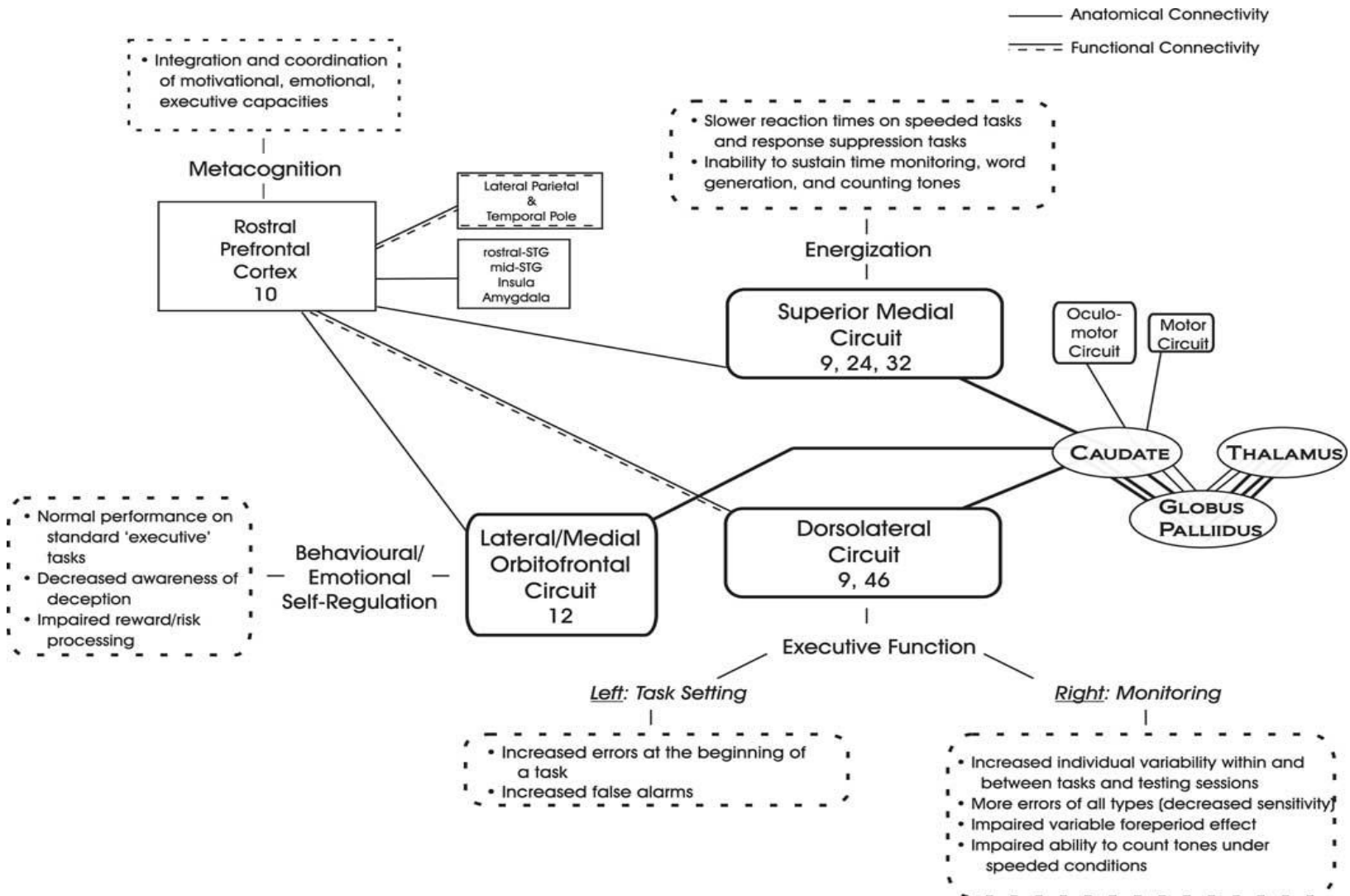
Need caffeine
So bored !

This is chill
Life is good

Too much info
Out of my mind

Frontal lobes and executive functions

Stuss, 2011



Recommendations for Remediation of Executive Dysfunction

Practice Guideline

Training of formal problem solving strategies and their application to functional situations is recommended for persons with stroke or TBI during the post-acute period of rehabilitation

Remediation of Deficits in Executive Functioning

Several Class I studies of attention, neglect and memory have incorporated self-instructional training as a component of interventions

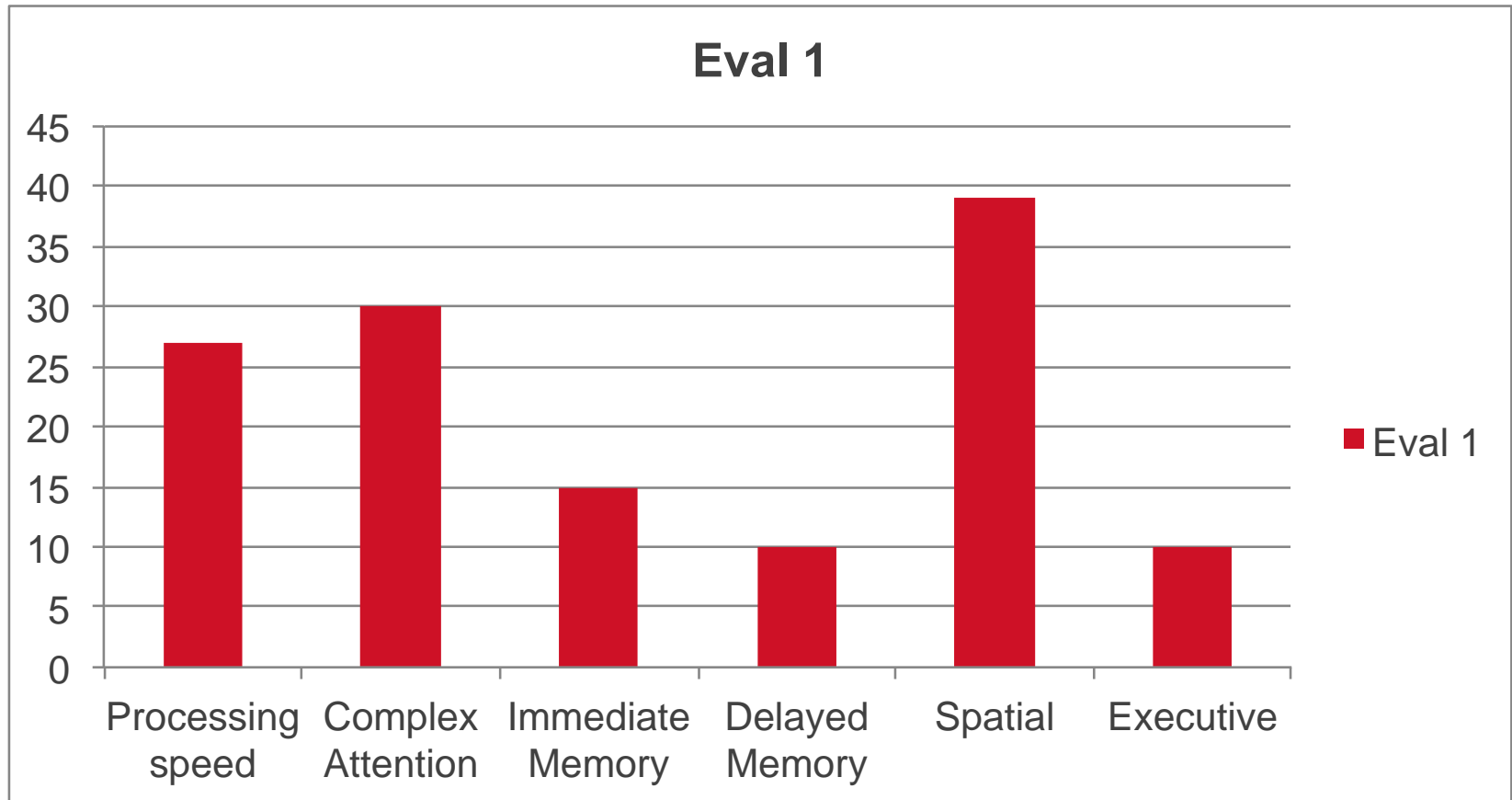
Case Illustration 3

- 44 year old woman
- 12 years education
- 24 years post MVA collision
- 6 weeks LOC, 2 years independent living rehabilitation
- Living with mom (sister nearby)
- Difficulty initiating and sustaining routine activities
- Difficulty with emotional regulation and impulse control (smoking, drinking, swears like a sailor)

