Factors Affecting Home Exercise Compliance for Direct Attention Training

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Session Agenda

- Review Factors Affecting Home Practice in Rehabilitation
- Review Theory & Procedures for Direct Attention Training (DAT) (APT-3 program*)
- Evaluation of Choice Condition for Home Practice with APT-3 Exercises*
- Clinical Implications and Questions

**Conflict of Interest Declaration: APT-3 program distributed by Lash publications and authors receive royalty**
Rehabilitation Does Not Occur in a Vacuum

• Contextual variables affect the rehabilitation process and compliance with home practice
  • Personal Variables
  • Therapy Program Characteristics
Influential Personal Characteristics

Three Biggies

• Self Efficacy

• Locus of Control

• Beliefs & Expectations about Therapy Program
Influential Therapy Program Characteristics

- Program intensity
- Timing
- Task complexity
- Practice regimen
- Cueing & feedback
Personal Characteristics
• Encourage SE & internal locus of control-involve clients in tx management
• Provide self evaluation tools
• Tie tx program to meaningful goals
• Prepare clients to cope with temporary lapses by having alternative plans

Tx Program Characteristics
• Provide variety—reduce boredom
• Individualize therapy & ensure exercises not too hard or too easy
• Help client establish a tx routine
• Provide clear instructions
• Monitor participation regularly
• Use written goal logs
Direct Attention Training

- Based on the premise that attentional abilities can be improved by activating particular aspects of attention through a stimulus drill approach
  - Repeated stimulation of attentional systems via graded attention exercises is hypothesized to facilitate changes in attentional functioning

- Includes functions related to sustaining attention over time (vigilance), information processing capacity and speed, shifting attention, resisting distraction
Direct Attention Training

Key Components

- Process oriented, impairment level therapy
- Theoretical basis relies on neuroplasticity
- Incorporates attention drills plus self regulation & metacognition
Principles of DAT

- Theoretically-grounded model of attention
  - Basic Sustained Attention
  - Executive Control: Selective Attention
  - Executive Control: Working Attention
  - Executive Control: Suppression
  - Executive Control: Alternating Attention

- Provide sufficient repetition using hierarchically organized exercises
- Promote metacognitive engagement
- Client performance drives therapy plan
- Active facilitation of generalization
# Attention Tests

## Sustained Attention/Vigilance
- Digit Span-Forward (*Wechsler Abbreviated Scale of Intelligence*; Wechsler, 1999)
- Conners' Continuous Performance Test-II (Conners, 1992)

## Working Memory and Executive Control
- Trail Making Test B (Reitan, 1969)
- Paced Auditory Serial Addition Test (Roman, Edwall & Buchanan, 1991)
- Stroop Color and Word Test (Golden, 1978)

## Mixed Batteries
(Subtests assess sustained, selective and alternating attention, and working memory)
- Test of Everyday Attention (Robertson, Ward, Ridgeway & Nimmo-Smith, 1994)

## Attention Questionnaires
- The Cognitive Failures Questionnaire (Broadbent, Cooper, FitzGerald & Parkes, 1982)
- The Moss Attention Rating Scale (Whyte, Hart, Bode & Malec, 2008)
- The Rating Scale of Attention Behavior (Ponsford & Kinsella, 1991)
APT-3 Technology Supports Principles of DAT

- Increased access
- Supplemental practice for optimal therapy dosage
- Capture & analyze performance data
- Provide immediate, objective feedback
- Reflection and strategy logs promote engagement and generalization

Attention Process Training-3 (APT-3) – Sohlberg & Mateer (2011)
Lash & Associates (www.lapublishing.com)
Welcome to Attention Process Training for Alice

The current APT program: N/A

Create or Select an APT Program
Edit Current APT Program
View Data on Performance
Run Current APT Program

Exit
Fill in the Goal Attainment Scale for Alice

Individualize and modify the text below as necessary. Once finished, click Continue.

Goal: Improve Alice's working memory in order to improve ___.

