Attemo: An Objective Measure of Attention and Motion Control
Pearson Clinical Assessment

Attemo™
An Objective Measure of Attention & Motion Control

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Agenda
• Assessment of Attention
• Attemo Overview
• Clinician Training
• Administration
• Scoring and Reporting
• Technical Information
• Pricing and Ordering

Assessment of Attention
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Attention Problems

Who has attention problems in school?
ADHD
TBI
LD
Underachievers?
FAS-FAE?

How does an attention problem affect academic performance?
Reading, Comprehension?
Writing?
Arithmetic?
Listening?
Behavior?
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Attention

How do you currently assess attention?
Do you give the WISC-V Digit Span test?
Do you administer anything else?
Conner's scales?
Is that all you need?

Attention

Do you measure sustained attention?
Divided attention?
Switching attention?
Do you look at consistency?
Or variability over time?
Impulsivity? Disinhibition?
Distractibility?
Accuracy?
Do you measure movement?

ADHD Definition

“ADHD appears to be a developmental disability in the
domains of sustained attention, impulse control and the
regulation of activity level to situational demands.”

Barkley, 1989.
Russell Barkley: what did he say about the evaluation of ADHD in children?

"Children with ADHD thrive when the task is novel, unfamiliar, challenging and they are in a 1:1 setting..."

- So is the administration of a WISC the ideal tool to assess attention problems in children with ADHD?
- What did Barkley recommend?

" A comprehensive clinical assessment is required with several informants, multiple settings, and use a variety of assessments that focus on the primary symptoms of ADHD but also the child's academic and social functioning..." Mash & Barkley, 1989.

Early CPT type tests

Why do we need them?
Can you infer attention from observation of a cognitive task? (Cohen, 1995).
Do you need to measure attention objectively? (Lezak, 1983)
Is Digit Span adequate? E.g. can a child with ADHD do well on Digits?
Does a low score mean the child has ADHD? What did Russell Barkley say about that?
What is the sensitivity and specificity of attention measures? Hit rate?
What were the features of the early versions?
What are some of the characteristics and disadvantages of these tests?

How do you assess sustained attention?

"Promising laboratory measures of sustained attention may soon make it possible to evaluate ADHD symptoms more objectively in clinical settings..." Barkley, 1981

He was referring to CPTs. He said the hit rate is close to 80% and that is the best tool to identify children with attention problems. i.e. 80 percent of the time a CPT will correctly identify ADHD, but it will still miss 20% of children with an actual diagnosis of ADHD.
ADHD Assessment Tools

Traditionally, ADHD diagnoses have been based on interviews with parents, relatives, teachers and/or the student, and are often combined with questionnaires, rating scales or Continuous Performance Tests (CPTs). However, the clinical presentation of ADHD is variable, the symptoms are situational, and the degree to which a patient exhibits them may be observed and interpreted differently by various observers.¹


What is a CPT?

Although the tests may vary in terms of length and type of stimulus used, the basic nature of the tests remains the same. Clients are presented with a repetitive, boring task and must maintain their focus over a period of time in order to respond to targets or inhibit response to foils. Tests may use numbers, symbols, or even sounds, but the basic task has the same concept.

CPT Early Years: Rosvold (1956)

The first part requires the patient to respond to the letter "G." In the second phase the patient is told to respond to the series "AX." A precedes X and is only followed by X and no other letter. The examiner has to program the exposure, in seconds and the reaction time permitted. So each time a child is given the test, the examiner has to enter certain characteristics and parameters, total errors permitted, and then what results are required. This may include how a child performed over time, how many times they were incorrect, how accurate they were and the variability over time. Parents can then see how a child's attention varied. How did they begin? How did they sustain attention? Were they impulsive? Distracted? Did they give up?
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Research?

Research Article
Exploring Cortical Attentional System by Using fMRI during a Continuous Performance Test
M. G. Tana, E. Montin, S. Cerutti, and A. M. Bianchi
Department of Bioengineering, IIT Unit, Politecnico di Milano, Milan, Italy
Received 14 June 2009; Accepted 20 August 2009

Attemo Overview

What is it?
What does it do?
Why do you need it?
What else do you need?
What is Attemps®?

The Attempo™ Attention & Motion Test is a 15-minute visual attention continuous performance task (CPT) administered on an iPad® along with simultaneous measurement of the examinee’s head movement.

It is designed to objectively measure the three core symptoms of attention and behavior issues:

1. Inattention
2. Hyperactivity
3. Impulsivity

Overview

Age Range
- Child Version: 6–12.11
- Adolescent Version: 13–19.11
- Adult Version: 20 years and older

Qualification Level: R

Completion Time
- Setup: 5 minutes
- Administration: 15 minutes

Administration
- Downloadable iPad app

Scoring & Reporting
- Attempo Clinician Portal (web-based)

Report Options
- Score Report, Progress Report

Publication Date: 2017

Components

- iPad and Apple Keyboard (customer supplied)
- Headband and Stand (Pearson supplied)
Why do you need a head band?

What does the IPad camera capture from the LED marker on the head band?
Why do you need it?
What will that tell you?

