Assessing College Students for Learning Disabilities: Using Data from WAIS-IV and WIAT-III

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Agenda

- Describe components of WAIS-IV and WIAT-III used to evaluate college students for possible SLD classification.
- Use sample data to illustrate interpretive process.

WAIS-IV Content and Structure
Ages 16 - 90
WIAT-III: 16 Subtests

- Listening Comprehension
- Oral Expression
- Early Reading Skills
- Word Reading
- Pseudoword Decoding
- Oral Reading Fluency
- Reading Comprehension
- Alphabet Writing Fluency
- Spelling
- Sentence Composition
- Essay Composition
- Numerical Operations
- Math Problem-Solving
- Math Fluency Addition
- Math Fluency Subtraction
- Math Fluency Multiplication

WIAT-III: 7 Domain Composite Scores

- Oral Language
- Total Reading
- Basic Reading
- Reading Comprehension & Fluency
- Written Expression
- Mathematics
- Mathematics Fluency

What do the measures offer?

Why are they important for the diagnosis of SLD of college students?
Mediating Factors

- Processing Speed
- Working Memory

Conservation of cognitive resources

Working Memory (WM)

- WM contributes the second largest amount of variance, after VC, to the prediction of reading, writing, and mathematics scores on the WIAT and other measures of achievement (Konold, 1999; Hale et al., 2001).
- High correlations between working memory and reading comprehension have been replicated numerous times (see Daneman & Merikle, 1996).

Implications for Learning

- A weakness in working memory may make the processing of complex information more time consuming, and tax the student’s mental energies more quickly compared to others of the same age.
- This may contribute to more frequent errors on a variety of learning tasks, excessive fatigue, or difficulty tolerating frustration.
- Deficits in the executive function system of planning, organization, and the ability to shift cognitive sets should also be evaluated with these students.
WAIS-IV: Composite Scores

Working Memory Index
- Essential component of fluid reasoning and other higher order skills.
- Closely related to achievement and learning.

See Fry & Hale, 1996; Perlow, Juttuso, & Moore, 1997; Swanson, 1996

Importance of Processing Speed
- Performance on the PSI is an indication of the rapidity with which an individual processes routine information without making errors.
- Many learning tasks involve a combination of routine information processing and complex information processing (such as reasoning).
  - For example, reading

Importance of Processing Speed
- A weakness in the speed of processing routine information may make the task of comprehending novel information more time-consuming and difficult.
- A weakness in simple visual scanning and tracking may leave an individual less time and mental energy for the complex task of understanding new material.
WAIS-IV: Composite Scores

Processing Speed Index
- Dynamically related to mental capacity, reading performance & development, and reasoning by conservation of resources (e.g., efficiency)
- See Fry & Hale, 1996; Kail, 2000; Kail & Hall, 1994; Kail & Salthouse, 1994)

WIAT-III: Reading Comprehension

- WIAT-III provides a purer measure of comprehension skills than most other assessments
- Item-set approach permits control of confounding variables
  - Vocabulary
  - Word Attack

<table>
<thead>
<tr>
<th>Grade</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 - 18</td>
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<tr>
<td>2</td>
<td>5 - 24</td>
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<td>4</td>
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<td>32 - 53</td>
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<td>6</td>
<td>38 - 59</td>
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<td>7</td>
<td>46 - 67</td>
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<tr>
<td>8</td>
<td>54 - 75</td>
</tr>
<tr>
<td>9-12+</td>
<td>60 - 84</td>
</tr>
</tbody>
</table>

IF you reverse to lower item sets, the proper statement would be:
- Howard’s reading comprehension skills, as measured by the WIAT-III, are within the average range.
- He was able to demonstrate his skills in answering literal and inferential questions, only with reading passages that were somewhat below his current grade placement.
WIAT-III: Reading Comprehension

If you reverse to easier item sets, the proper statement is:
- In reviewing Howard’s scores on the other reading, oral language subtests, it is apparent that his difficulties with word attack skills, vocabulary, oral language likely impact his ability to comprehend reading material at grade level.