+2: Best expected outcome
Alice will achieve ___ on ___ with no reminders to use the ___ strategy.

+1: More than expected outcome
Alice will achieve ___ on ___ when given 1 reminder to use the ___ strategy before the ___ are administered.

0: Expected outcome
Alice will achieve ___ on ___ when given two reminders to use the ___ strategy — one before and one during administration of ___.

-1: Less than expected outcome
Alice will achieve ___ on ___ when given two reminders to use the ___ strategy.

-2: Worst expected outcome
Alice will require coaching to use the ___ strategy in order to complete ___.

Person to monitor: Clinician

Date to evaluate: September 28, 2011

Show Example  Continue
<table>
<thead>
<tr>
<th>Basic Sustained Tasks:</th>
<th>Speed</th>
<th>Clinician</th>
<th>Mode</th>
<th>Top Score</th>
<th>History</th>
<th>Scoresheet</th>
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<td>Slow</td>
<td>Male</td>
<td>Auditory</td>
<td>100%</td>
<td>View</td>
<td>DOC PDF</td>
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<tr>
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<td>DOC PDF</td>
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<td>Auditory</td>
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<td>DOC PDF</td>
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<tr>
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<td>Auditory</td>
<td>N/A</td>
<td>View</td>
<td>DOC PDF</td>
</tr>
<tr>
<td></td>
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<td>Auditory</td>
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<td>View</td>
<td>DOC PDF</td>
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<td>Listening for 2 Letters in a Word</td>
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<td>View</td>
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<td>Auditory</td>
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<td>Listening for 2 Animal Sounds</td>
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</tbody>
</table>

*Numbers in parentheses next to a speed represent how many times a task has been attempted at that speed.

Estimated program time: 10 minutes

Save Changes

Back to Menu
APT-3 task selection continued

Create an APT Program for Julien

- Word Sentences (Reverse)
  - Male: Yes, 5 words
  - Female: No, 10 words

- Word Sentences (Alphabetical)

- Word Sentences (Progressive)

Executive Control Suppression Tasks:

- Happy-Sad Intonation
  - Mode: Auditory
  - Speed: Slow

- Falling-Rising Intonation

- High-Low Pitch
  - Mode: Auditory
  - Speed: Slow

- Loud-Soft Volumes

Estimated program time: 30 minutes

Continue to Summary

Back
APT-3 program summary

APT Program Summary for Julien

The current APT program: 30 minutes

Executive Control Working Memory Tasks:
10 4-Word Sentences (Reverse) with female clinician

Executive Control Suppression Tasks:
Happy-Sad Intonation with button response (slow)
High-Low Pitch with verbal response (slow)
Above-Below Position with button response (fast)
Numbers-Digits with button response (fast)

Your APT program has been created. If you plan on creating additional programs and would like to reuse this program, you can save it for this client or as a new standard APT program for all clients.

Name this APT program:
Mixed Memory and Suppression

Save program for this client
Save as a standard program
Continue to home screen

Back
Sustained Attention task

Attention Task #1 of 1

Domain: Sustained Attention
Task: Matching Animals

Click here to BEGIN
Sustained Attention task continued

Attention Task #1 of 1

Click here to RESPOND
Working Memory task

Attention Task #1 of 1

Click here for the NEXT SEQUENCE

Click here to EXIT
Attention Task #1 of 1

Domain: Executive Attention
Task: High-Mid-Low

Click here to BEGIN
Effort/Motivation rating

How hard did your brain work on that exercise?

How motivated were you to complete that exercise?

Click here to Continue
Viewing APT Performance Data for Alice
Click buttons below to view different graphs.

Listening for 1 Number
Viewing APT Performance Data for Alice

Click buttons below to view different graphs.