How does it work?

1. Examinee wears the headband and begins the visual attention test.
2. Various types of stars appear every few seconds at random locations around the screen.
3. Examinee should press the spacebar when a target star appears and not press any key when a non-target appears.
4. Attêmo's advanced motion-tracking software records the movement of a small LED marker attached in front of the headband.

Why is Attêmo different?

• Attêmo directly observes key behaviors rather and provides objective, quantifiable data to inform decision making. It can be used along with standard rating scales to get a more comprehensive diagnostic evaluation.
• Attêmo surpasses traditional CPTs by looking at neurobehavioral issues beyond average attention, such as the ability to control motion as well as dynamically fluctuating attention states over the course of the test.
Attemo Workflow – Select Client

Log in to Attemo and the Upcoming List displays
Attemo Overview

Attēmo Workflow – Review Instructions
The test descriptions display. Review the instructions and press the space bar to confirm the bell tone/Bluetooth keyboard connection.

Attēmo Workflow – Adjust Marker
Practice Test/Marker Adjustment
- Show the client the headband, turn it on, and place on head
- Adjust to sit 25" from iPad camera (marker should display)
- Adjust candidate/stool, iPad or iPad stand so that marker is in the box
- Confirm the candidate can comfortably tap the keyboard space bar
- Start Practice Test (bell tone sounds for correct response)
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**Attemo Overview**

**Attēmo Workflow – Adjust Marker**
When the marker is not properly aligned, the rectangle is orange and/or the circle is red.

**Ready, Set, Go!**
After the Practice Test is complete, tap the Take Test button

**Attemo Workflow - Test Submits Automatically**
The test completes after 15 minutes and a confirmation message displays
Results: What do the patterns of scores look like?

How are they graphed?
What is the speed of responses?
What do the inaccuracies look like?
Is there a regularity to the pattern of scores?
Is there a change over time? E.g. starting off well and then getting worse?
How do the results compare to same age peers?
Is it easy to see very low scores? Answer: yes look for a red t (t) next to the number..that is below the 16th percentile.

Scoring and Reporting

Scoring

• After 15 minutes, the test will automatically end and the app will display a message to confirm that the test is completed.
• Test data is automatically submitted to the Attemo server for digital scoring (as long Wi-Fi connection exists).
• If the iPad's Wi-Fi connection is lost during the test, the test file will be saved but it will not be submitted to the server. The file will be submitted to server once Wi-Fi is available and you log into the app again.
• Once the data is submitted to the server, the test reports are accessible on the Attemo Clinician Portal.
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Reporting
- Attemo provides easy to read, graphical reports that are available in real time.
- Reports are accessible on the Attemo Clinician Portal (there is no generate report option): https://attemo.pearsonclinical.com
- The clinician portal can be accessed from any web enabled device (including your laptop).
- Two different kinds of reports:
  - Score Report
  - Progress Report
- Attemo test results should be used as part of a comprehensive diagnostic evaluation, not as a substitute for the diagnostic process itself.

Score Report
The Attemo score report presents data in each section with graphs and tables, utilizing percentile ranks to compare specific scores to the normative range. The table reports the raw score for each test parameter—motion and attention. Raw scores are converted to percentile ranks for comparison to the community sample-referenced percentile ranges (scores between the 16th and 84th percentiles).

The Attemo Score report consists of four sections:

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motion Analysis</td>
<td>Head movements greater than 1mm</td>
</tr>
<tr>
<td>Attention Response Analysis</td>
<td>Responses to computerized attention task</td>
</tr>
<tr>
<td>Attention State Analysis</td>
<td>Fluctuations in attention state using 30-second blocks</td>
</tr>
<tr>
<td>Composite Scores</td>
<td>Overall performance by integrating motion and attention composite scores</td>
</tr>
</tbody>
</table>

Score Report: Motion Analysis

Five Motion Indicators

<table>
<thead>
<tr>
<th>Motion Indicator</th>
<th>Frequency</th>
<th>Median</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Age Percentile</th>
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<tbody>
<tr>
<td>Head Movement</td>
<td>101</td>
<td>96</td>
<td>56</td>
<td>182</td>
<td>80.3%</td>
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<tr>
<td>Eye Movement</td>
<td>102</td>
<td>99</td>
<td>56</td>
<td>182</td>
<td>80.3%</td>
</tr>
<tr>
<td>Body Movement</td>
<td>103</td>
<td>99</td>
<td>56</td>
<td>182</td>
<td>80.3%</td>
</tr>
<tr>
<td>Hand Movement</td>
<td>104</td>
<td>99</td>
<td>56</td>
<td>182</td>
<td>80.3%</td>
</tr>
<tr>
<td>Foot Movement</td>
<td>105</td>
<td>99</td>
<td>56</td>
<td>182</td>
<td>80.3%</td>
</tr>
</tbody>
</table>

Figure 2b Motion Quantified Analysis Example: Child with Motion Dyscontrol
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Score Report: Motion Analysis

