Benefits Of Cognitive Training After Brain Injury
Tanya Mitchell
Vice President of Research and Development
LearningRx 2011 Student of the Year
Today’s Workshop

• What are cognitive skills?

• Demonstration Of Major Cognitive Skills Affected By Brain Injury

• Effective Training Methodology

• Training Results With Brain Injured Students
Two Parts to Learning

Knowledge
- Data Storage

Intelligence
- Processing Abilities
Other Names for Intelligence

- Cognitive Skills
- Processing Skills
- Learning Tools or Skills
- Mental Skills & Abilities
Two Parts to Learning

Knowledge
- Accumulated Facts, Knowledge
- “Database”
- Measured by Achievement Tests, Grades

Intelligence
- Automatic “Input” Processing
- Higher Thinking
- Measured by IQ, SAT, ACT, College Entrance Tests
How We Learn

Model of Processing New & Known Information

- **INPUT**
  - see
  - hear
  - feel
  - smell
  - taste

- **ATTENTION**
- **WORKING MEMORY**
- **PROCESSING SPEED**

- **AUTOMATIC PROCESSING**

- **HIGHER THINKING**
  - AUDITORY PROCESSING
  - VISUAL PROCESSING
  - LOGIC & REASONING
  - LONG-TERM MEMORY
  - NEW INFORMATION
  - KNOWN INFORMATION

- **DECISION**

- **OUTPUT**
  - writing
  - spelling
  - drawing
  - speaking
  - testing

- **KNOWLEDGE BANK**

- **COGNITIVE SKILL EFFICIENCY**
- **ACADEMIC PERFORMANCE**
Demonstration of Major Cognitive Skills

- Attention
- Processing Speed
- Working Memory
- Long-Term Memory
- Visual Processing
- Reasoning
- Auditory Processing
Attention

black red green yellow blue
blue green yellow black black
red black red black green red
green yellow blue black black
Demonstration of Major Cognitive Skills

- Attention
- Processing Speed
- Working Memory
- Long-Term Memory
- Visual Processing
- Reasoning
- Auditory Processing
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Demonstration of Executive Function

- Attention
- Processing Speed
- Working Memory
- Long-Term Memory
- Visual Processing
- Reasoning
- Auditory Processing
## Mental Tic Tac Toe

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Cognitive Skills and Performance

AUTOMATIC PROCESSING
- Attention
- Processing Speed
- Working Memory

HIGHER THINKING
- Auditory Processing
- Visual Processing
- Logic & Reasoning
- Long-Term Memory

NEW INFORMATION
- Decision
- Known

LEARNED INFORMATION
- Knowledge Bank

OUTPUT
- Writing
- Spelling
- Drawing
- Speaking
- Testing

COGNITIVE SKILL EFFICIENCY

ACADEMIC PERFORMANCE

INPUT
- See
- Hear
- Feel
- Smell
- Taste

LearningRx
Effective Training Methodology
One-on-One
Sequencing
Feedback
Intensity
Targeting
Non-Academic
How Training Works
How Training Works

Splinter Skills

Underlying Skills
RESULTS WITH BRAIN TRAINING
TBI Pre/Post Percentile – Age 20+

IQ: Before LearningRx Brain Training = 30, After LearningRx Brain Training = 58
Logic & Reasoning: Before LearningRx Brain Training = 46, After LearningRx Brain Training = 60
Short-Term Memory: Before LearningRx Brain Training = 37, After LearningRx Brain Training = 60
Executive Processing Speed: Before LearningRx Brain Training = 41, After LearningRx Brain Training = 66
Auditory Processing: Before LearningRx Brain Training = 39, After LearningRx Brain Training = 65
Visual Processing: Before LearningRx Brain Training = 47, After LearningRx Brain Training = 68
Long-Term Memory: Before LearningRx Brain Training = 28, After LearningRx Brain Training = 51
Working Memory: Before LearningRx Brain Training = 31, After LearningRx Brain Training = 59
TBI Pre/Post Percentile – Age <20

Logic & Reasoning
Before LearningRx Brain Training: 29
After LearningRx Brain Training: 51

Short-Term Memory
Before LearningRx Brain Training: 38
After LearningRx Brain Training: 51

Executive Processing Speed
Before LearningRx Brain Training: 40
After LearningRx Brain Training: 49

Auditory Processing
Before LearningRx Brain Training: 34
After LearningRx Brain Training: 51

Visual Processing
Before LearningRx Brain Training: 39
After LearningRx Brain Training: 53

Long-Term Memory
Before LearningRx Brain Training: 20
After LearningRx Brain Training: 47
A tragic accident.
A traumatic brain injury.
A lengthy coma.

When a thirty-three-year-old father is left with the brain function of a child, what will it take to turn him back into a man and a dad?  

MICHAEL J. KLASSEN AND KAREN LINAMEN
Mental Skills Change with Age

Typical scores drawn from Woodcock Johnson III Examiner’s and Technical Manual, 2001
The Gap

Scores by Percentile (where your child rates out of 100)

"Top-of-Class"

Average entrance of all college-bound students

Closing THE GAP in Auditory Processing

Memory  |  Visual Processing  |  Logic & Reasoning  |  Word Attack  |  Auditory Processing  |  Processing Speed

0%  |  10%  |  20%  |  30%  |  40%  |  50%  |  60%  |  70%  |  80%  |  90%  |  100%
One-Year Retention of Gains Based on Percentile Scores

Logic and Reasoning
Percent of gain retained one year later: 103%

Before brain training: 44.6
After brain training: 66.1
One Year Later: 67.1

General Intellectual Ability (GIA)
Percent of gain retained one year later: 102%

Before brain training: 29.5
After brain training: 55.3
One Year Later: 55.9
# Classifications of Intelligence Quotients

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<tr>
<th>% of Pop</th>
<th>IQ Range</th>
<th>IQ</th>
<th>Percentile</th>
<th>Description</th>
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<tr>
<td>2.20%</td>
<td>130+</td>
<td>135</td>
<td>99</td>
<td>Very superior</td>
<td>2 (115 to 130 = 13.5%)</td>
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<td>130</td>
<td>98</td>
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<tr>
<td>6.70%</td>
<td>120-129</td>
<td>125</td>
<td>95</td>
<td>Superior</td>
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<td></td>
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<td>120</td>
<td>91</td>
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<tr>
<td>16.10%</td>
<td>110-119</td>
<td>115</td>
<td>84</td>
<td>High average</td>
<td>1 (100 to 115 = 34%)</td>
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<td>110</td>
<td>75</td>
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<td>50%</td>
<td>90-109</td>
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<td>63</td>
<td>Average</td>
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<td>95</td>
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<tr>
<td>16.10%</td>
<td>80-89</td>
<td>90</td>
<td>25</td>
<td>Low average</td>
<td>1 (100 to 85 = 34%)</td>
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<td>85</td>
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<td>70-79</td>
<td>80</td>
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<tr>
<td>2.20%</td>
<td>Below 70</td>
<td>70</td>
<td>2</td>
<td>Extremely low</td>
<td>2 (85 to 70 = 13.5%)</td>
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