Word Reading and Pseudoword Decoding - Item Analysis

- Items categorized under three content area domains: Morphology Features, Vowel Features, and Consonant Features.
  - Within domains, items measure a variety of word recognition skills, such as recognizing common prefixes and suffixes, recognizing vowel and consonant digraphs, etc.
- The specific parts of each word read incorrectly are recorded.
  - E.g., if student incorrectly read (in) as on, select the single short vowel i as an error.
- Conducting this skills analysis yields specific information about a student’s word identification strengths and weaknesses.

Listening Comprehension

Carlisle (1991) explains that it is necessary to assess both listening comprehension and reading comprehension because students can perform poorly on reading comprehension measures for different reasons.
Listening Comprehension

- If the student has significant language comprehension problems, he or she would be expected to perform poorly on measures of listening comprehension and reading comprehension.
- However, a student who performs poorly on a reading comprehension measure, but performs well on a listening comprehension measure, may have poor word recognition skills, rather than a comprehension problem (Carlisle, 1991).

Why have Written Expression Measures at Multiple Levels?

It is important to evaluate written expression at subword, word, and text levels because:
- difficulty with composition (a high-level skill) may be due to impaired low-level skills such as handwriting, spelling, and grammar.
- word writing skills do not predict sentence writing or composition writing skills.
- sentence writing skills do not predict composition writing skills (Berninger, Cartwright, Yates, Swanson, & Abbott, 1994; Whitaker, Berninger, Johnston, & Swanson, 1994).

Word Count in Essay Composition

- Word Count is a measure of productivity, and has been shown to be a sensitive indicator of writing disorders.
- The Word Count score was optional on the WIAT-II; however, it contributes to the subtest score on the WIAT-III.
**Scoring - Written Expression**

*Supplemental* scoring procedure to evaluate grammar and mechanics
- Correct and Incorrect Word Sequences (CIWS) for written expression
  - Count correct and incorrect sequences of words according to specified rules in manual
  - Appendix B.7

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**Critical Features in Math Disorders**

- Bryant, Bryant, and Hammill (2000) found that individuals diagnosed with math learning disabilities most often have trouble with
  - multistep problem solving,
  - regrouping and renaming, and
  - recalling number facts automatically.
- Bryant et al. conclude that having difficulty with “multistep problems is the single most important behavior for predicting math weaknesses” (p. 175).
- *The WIAT-III mathematics subtests include items that measure these critical skills.*

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**Why include Math Fluency Items?**

- Math computation fluency facilitates more complex problem solving and the acquisition of higher-level mathematics skills.
- The NCTM lists “the ability to compute fluently” (p. 152) as an instructional standard for kindergarten through eighth grade.
  - By ninth grade, math fluency is no longer listed as a standard because it is an assumed skill.
Interpretation
Application of Concepts

WAIS-IV: Composite Scores

Full Scale IQ
- Based on 10 core subtests

Index Scores: Primary interpretation level
- VCI & PRI: 3 core subtests each
- WMI & PSI: 2 core subtests each

GAI = VCI + PRI
- Optional Index score

What is the GAI?
The WAIS-IV GAI provides the practitioner with a summary score that is less sensitive than the FSIQ to the influence of working memory and processing speed.

GAI = sum of scaled scores for VCI subtests and PRI subtests.
General Ability Index

Consider using the GAI if a significant and unusual discrepancy exists between

- VCI and WMI;
- PRI and PSI
- WMI and PSI, or
- between subtests within WMI and/or PSI.

Deriving and Analyzing the GAI

Step 1. Obtain the General Ability Sum of Scaled Scores

Step 2. Determine the GAI Score
   (Table C.1; WAIS-IV Technical Manual)

Step 3. Perform the FSIQ-GAI Discrepancy Comparison
   (Table C.2, C.3; WAIS-IV Technical Manual)

Suggested Procedures for Basic Profile Analysis

Step 1. Report and Describe the FSIQ

Step 2. Report and Describe the Index Scores (VCI, PRI, WMI, PSI)

Step 3. Evaluate Index-Level Discrepancy Comparisons

Step 4. Evaluate Subtest-Level Strengths and Weaknesses
Suggested Procedures for Basic Profile Analysis