Subjective Complaints

- Spends time on computer but loses track of what she is doing
- “Train of thought goes off and then I lose everything”
- Frequently “gets stuck” and can not figure out another way of doing something

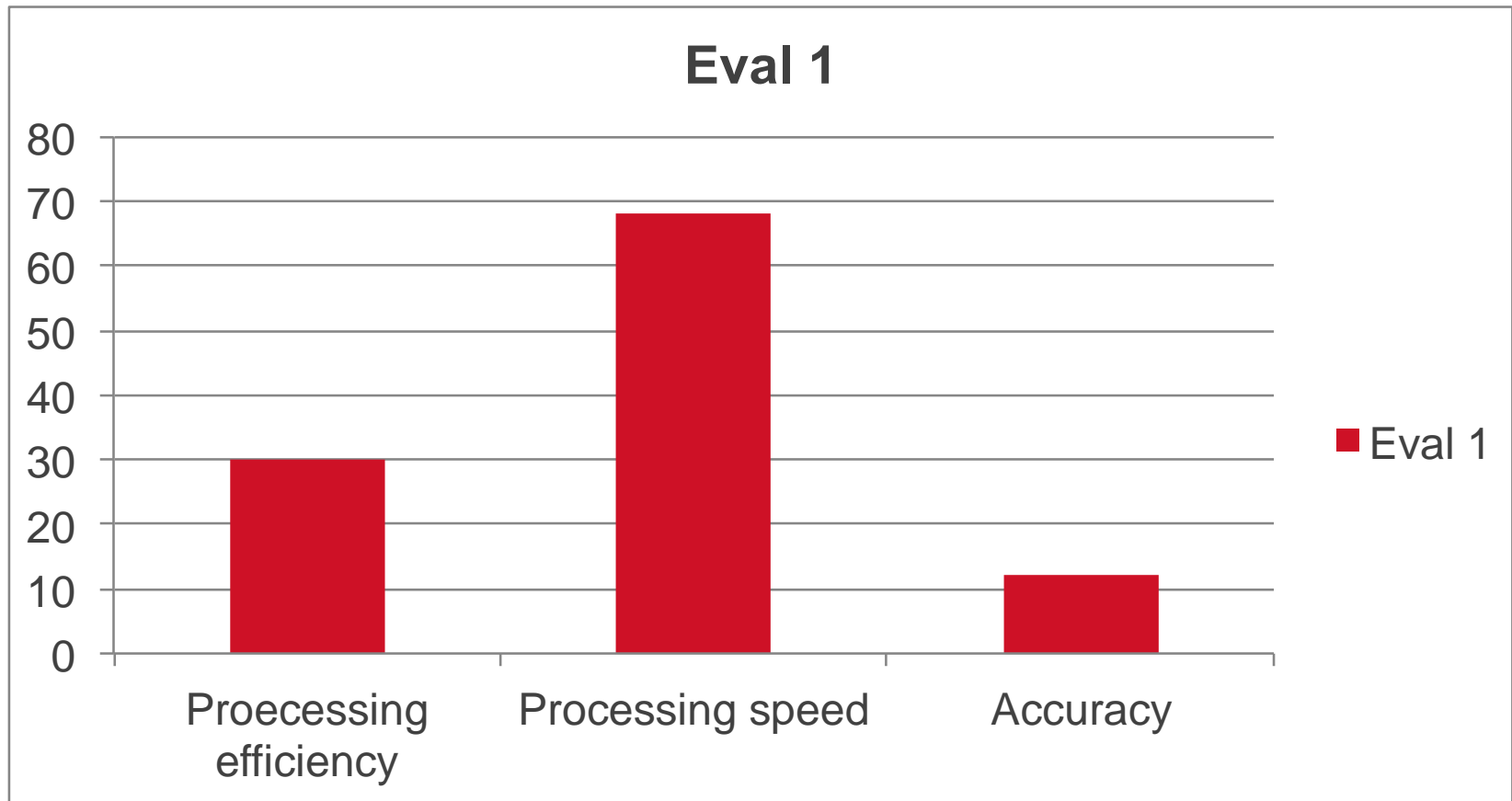
Neuropsychological Assessment Case 3



Neuropsychological Assessment

Sustained Attention

Case 3





Case 3 Intervention

Metacognitive Training for Sustained Attention and Goal Maintenance

- Prosthetic cues (*O'Connor et al., 2011*)
- Content-free cuing (*Manly et al., 2002, 2004; Fish et al., 2006, 2008*)