Task Data Over Time  Detailed Task Data

Listening for 1 Number

<table>
<thead>
<tr>
<th>Date</th>
<th>Correct/Incorrect Button Presses</th>
<th>Score/Effort</th>
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<td><img src="image1" alt="Correct/Incorrect Button Presses" /></td>
<td>100% Effort: 3  Motivation: 2</td>
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<td>Jul 9, '10</td>
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<td>5% Effort: 6  Motivation: 3</td>
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<td>24% Effort: 1  Motivation: 7</td>
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<td>Jul 7, '10</td>
<td><img src="image5" alt="Correct/Incorrect Button Presses" /></td>
<td>1/4%  Medium effort</td>
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</table>

Correct  Omission  False positive
Home Practice
What does attention training look like in a therapy session?

- Review Generalization Data
- Review Home Program
- Pre-Training Metacognitive Component
- Attention Tasks (30-45 minutes with task feedback and self monitoring inserted)
- Post Training Metacognitive Component and Review of Home Practice
Research Evidence

• Generally supportive
  • Galbiati (2009)
  • Serino et al. (2006)
  • Butler et al. (2008)

• Generalization continues to be questioned

• Limited information on dosage & frequency

• *More robust outcomes with more intensive therapy
Enhanced Goals of APT-3

**Enhance Personal Factors:**
- Increase self-efficacy & positive beliefs about program
- Encourage internal locus of control
  - Feedback on task performance
  - Motivational/effort ratings
  - Goal Attainment Scaling

**Enhance Therapy Program Characteristics:**
- Increase therapy dosage (home practice drive)
- Maintain engagement/motivation (varied stimuli)
- Decisions based on objective performance data
- Actively program for/facilitate generalization from outset
- Provide clear, standardized instructions for each task
Purpose of our Research Study

- Need to understand factors that may enhance therapy compliance
- Locus of control or autonomy critical to compliance
- Delivery of APT-3 via television allowed us to evaluate locus of control with two telerehabilitation conditions:
  - “Push” Scheduling: TV automatically turns on at scheduled times (external locus of control)
  - “Pull” Scheduling: Client self-initiates therapy program at time of choice (internal locus of control)

Research Question #1

Do individuals with acquired brain injury (ABI) receiving attention training (APT-3) complete more home practice sessions when the attention exercises are automatically “pushed” to their television or when they can self-initiate and “pull” them to their television on their own schedule?

Hypothesis: Individuals will complete more sessions under the “pull” condition when they have control of timing of their home practice (internal locus of control).
Research Question #2

Will individuals with ABI indicate a preference for the “push” vs. “pull” conditions following the experiment?

Hypothesis: Individuals will prefer the “pull” condition due to greater autonomy.
Research Question #3

If individuals receiving attention training complete home practice training at least twice weekly, will there be an improvement in attention as measured by neuropsychological attention tests and a goal attainment scale?

Hypothesis: If individuals receive once weekly individual treatment supplemented by twice weekly home practice, there will be improvements in attention as measured by attention tests and functional goal attainment.
**Research Study**

- 2 female participants
- Single subject experimental design using alternating treatment conditions (push vs pull)
- Pre/Post attention assessments (92% agreement)
- 6 weeks duration
  - 1 weekly clinic session* (100% fidelity of implementation)
  - Asked to complete twice daily home practice
  - Generalization practice homework assigned
  - Self-selected push/pull preference in week 6

*Special thanks to graduate students David Kaplowe & XXX for their assistance with this project.
Percent of completed practice sessions for “push” and “pull” conditions for KC

40yo F, 2 yrs post toxic medication reaction; lived in her own home; managed household and parent with min assistance from her mother; unable to work

Moderate attention impairments (executive attention & working memory)
Percent of completed practice sessions for “push” and “pull” conditions for JG

61yo F, 15 mos post ICH 2° ACA aneurysm rupture; lived in supervised residential facility; unable to work

Moderate attention impairments (executive attention & working memory)
Results

• Both participants completed more sessions in the push versus the pull condition (contrary to hypothesis)
• Both participants preferred pull condition (consistent with hypothesis)
• Findings likely suggest an interaction between self-efficacy, therapy beliefs, and autonomy
  – Is autonomy less important when motivation and self-efficacy high?
  – Structure important for clients with cognitive impairments (ATC effective for reminders)
Pre/Post Testing