Step 5. Evaluate Subtest-Level Discrepancy Comparisons

Step 6. (Optional) Evaluate the Pattern of Scores Within Subtests

Process Scores

Block Design
  - Block Design No Time Bonus (BDN)

Digit Span
  - Digit Span Forward (DSF)
  - Digit Span Backward (DSB)
  - Digit Span Sequencing (DSS)
  - Longest Digit Span Forward (LDSF)
  - Longest Digit Span Backward (LDSB)
  - Longest Digit Span Sequence (LDSS)

Letter-Number Sequencing
  - Longest Letter-Number Sequence (LLNS)

Thinking About Interpretation

- Input Requirements
  - e.g., Hearing, Vision, Motor, etc...

- Output Requirements
  - Minimal verbal expression to maximal verbal expression required.
  - Minimal motor output required to maximal motor output required.
Thinking About Interpretation

- Characteristics of Response
  - Correct, Efficient and Automatic
  - Incorrect, Efficient and Automatic
  - Correct, Inefficient and Effortful
  - Incorrect, Inefficient and Effortful

Factors that can Influence Performance

- Acuity
- Attention
- Executive Functioning
- Working Memory
- Language Impairment
- Visual-Spatial Processing
- Fatigue
- Poor Effort
- Impulsivity

Goal Statements

- Goal statements are provided according to content area domain or specific skills
  - Early Reading Skills, Reading Comprehension, Numerical Operations, Math Problem Solving, Word Reading, Pseudoword Decoding, Spelling.

- Goal statements are also available for the following three subtests that do not have item-level or within-item level skills analysis: Oral Reading Fluency, Sentence Composition, and Essay Composition.
Goals and Objectives

Reading Comprehension

Literal

Items with Errors: 51, 86, 89

- Quan: circle: pro, memory, narrative: passage at a ____________ level, the student will read the passage of a story, identify and list four events, circle the place, retells, circle open-ended, multiple-choice, true/false, uses literal comprehension questions with 10 correct accuracy, listening back to the passage as needed to answer the questions.

Short Term Objectives

- Quan: circle: pro, memory, narrative: passage at a ____________ level, the student will read the passage of a story, identify, locate each of the words, open-ended literal comprehension questions, and then point to the part of the passage that explains how the words fit into the story.
- Quan: circle: pro, memory, narrative: passage at a ____________ level, the student will read the passage of a story, identify, locate each of the words, open-ended literal comprehension questions, and then point to the part of the passage that explains how the words fit into the story.

Sample Data

June16 - Age 19:1

Intake Information

- June16 is a 19-year-old male who is interested in enrolling in college.
- With support services, he graduated from highschool with a 2.5 GPA.
- Since elementary grades, he received direct specialized instruction because of a Specific Reading Disability.
Intake Information

- June16 is concerned about his ability to succeed in college and contacted the Office of Disability Concerns at his local Community College.
- The Office of Disability Concerns requested a psychoeducational evaluation to determine if June16 has a Specific Learning Disability.

Contextual Analysis

- In acquiring new information, how does June16 encode, consolidate, retrieve information presented verbally/visually?
- How does he receive, perceive, process, and remember information?

Contextual Analysis

Success in acquisition of information requires fundamental and higher-order cognitive abilities. For example,
- attention, visual scanning and tracking, linguistic and perceptual ability, speed of processing.
- conceptualization, reasoning, problem-solving, shifting set.
Contextual Analysis

Success in acquisition of information requires fundamental and higher-order cognitive abilities.

- Low level skills must be at a certain level of automaticity to conserve cognitive resources.
- Low level skills enhance or detract from expression of higher-order skills.