Intervention for Sustained Attention

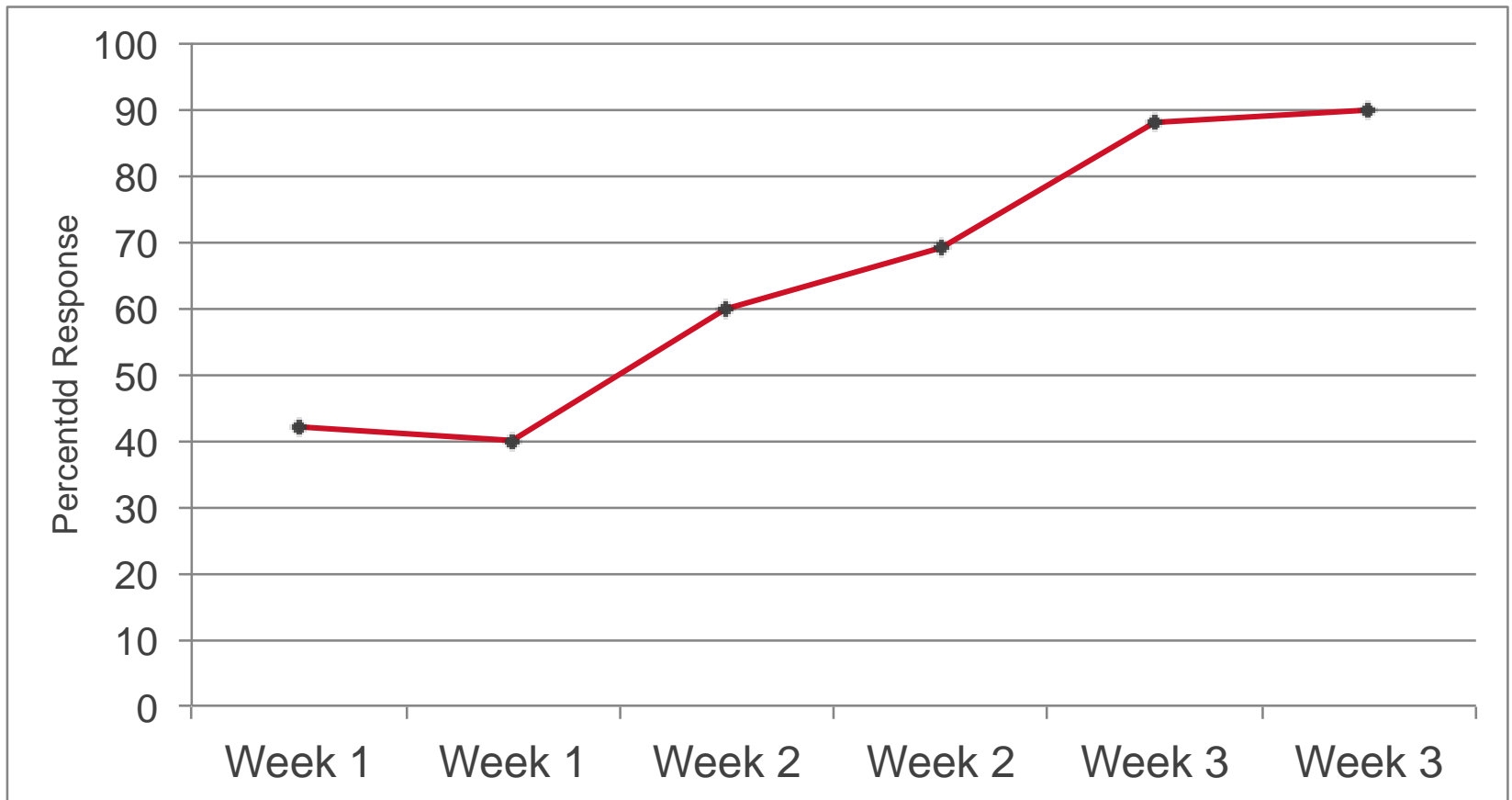
- Content-free external cuing
 - During sustained attention tasks
 - During complex problem solving
 - During daily activities (computer use)
- Transfer of external cuing to self-cuing
 - “Am I doing what I planned on doing?”

Awareness and Compensation

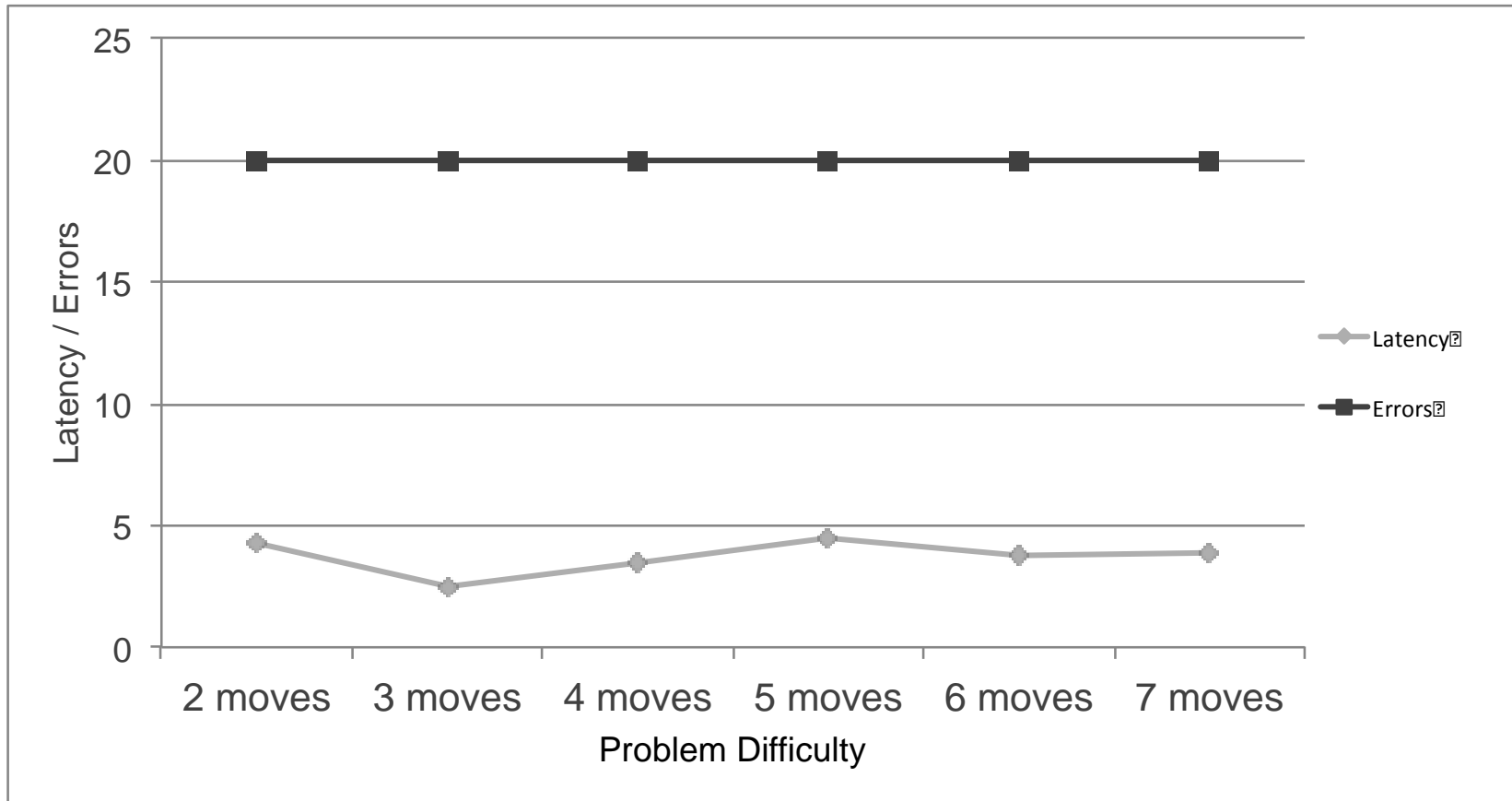
(Crosson et al., 1989)

- Intellectual awareness deficit
- Emergent awareness deficits
- Anticipatory awareness deficit
- No significant awareness deficit
- External compensations
- Situational compensations
- Recognition compensations
- Anticipatory compensations

