Effects of Acquired Brain Damage on Adult Executive Functioning

Dean C. Delis, Ph.D., A.B.P.P

Professor Emeritus of Psychiatry, University of California, San Diego, School of Medicine
Adjunct Professor of Psychology, San Diego State University
Staff Neuropsychologist, San Diego VA Medical Center

Executive Functions

• Abstract Thinking
• Concept Formation
• Novel Problem Solving
• Creativity
• Fluent Novel Thinking
• Multi-Tasking
• Planning and Organization
• Inhibit responses from the immediate environment
Emotional/Personality Changes Associated With Orbital-Prefrontal Damage

- Disinhibition/Inappropriate Behavior
- Jocularity/Child-Like Behavior
- Impulsivity
- Emotional Lability
- Poor Judgment
- Lack of Insight
- Downward Social and Occupational Functioning

Emotional/Personality Changes Associated With Dorsolateral or Medial Frontal Damage

- Apathy/Amotivation
- Flat Affect
- Poor Judgment
- Lack of Insight
- Greater Executive Function Deficits
- Downward Social and Occupational Functioning

Top 4 Mistakes Made by Psychologists in Assessing Executive Functions

1. A low score on an “Executive Function” test means that the patient has an executive function deficit as assessed by this test.
Top 4 Mistakes Made by Psychologists in Assessing Executive Functions

2. A high standardized score on the final “achievement” measure of an “Executive Function” test means that the patient does not have an executive function deficit as assessed by this test.

Top 4 Mistakes Made by Psychologists in Assessing Executive Functions

3. If a patient makes key errors on an “Executive Function” test, this means that the patient has an executive function deficit as assessed by this test.

Top 4 Mistakes Made by Psychologists in Assessing Executive Functions

4. Executive functioning can be assessed only on “Executive Function” tests.
Verbal Tests
- Verbal Fluency Test
- Word Context Test
- Proverb Test

Visual-Spatial Tests
- Design Fluency Test
- Tower Test

Verbal and Visual-Spatial Modality
- Sorting Test
- Twenty Questions Test
- Color-Word Interference Test
- Trail Making Test
The Process Approach to the Assessment of Executive Functions

- Development of different test conditions to parse out more fundamental component skills from higher-level executive functions
- Provide scores not only for correct responses or time to completion (i.e., achievement), but also for strategies and errors (i.e., process).
- Obtain normative data for both achievement and process measures.

Top 4 Mistakes Made by Psychologists in Assessing Executive Functions

1. A low score on an “Executive Function” test means that the patient has an executive function deficit as assessed by this test.
Component Processes of the Trail Making Test

• Visual Scanning
• Motor Speed
• Number Sequencing Skills
• Letter Sequencing Skills
• Cognitive Flexibility

Traditional Trail Making Test

Executive Function:
Cognitive Flexibility | Trails B

Component Skills:
Visual Scanning | No
Motor Speed | No
Number Sequencing Skills | Trails A
Letter Sequencing Skills | No

Trails: Shifting Condition

Top 4 Mistakes Made by Psychologists in Assessing Executive Functions

1. A low score on an “Executive Function” test means that the patient has an executive function deficit as assessed by this test.
Case Example: NA

- 15-year-old male
- Native American/White
- Right Handed
- Possible Fetal Alcohol Syndrome
- h/o ADHD
- WISC-III
  - FSIQ = 87
  - VIQ = 73
  - PIQ = 106
  - VC = 75
  - PO = 105
  - FD = 75
  - PS = 101

DKEFS Trail Making Test: NA’s Results

Contrast Scores
- NLS vs. Visual Scan = 5
- NLS vs. Number Seq = 5
- NLS vs. Letter Seq = 7
- NLS vs. Combined = 1
- NLS vs. Motor Speed = 2

Top 4 Mistakes Made by Psychologists in Assessing Executive Functions

2. A high standardized score on the final “achievement” measure of an “Executive Function” test means that the patient does not have an executive function deficit as assessed by this test.
Assessing the elusive cognitive deficits associated with ventromedial prefrontal damage: A case of a modern-day Phineas Gage
Top 4 Mistakes Made by Psychologists in Assessing Executive Functions

3. If a patient makes key errors on an “Executive Function” test, this means that the patient has an executive function deficit as assessed by this test.

Top 4 Mistakes Made by Psychologists in Assessing Executive Functions

4. Executive functioning can only be assessed on “Executive Function” tests.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Standard Form</th>
<th>Alternate Form</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hit 1 Correct</td>
<td>8.71</td>
<td>8.82</td>
<td>0.40</td>
</tr>
<tr>
<td>Hit 2 Correct</td>
<td>8.79</td>
<td>9.01</td>
<td>0.44</td>
</tr>
<tr>
<td>Hit 3 Correct</td>
<td>10.50</td>
<td>10.60</td>
<td>0.60</td>
</tr>
<tr>
<td>Hit 4 Correct</td>
<td>11.32</td>
<td>11.50</td>
<td>0.78</td>
</tr>
<tr>
<td>Hit 5 Correct</td>
<td>12.75</td>
<td>12.90</td>
<td>0.90</td>
</tr>
<tr>
<td>Hit 6 Correct</td>
<td>13.90</td>
<td>14.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Hit 7 Correct</td>
<td>15.00</td>
<td>15.10</td>
<td>1.10</td>
</tr>
<tr>
<td>Hit 8 Correct</td>
<td>16.10</td>
<td>16.20</td>
<td>1.20</td>
</tr>
<tr>
<td>Mean Delay Free Recall Correct</td>
<td>9.00</td>
<td>9.00</td>
<td>0.60</td>
</tr>
<tr>
<td>Variability, Chronology</td>
<td>1.52</td>
<td>1.60</td>
<td>0.60</td>
</tr>
<tr>
<td>Total Learning Slope Stds 1.5</td>
<td>2.00</td>
<td>2.10</td>
<td>0.60</td>
</tr>
<tr>
<td>Percent Recall Performance Regions</td>
<td>36.00</td>
<td>36.00</td>
<td>0.60</td>
</tr>
<tr>
<td>Percent Recall Recovery Regions</td>
<td>26.00</td>
<td>26.00</td>
<td>0.60</td>
</tr>
<tr>
<td>Total</td>
<td>62.00</td>
<td>62.00</td>
<td>0.60</td>
</tr>
</tbody>
</table>

---

**Table 8.15: CVLT-2 Focal Frontal Study**

- 11 Frontal Patients, 11 Matched Controls
- 6 Focal Left, 5 Focal Right
- Mean Ages = 63.8