WAIS-IV Scores

<table>
<thead>
<tr>
<th>Composite Score/</th>
<th>Scaled Score</th>
<th>Composite Score/</th>
<th>Scaled Score</th>
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<tbody>
<tr>
<td>Index/Subject</td>
<td>Index/Subject</td>
<td>Verbal Comprehension</td>
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</tr>
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<td></td>
<td></td>
<td>Information</td>
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<td>Vocabulary</td>
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<td>Similarities</td>
<td>13</td>
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<td>Block Design</td>
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<td>Matrix Reasoning</td>
<td>13</td>
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<td>Visual Puzzles</td>
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<td>Working Memory</td>
<td>86</td>
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<tr>
<td></td>
<td></td>
<td>Processing Speed</td>
<td>84</td>
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<tr>
<td></td>
<td></td>
<td>Arithmetic</td>
<td>9</td>
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<td></td>
<td></td>
<td>Coding</td>
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<td></td>
<td></td>
<td>Digit Span</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Symbol Search</td>
<td>9</td>
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<td>Full Scale IQ</td>
<td>104</td>
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<td>General Ability Index</td>
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<td></td>
<td></td>
<td>Perceptual Reasoning</td>
<td>115</td>
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Index-Level Discrepancy Comparisons

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<tr>
<th>Comparison</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Difference</th>
<th>Critical Value .05</th>
<th>Significant Difference Y / N</th>
<th>Base Rate Overall Sample</th>
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<tr>
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<td>115</td>
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<td>48.2</td>
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<td>VCI - WMI</td>
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<td>86</td>
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<td>9.29</td>
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<td>1.5</td>
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<td>VCI - PSI</td>
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<td>10.99</td>
<td>Y</td>
<td>2.6</td>
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<tr>
<td>PRI - WMI</td>
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<td>86</td>
<td>29</td>
<td>10.17</td>
<td>Y</td>
<td>1.7</td>
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Verbal Comprehension Subtests

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<tr>
<th>Vocabulary</th>
<th>Information</th>
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<tbody>
<tr>
<td><strong>Relative Strength</strong></td>
<td><strong>Relative Weakness</strong></td>
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<tr>
<td>Measures</td>
<td>Measures</td>
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<tr>
<td>ability to verbalize meaningful concepts</td>
<td>fund of general knowledge</td>
</tr>
<tr>
<td>ability to retrieve information from long-term memory</td>
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</tr>
</tbody>
</table>

Working Memory Subtests

- June16’s abilities to sustain attention, concentrate, and exert mental control are a weakness relative to his nonverbal and verbal reasoning abilities.
- A weakness in mental control may make the processing of complex information more time-consuming for June16, draining his mental energies more quickly as compared to others at his level of ability, and perhaps result in more frequent errors on a variety of learning or complex work tasks.

Digit Span

<table>
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<tr>
<th>Digit Span</th>
<th>Raw Score</th>
<th>Scaled Score</th>
<th>Percentile Rank</th>
<th>Base Rate</th>
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<tr>
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<td>5</td>
<td>3</td>
<td>1</td>
<td>--</td>
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<tr>
<td>Digit Span Backward</td>
<td>8</td>
<td>9</td>
<td>37</td>
<td>--</td>
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<tr>
<td>Digit Span Sequencing</td>
<td>8</td>
<td>9</td>
<td>37</td>
<td>--</td>
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<td>Longest Digit Span Forward</td>
<td>3</td>
<td>--</td>
<td>--</td>
<td>100</td>
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<tr>
<td>Longest Digit Span Backward</td>
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<td>15.5</td>
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<tr>
<td>Longest Digit Span Sequence</td>
<td>5</td>
<td>--</td>
<td>--</td>
<td>88.5</td>
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Digit Span

Process Level Discrepancy Comparisons

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<tr>
<th>Process Comparison</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Diff.</th>
<th>Critical Value</th>
<th>Sign. Diff.</th>
<th>Y / N</th>
<th>Base Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSF - DSB</td>
<td>3</td>
<td>9</td>
<td>-6</td>
<td>3.65</td>
<td>Y</td>
<td>3.4</td>
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<td>-6</td>
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<td>7</td>
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<td>--</td>
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<td>Longest DSF - Longest DSS</td>
<td>7</td>
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<td>3</td>
<td>--</td>
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<td>Longest DSB - Longest DSS</td>
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<td>3</td>
<td>2</td>
<td>--</td>
<td>--</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

PSI: Strengths and Needs

- Ability to mentally process routine information rapidly without making errors is in the low-average range.
- He performed much better on Symbol Search (Scaled score = 9), which is more demanding of attention to detail and visual discrimination, than on Coding (scaled score = 5), which is more demanding of fine-motor skills, short-term memory, and learning ability.