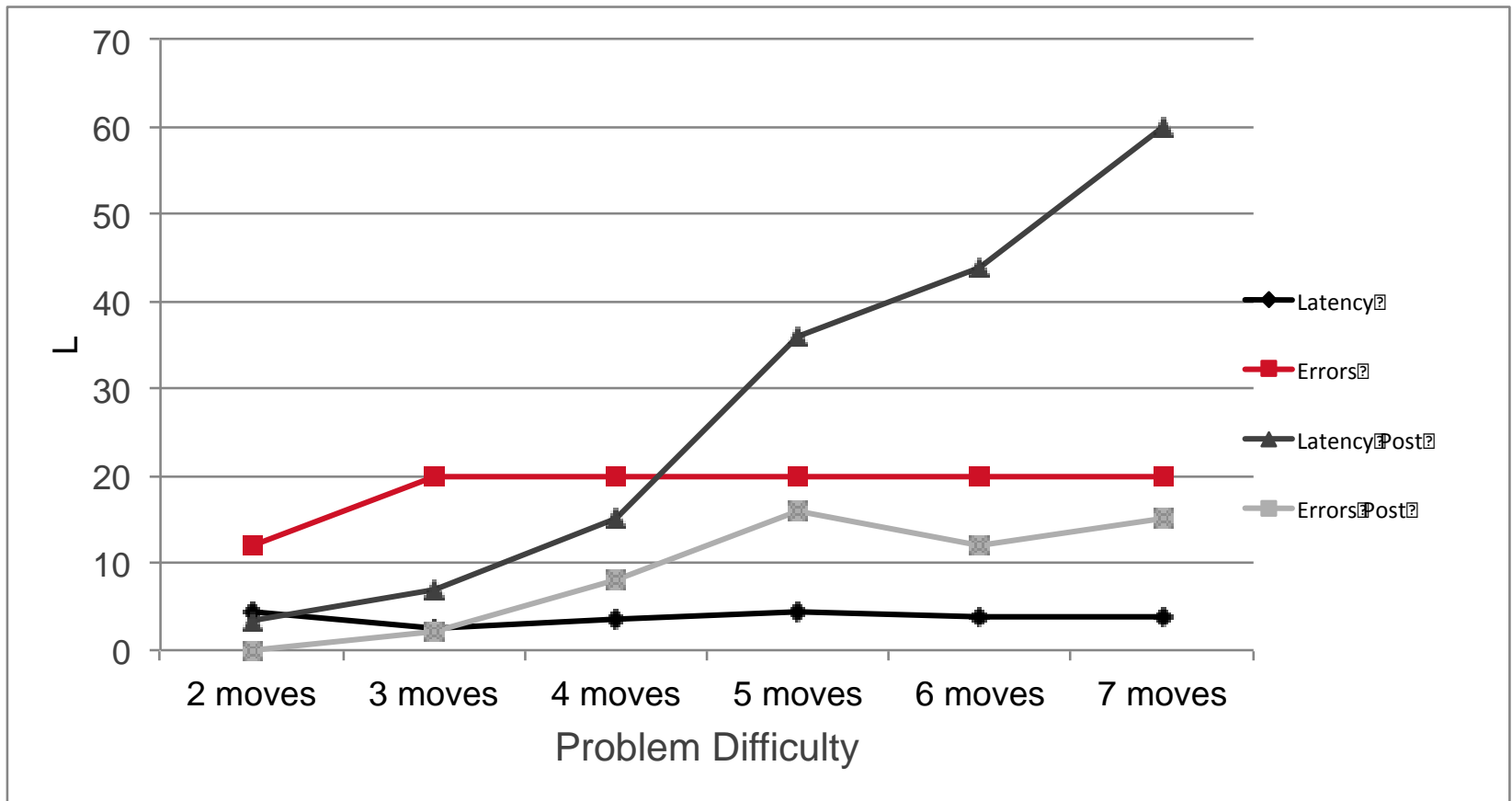
Verbal Response to External Cue



Self-Instructional Training Prediction and Problem Solving



Self-Instructional Training Prediction and Problem Solving



Prediction and Problem Solving Intervention

- Throughout the problem solving intervention there was a consistent emphasis on fostering a positive problem orientation
- Throughout the problem solving intervention there was a consistent emphasis on relevance to social problem solving (*stop, think, plan*)

Metacognitive contextual intervention to enhance error awareness
Ownsworth et al., 2006

- **PAUSE** to provide an opportunity for client to self correct errors, if not apparent
- **PROMPT**
 - **Non-specific prompts**: “Stop and tell me what you are doing right now”
 - **Specific prompts**: “check the recipe and find the first ingredient to put in the mixing bowl”
- **PRAISE**

Application to Social Cognition

- STOP and identify problem
- Use a rational problem solving strategy
- Manage emotional reactions
- Manage cognitive overload
- Maintain positive problem orientation

Emotional Regulation

- Management of frustration during task performance
- Positive problem orientation
- Clarification of emotional states (CES)
- Goal maintenance and goal interference

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Cognitive Energy Scale (CES)

1

Not paying attention

Mind is Blank

Inactive

2

3

Able to focus

Mind is sharp

Engaged

4

5

Distractible

Mind is Overwhelmed

Irritable to Aggressive

PURPOSE OF CES ANALYSIS: Help to learn to apply the CES and identify warning signs and triggers.

Describe a situation that occurred in which you experienced a change in your CES. (Who, What, Where, When?):

Did your CES become higher or lower during this situation?

What were the initial warning signs that your CES had changed? (Consider specific cognitive, emotional, physical or behavioral signs.)

What might have caused your CES to fluctuate? What were the triggers? (Consider noise, mental effort, fatigue, complexity or novelty of task.)

What strategies did you use to manage your CES?

Rate how satisfied you are with how you managed your CES in this situation.

1

3

5

7

10

Very Dissatisfied

Very Satisfied

Generalization of errorfull learning

- Limited transfer of metacognitive strategy use to functional tasks (e.g., craft activities)

Recommendations for Memory Remediation

Practice Option

- For people with severe memory impairments after TBI, errorless learning techniques may be effective for learning specific knowledge or skills, with limited transfer to novel tasks or reduction in overall functional memory problems

Remediation of Memory Deficits

Bourgeois et al (2007)

- Teletherapy-based training of compensatory strategy use for specific memory problems (*taking medications, losing keys*)
- Errorless learning vs. didactic strategy training

Remediation of Memory Deficits

Bourgeois et al (2007)

- Errorless learning facilitated specific strategy acquisition and use
- No difference in generalized strategy use or incidence of everyday memory problems

Direct application of errorless learning

- Limited transfer of metacognitive strategy use to functional tasks (e.g., craft activities)
- Use of checklist
 - Errorless learning
 - Reinstatement procedure

Cognitive Orientation to Occupational Performance

1. Therapist demonstrates **client-centered goal setting**
2. Therapist responds to changing clients needs by rescaling goals
3. Client and therapist engage in discussion of goals and performance throughout the session (1 to 3 goals are addressed but no more than 3)
4. Evidence of teaching global cognitive strategy: **Goal-Plan-Do-Review**
5. Therapist encourages client to **articulate a plan** prior to performance
6. Therapist incorporates **guided discovery**: Ask don't tell; Coach don't adjust; Make it obvious (scaffolding); One thing at a time
7. Therapist **enables** client to promote independence & self-efficacy
8. Therapist facilitates generation and use of domain specific strategies
9. Specific remediation of component impairments **is not** evident
10. Therapist encourages the client to **check his/her plan** after performing it
11. Evidence of **collaborative (therapist and client) analysis** of performance breakdown

Emotional Regulation

- Management of frustration during task performance
- Positive problem orientation
- Clarification of emotional states (CES)
- Goal maintenance and goal interference

Cognitive Energy Scale (CES)

1

Not paying attention

Mind is Blank

Inactive

2

3

Able to focus

Mind is sharp

Engaged

4

5

Distractible

Mind is Overwhelmed

Irritable to Aggressive

PURPOSE OF CES ANALYSIS: Help to learn to apply the CES and identify warning signs and triggers.

Describe a situation that occurred in which you experienced a change in your CES. (Who, What, Where, When?):

Did your CES become higher or lower during this situation?

What were the initial warning signs that your CES had changed? (Consider specific cognitive, emotional, physical or behavioral signs.)

What might have caused your CES to fluctuate? What were the triggers? (Consider noise, mental effort, fatigue, complexity or novelty of task.)

What strategies did you use to manage your CES?

Rate how satisfied you are with how you managed your CES in this situation.