Score Report: Attention Response
Six Measures of Attention Response

Score Report: Attention Response: Attentive

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Score Report: Attention

Score Report: Attention State

Four Measures of Attention States:
- Attentive: Good level of accuracy (greater than 85%) with limited omission or commission errors
- Impulsive: Good level of accuracy (greater than 85%) with significant commission errors
- Distracted: Fair level of accuracy with significant omission errors
- Disengaged: Accuracy no better than chance levels (less than 50%), with behavior reflecting a disengaged manner

Scores and Behaviors:
- Random: No better than random chance
- Minimal: Few responses, less than random chance
- Contrary: Significantly worse than random chance

Figure 4b: Attention Response Graph: Inattentive Child

Figure 7a: Attention State Graph: Attentive Child

Figure 7b: Attention State Graph: Inattentive Child

Figure 8a: Attention State Analysis: Inattentive Child
Score Report: Composite Scores

The Composite Scores section of the report provides an integrated view of the individual's overall performance compared to his or her reference group.

Progress Report

Compares scores from each section across multiple administrations.
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What do the norms look like?
N=1266

<table>
<thead>
<tr>
<th>Age</th>
<th>6-12</th>
<th>13-19</th>
<th>20-79</th>
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<tbody>
<tr>
<td>Mean</td>
<td>8.8</td>
<td>15.3</td>
<td>44.9</td>
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<tr>
<td>SD</td>
<td>1.9</td>
<td>1.9</td>
<td>18.2</td>
</tr>
<tr>
<td>Range</td>
<td>6-12</td>
<td>13-19</td>
<td>20-79</td>
</tr>
</tbody>
</table>

Race/Ethnicity
- African American: 12.6, 11.1, 6.4
- Asian: 4.7, 5.1, 4.8
- Hispanic: 19.9, 19.4, 14.7
- Other: 7.6, 6.0, 3.9
- White: 55.2, 58.4, 70.2

Region
- Midwest: 0.2, 0.0, 0.5
- South: 34.5, 19.9, 14.9
- West: 65.3, 80.1, 84.6

Sex
- Female: 51.3, 48.6, 56.7
- Male: 48.7, 51.4, 43.3

Reliability: Test Retest
N =350

<table>
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<tr>
<th>Age</th>
<th>6-12</th>
<th>13-19</th>
<th>20-79</th>
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<tr>
<td>Range</td>
<td>6-12</td>
<td>13-19</td>
<td>20-79</td>
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<tr>
<td>Test interval (days)</td>
<td>Mean</td>
<td>11.2</td>
<td>9.7</td>
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<tr>
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<tr>
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</table>

Race/Ethnicity
- African American: 3.9, 9.1, 8.0
- Asian: 0.0, 2.2, 3.8
- Hispanic: 24.3, 31.8, 10.6
- Other: 8.7, 4.6, 5.8
- White: 63.1, 52.3, 71.8

Region
- Midwest: 0.0, 0.0, 0.5
- Northeast: 0.0, 0.0, 0.0
- South: 19.4, 20.4, 8.5
- West: 80.6, 79.6, 91.0

Sex
- Female: 54.4, 47.7, 61.7
- Male: 45.6, 52.3, 38.3

Test-Retest Reliability: Ages 6-12

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<tr>
<th>Measure</th>
<th>Attention</th>
<th>Motor</th>
<th>Total</th>
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Test-Retest Reliability: Ages 13-19

<table>
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<tr>
<th>Variable</th>
<th>First testing Mean</th>
<th>Standard Deviation</th>
<th>Second testing Mean</th>
<th>Standard Deviation</th>
<th>Test-Retest Reliability</th>
<th>P-value</th>
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<td>95.2</td>
<td>19.2</td>
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</table>

Attemo

Research demonstrates that the Attêmo test has excellent test–retest reliability. When administered in clinical settings, Attêmo quickly provides real-time data to inform clinical decision-making in initial assessment as part of a thorough diagnostic evaluation, follow-up assessment to evaluate the current clinical status, treatment planning, and the stability of clinical parameters.

The Attêmo scoring program analyzes and compares an individual’s raw performance scores to the test results in the Attêmo reference database. The individual’s performance is reported as a percentile, relative to his or her age and sex peers. Individual performance scores significantly beyond the expected range of results are flagged on the report with a red t to indicate that the clinician may need to investigate further.

Pricing and Ordering
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Pricing & Ordering

1. Prerequisites (customer supplied):
   - iPad® Air, iPad® Air 2, iPad® (5th Generation) or iPad® Pro (9.7 inch, 10.5 inch or 12.9 inch models) and charge cable
   - iPad Bluetooth® Magic Keyboard (US/English) and charge cable
2. Download the Attemo app at the Apple® App Store (at no charge)
3. Order the Attemo Starter Kit (#0158009827): $487 from Pearson (includes a one-time license fee, headband, stand, and 2 test usages) by calling 877-246-2397
4. Order additional test usages (#0150019343): $20/test

Contact Information

Attemo:
   - Sales or General queries: Attemoinfo@Pearson.com
   - Technical support: Attemosupport@pearson.com
   - Phone: 1-877-246-2397
   - For more information:
     - Visit PearsonClinical.com/Attemo
     - or call 877-246-2397

QUESTIONS?