• Improvement on attention measure (Paced Auditory Serial Addition Test: PASAT). Total Scores reported as T-score matched for age and educational levels:

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<th></th>
<th>Pre-Treatment</th>
<th>Post-Treatment</th>
<th>Improvement</th>
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<tr>
<td>KC</td>
<td>38.10</td>
<td>60.75</td>
<td>2 SD</td>
</tr>
<tr>
<td>JG</td>
<td>32.26</td>
<td>42.35</td>
<td>1 SD</td>
</tr>
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</table>

• No improvement on PPVT control measure

• Positive changes on GAS:
  • KC-best expected outcome
  • JG-expected outcome
## Goal Attainment for KC

<table>
<thead>
<tr>
<th>GAS Level</th>
<th>Criteria</th>
</tr>
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</table>
| **+2** \*Best expected outcome\* LEVEL ACHIEVED | KC will experience “occasional” difficulty with all of the following: (a) maintaining a “train of thought”, (b) forgetting things immediately after being told and (c) becoming fatigued during or after activities that require sustained mental effort. These issues will happen most days.  

She will experience 1-2 memory lapses per week where she cannot recall the content from a significant interaction. |
| **+1** \*More than expected outcome\* | KC will experience “occasional” difficulty with two of the following: (a) maintaining a “train of thought”, (b) forgetting things immediately after being told and (c) becoming fatigued during or after activities that require sustained mental effort. These issues will happen most days.  

She will experience 3-4 memory lapses per week where she cannot recall the content from a significant interaction. |
| **0** \*Expected outcome\* | KC will experience “occasional” difficulty with one of the following: (a) maintaining a “train of thought”, (b) forgetting things immediately after being told and (c) becoming fatigued during or after activities that require sustained mental effort. These issues will happen most days.  

She will experience 5-6 memory lapses per week where she cannot recall the content from a significant interaction. |
| **-1** \*Less than expected outcome\* | KC will continue to experience “frequent” difficulty with (a) maintaining a “train of thought”, (b) forgetting things immediately after being told and (c) becoming fatigued during or after activities that require sustained mental effort. These issues will happen most days.  

She will experience an average of one memory lapse a day where she cannot recall the content from a significant interaction. |
## Goal Attainment for JG

<table>
<thead>
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<th>GAS Level</th>
<th>Criteria</th>
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</thead>
<tbody>
<tr>
<td><strong>+2</strong></td>
<td>JG will maintain topics in conversation by demonstrating the ability to self-correct 100% of the time.</td>
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<tr>
<td><em>Best expected outcome</em></td>
<td></td>
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<tr>
<td><strong>+1</strong></td>
<td>JG will maintain topics in conversation by demonstrating the ability to self-correct 75% of the time. She will get off-topic no more than once during a conversation.</td>
</tr>
<tr>
<td><em>More than expected outcome</em></td>
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<td><strong>0</strong></td>
<td>JG will maintain topics in conversation by demonstrating the ability to self-correct 50% of the time. She will get off-topic no more than twice during a conversation.</td>
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<td><em>Expected outcome LEVEL ACHIEVED</em></td>
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<td><strong>-1</strong></td>
<td>JG will maintain topics in conversation by demonstrating the ability to self-correct 25% of the time. She will get off-topic easily and forget where she began.</td>
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<td><em>Less than expected outcome</em></td>
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<td><strong>-2</strong></td>
<td>JG will be unaware of when she is off-topic. She will get off-topic easily and forget where she began.</td>
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<td><em>Worst expected outcome</em></td>
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Summary & Implications

- Weekly sessions with home practice appeared to facilitate improved attention with carryover to functional activities.

- Methods to increase home practice (intensity) are needed to demonstrate robust treatment changes.

- Important area of future research is on the affective variables that affect compliance with home programs (self-efficacy beliefs, autonomy, motivation).
Questions?