1

3

5

7

10

Very Dissatisfied

Very Satisfied

Self-efficacy Beliefs

Cicerone et al., 2004

- *“To be effective rehabilitation after TBI must address patient’s attitudes and beliefs in addition to their cognitive abilities; remediation of cognitive abilities may have more generalized effects if it increases self-efficacy beliefs as well as trains cognitive skills”*

Clinical Applications of Problem-Solving Research in Neuropsychological Rehabilitation: Addressing the Subjective Experience of Cognitive Deficits in Outpatients With Acquired Brain Injury

RathHradil. Litke Leonard Diller, 2011

The concept of ***Problem Orientation***...

provides a framework for conceptualizing interventions to address the impact of subjective experience on cognitive functioning, within the context of cognitive remediation...Focusing on the beliefs, assumptions, and expectations that individuals with acquired brain injury have about their own cognitive functioning.

Remediation of Deficits in Executive Functioning

Rath et al, 2003

- Group-based training on social problem solving and emotional regulation strategies (problem orientation)
- Selective benefits on self-appraisal and interpersonal problem solving strategies
- Benefits on problem solving most apparent for patients with slower processing at baseline

Remediation of Deficits in Executive Functioning

Ownsworth et al, 2008

- Individual vs. Group-based training on awareness and problem solving
- Individual treatment improved specific cognitive skills
- Group treatment improved behavioral and emotional symptoms

Recommendations for Remediation of Executive Dysfunction

Practice Option

Group based interventions may be considered for remediation of executive and problem solving deficits after TBI

Meta - Recommendation

Executive Functioning

Cognitive rehabilitation for TBI should incorporate training in self-awareness and self-regulation

Training in self-regulation should be a component of treatment for all deficits

Meta - Recommendation

Executive Functioning

Cognitive rehabilitation for TBI should incorporate training in problem solving skills, problem orientation and emotional self-regulation

Group-based treatments may enhance problem-solving and self-regulation skills

Integration of Cognitive Interventions

- **Modular** treatments are generally aimed at a single cognitive impairment, which delivered alone, might be expected to enhance function in patients with a single or predominant impairment
- **Comprehensive** or **Holistic** programs typically contain a mix of modular treatments that target multiple cognitive impairments, treatments that address self-awareness of the impact of cognitive deficits, and individual or group therapies that facilitate coping with residual deficits and their social consequences.

Evaluating Complex Interventions

- Involve a number of interacting components
- Multiple aspects of therapist involvement
- Multiple changes in patient's behaviors
- Multiple levels of intervention
- Multiple levels of outcome assessed
- Treatment accommodations to individual goals and behaviors
 - Craig et al, 2008

Remediation of Attention: Post-acute Treatment

Integration of Attention Training as Part of Complex Interventions

- Wilson et al, 2005
- Miotto et al, 2009
- Spikman et al, 2010
- Gordon et al, 2010

Holistic Neuropsychological Rehabilitation

Ben-Yishay & Gold, 1990

- "It is meaningless to make rigid distinctions between higher and lower level cognitive functions or between physiogenic and psychogenic factors in emotional disturbances" after brain injury Thus, neither isolated cognitive remedial exercises to improve attention, memory, and or other "fragmentary" deficits, nor a focus exclusively on traditional psychotherapeutic interventions, are likely to be effective.

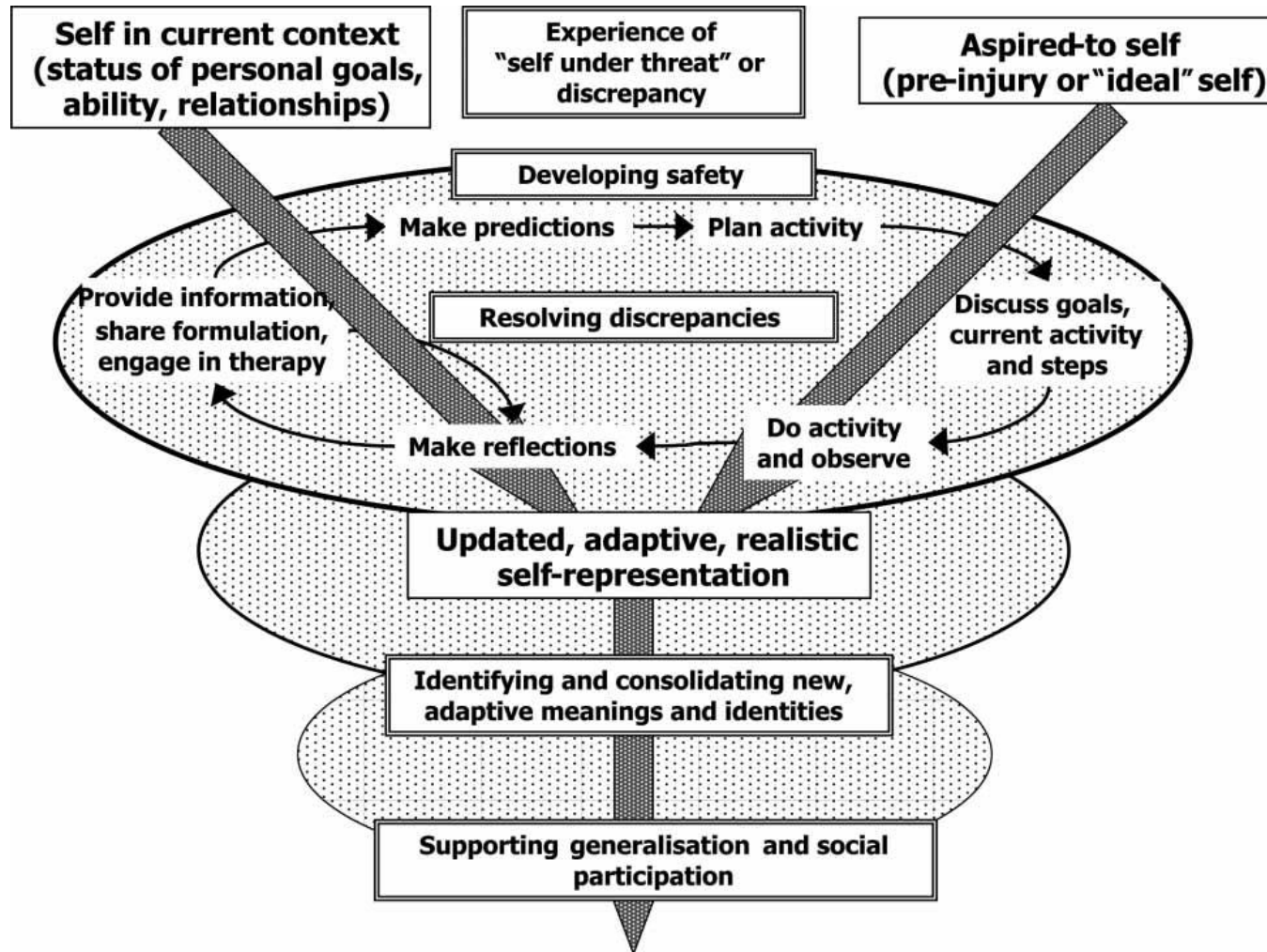
Holistic Cognitive Rehabilitation

Ben-Yishay & Gold, 1990

- Instead, an effective rehabilitation program must systematically integrate interventions directed at the remediation of cognitive deficits, functional skills, and interpersonal functions. Improvements in functioning are typically accomplished by an improvement in the effective functional application of residual cognitive abilities, rather than restoration of the underlying cognitive deficits, per se.

Process and Outcome in Complex Rehabilitation Interventions

Gracey, Evans & Malley, 2009



RCT of Holistic Neuropsychological Treatment

(Cicerone et al., 2008)

STD (n = 34)

- Individual tx model
- 1:1 therapies
- Interventions directed at restoration of discrete cognitive functions.
- Emphasis on discipline-specific interventions and goals

ICRP (n = 34)

- Holistic tx model
- Group structure & process
- Interventions directed at adapting to disability despite cognitive deficits
- Emphasis on practical skills and activity limitations

Intensive Cognitive Rehabilitation Program

Specific Treatment Components

- *Metacognitive evaluation and self-regulation (Activity Analysis)*
- *Emotional self-monitoring and self-regulation (CES)*

Intensive Cognitive Rehabilitation Program

Activity Analysis

- *What are the essential parts of the task / activity?*
- *What abilities and skills will influence completion of the activity?*
 - *(e.g. cognitive, emotional)*
- *What about the situation will influence completion of activity?*
 - *(e.g. deadlines, distractions, lack of information)*
- *What assistance is needed & available?*
- *What is the probability of success?*

Cognitive Energy Scale (CES)

1

Not paying attention

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Inactive

2

3

Able to focus

Mind is sharp

Engaged

4

5

Distractible

Mind is

Overwhelmed

Irritable to

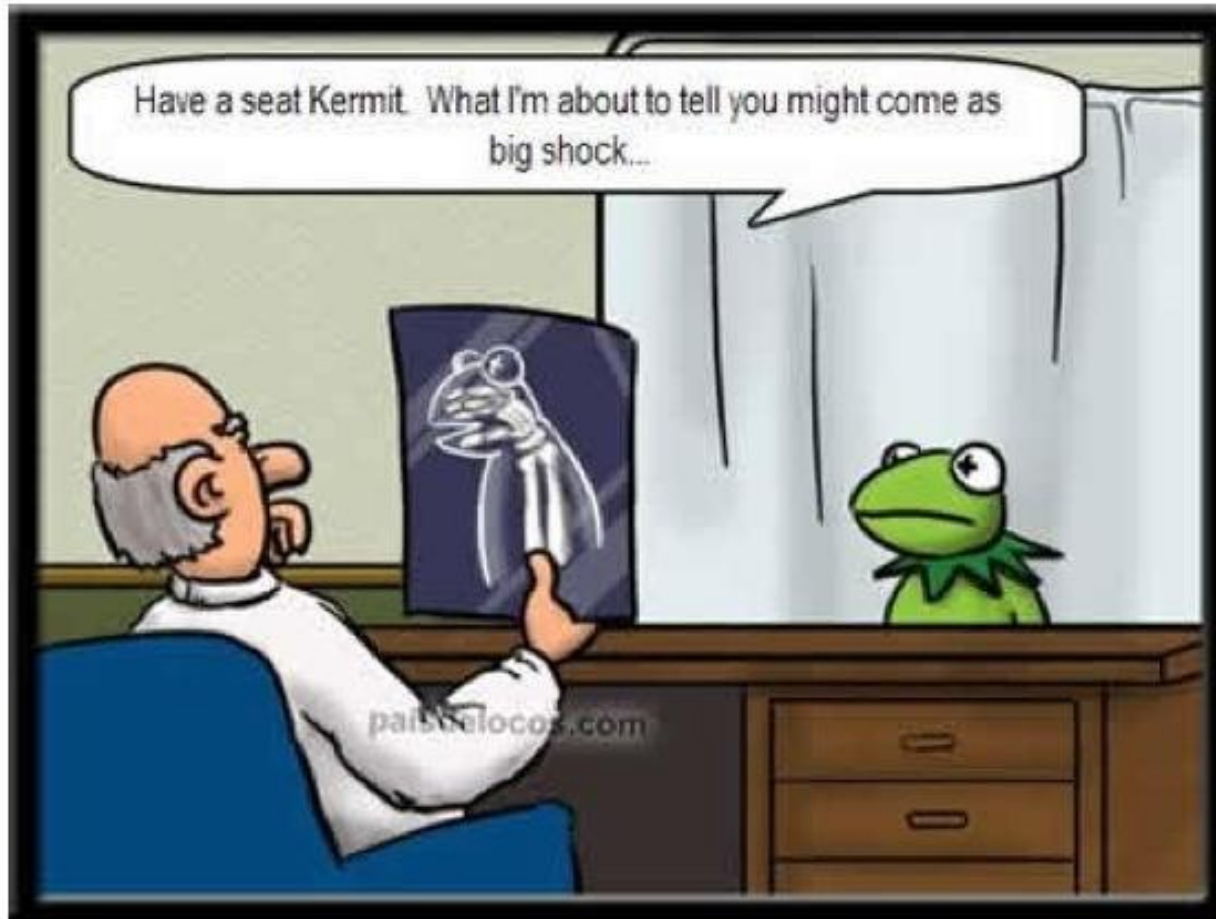
Aggressive

RCT of Holistic Neuropsychological Treatment

(Cicerone et al., 2008)

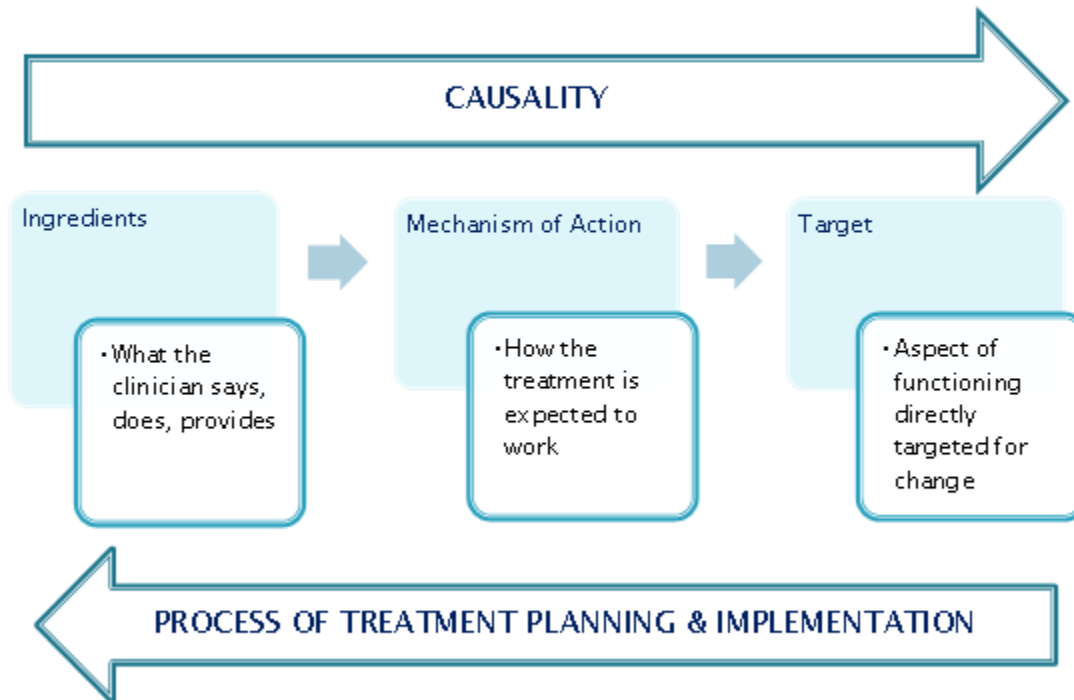
- Significant benefits of holistic Neuropsychological Rehabilitation on community integration & quality of life compared with “standard” rehabilitation
- Benefits are apparent beyond the effects on discrete neuropsychological abilities
- ICRP is associated with increased self-efficacy for management of cognitive and emotional symptoms

Mechanisms of change



The tripartite structure of treatment theory.

Adapted from Hart, T., Tsaousides, T., Zanca, J. M., Whyte, J., Packel, A., Ferraro, M., et al. (2014). Toward a theory-driven classification of rehabilitation treatments. Archives of Physical Medicine and Rehabilitation, 95(1 Suppl), S33-44 e32



Holistic Neuropsychological Rehabilitation Proposed Mechanisms of Change

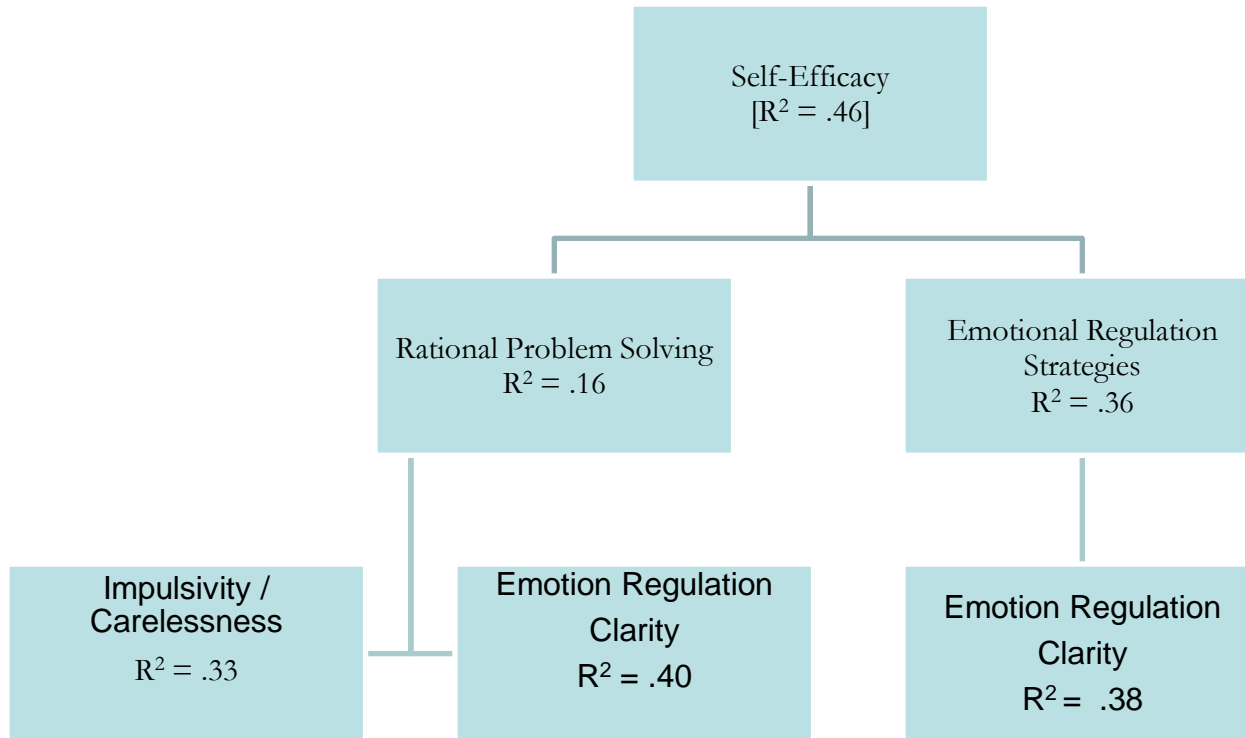
Self-Efficacy
[$R^2 = .52$]

```
graph TD; A[Self-Efficacy  
[R² = .52]] --- B[Rational Problem Solving  
R² = .16]; A --- C[Emotional Regulation Strategies  
R² = .36]
```

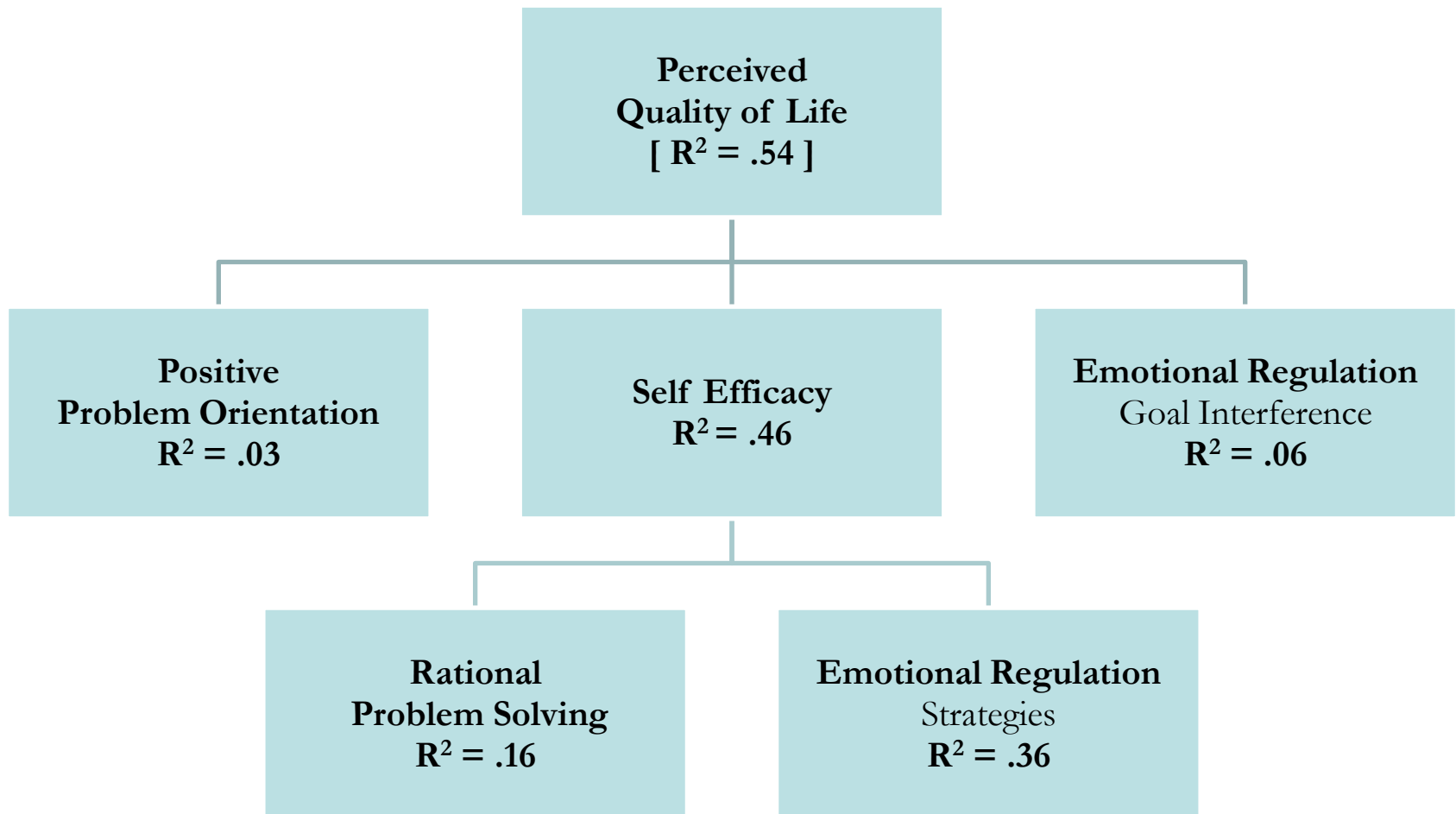
Rational Problem
Solving
 $R^2 = .16$

Emotional Regulation
Strategies
 $R^2 = .36$

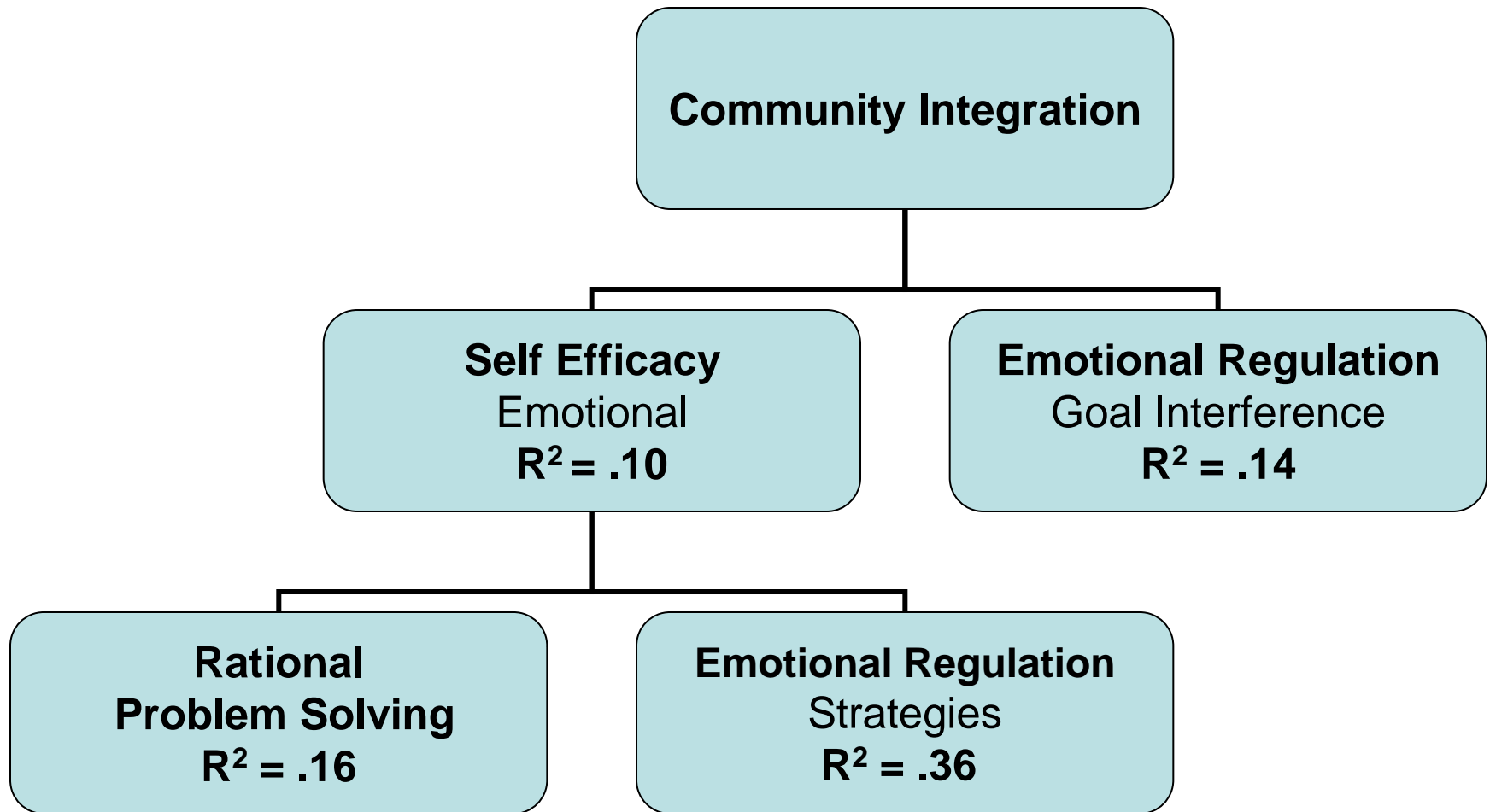
Holistic Neuropsychological Rehabilitation Proposed Mechanisms of Change



Holistic Neuropsychological Rehabilitation Proposed Mechanisms of Change



Holistic Neuropsychological Rehabilitation Proposed Mechanisms of Change



Holistic Neuropsychological Rehabilitation

Proposed Mechanisms of Change

- Interventions directed at metacognitive regulation and emotional awareness lead to increased personal self-efficacy for management of symptoms.
- Development of positive belief in capabilities, ability to prevent emotional reactions from interfering with goal attainment, and confidence in managing cognitive and emotional symptoms mediate well-being and social participation

Recommendations for Comprehensive-Holistic Cognitive Rehabilitation

Practice Standard

Comprehensive-holistic neuropsychological rehabilitation is recommended during post-acute rehabilitation to reduce cognitive and functional disability for persons with moderate to severe TBI.

Recommendations for Comprehensive-Holistic Cognitive Rehabilitation

Practice Option

Integrated treatment of individualized cognitive and interpersonal therapies is recommended to improve functioning within the context of a comprehensive neuropsychological rehabilitation program, and facilitate the effectiveness of specific interventions.

Recommendations for Comprehensive-Holistic Cognitive Rehabilitation

Practice Option

Group based interventions may be considered as part of comprehensive-holistic neuropsychological rehabilitation after TBI.

Activities of the Therapist in Cognitive Rehabilitation



Meta - Recommendation

Cognitive Remediation includes:

- *A General Algorithm* that relates the deficit to the intervention
- *Practical Exercises* directed at improvement of the disturbed function
- *Planned Application* of compensations in daily activities

Stages of Cognitive Rehabilitation

- *Awareness*
- *Acquisition*
- *Application*
- *Adaptation*

Activities of the Therapist in Cognitive Rehabilitation

- *Facilitative*
- *Instrumental*
- *Metacognitive*

It doesn't matter how sensitive you are or how damn smart and educated you are, if you're not both at the same time, if your heart and your brain aren't connected, aren't working together harmoniously, well, man, you're just hopping through life on one leg.

Tom Robbins, *Villa Incognito*

CME/CE Credits

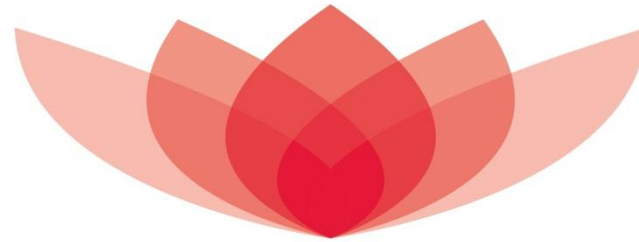
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- Choose either **Print Now** to instantly generate a PDF of your certificate, or you may choose to email your certificate.
- The website is open for completing evaluations and ordering the initial certificate until June 9, 2015.
- **After the website has closed on June 9th, you can come back to the site at any time to print your certificate, but you will not be able to add any evaluations.**
- **NOTE: If you are a Speech Language Professional, and are seeking ASHA CE credit, please be aware that you have ONLY until May 9, 2015 (30 days) to claim your credit. After that period, you will not be able to claim your credit in any form. We recommend that Speech Language Professionals claim their credit as soon as possible.**

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