PSI: Functional Implication

Learning often involves a combination of routine information processing (such as reading decoding/word naming) and complex information processing (such as reasoning).
**PSI: Functional Implication**

A weakness in the speed of processing routine information may make the task of comprehending novel information more time-consuming and difficult for June16.

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**PSI: Functional Implication**

A weakness in simple visual scanning and tracking may leave him less time and mental energy for the complex task of understanding new material.

---

**Further Questions**

- Is there a discrepancy between June16’s ability and achievement?
- What are his academic strengths and needs?
### Ability Score Type: WAIS-IV GAI  
**Ability Score**: 118

**Ability–Achievement Discrepancy Analysis**

<table>
<thead>
<tr>
<th>WIAT-III Composite</th>
<th>Predicted WIAT-III Score</th>
<th>Actual WIAT-III Score</th>
<th>Expected Diff.</th>
<th>Critical Value .05</th>
<th>Sign. Diff. Y/N</th>
<th>Base Rate</th>
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<tbody>
<tr>
<td>Oral Language</td>
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<td>98</td>
<td>16</td>
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<tr>
<td>Basic Reading</td>
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<td>91</td>
<td>19</td>
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<td>Written Expression</td>
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<tr>
<td>Mathematics</td>
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<td>124</td>
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<td>Math Fluency</td>
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<td>111</td>
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<td>7.07</td>
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<td>N/A</td>
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### Ability Score Type: WAIS-IV GAI  
**Ability Score**: 118

**Ability–Achievement Discrepancy Analysis**

<table>
<thead>
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<th>WIAT-III Subtest</th>
<th>Predicted WIAT-III Score</th>
<th>Actual WIAT-III Score</th>
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<td>113</td>
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<tr>
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<td>89</td>
<td>19</td>
<td>5.52</td>
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<td>≤10%</td>
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### Ability Score Type: WAIS-IV GAI  
**Ability Score**: 118

**Ability–Achievement Discrepancy Analysis**

<table>
<thead>
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<th>WIAT-III Subtest</th>
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<th>Critical Value .05</th>
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<td>Oral Expression</td>
<td>114</td>
<td>84</td>
<td>30</td>
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### Ability Score Type: WAIS-IV GAI  Ability Score: 118

#### Ability–Achievement Discrepancy Analysis

<table>
<thead>
<tr>
<th>WAIT-III Subtest</th>
<th>Predicted WAIT-III Score</th>
<th>Actual WAIT-III Score</th>
<th>Expected Diff.</th>
<th>Critical Value .05</th>
<th>Sign. Diff. Y/N</th>
<th>Base Rate</th>
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<tbody>
<tr>
<td>Spelling</td>
<td>110</td>
<td>103</td>
<td>7</td>
<td>6.54</td>
<td>Y</td>
<td>&gt;15%</td>
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<td>Sentence Composition</td>
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<tr>
<td>Sentence Combining</td>
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<td>Grammar &amp; Mech.</td>
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<td>78</td>
<td>29</td>
<td>11.92</td>
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<td>≤5%</td>
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</table>

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<tbody>
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<td>Math Fluency Subtraction</td>
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#### Pattern of Ss and Ws

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<tr>
<th>Area of Achievement</th>
<th>VDI-III</th>
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<th>90</th>
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<tbody>
<tr>
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<td>WAIS-IV</td>
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<td>Processing Strength</td>
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<tr>
<td>Processing Strength</td>
<td>WAIS-IV</td>
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</table>

The PDP was used to identify subtest weaknesses. The PDP was used to identify subtest weaknesses. The PDP was used to identify subtest weaknesses.
Conclusions

- The data indicate reading comprehension skills (GAI = 118) are a weakness relative to higher-order conceptualization and reasoning abilities.
- The weakness in reading comprehension is due to a weakness in processing routine information quickly.
- June 16 is unable to name words effortlessly and this reduces the mental energy he has available for the complex task of comprehension.

Recommendations

- Use associative linkages when encoding information. By linking new information to what has been learned previously, he may be able to gain a more global understanding of the information and improve recall.
- Record assigned material and play back the recording to take notes about main ideas and important details, as well as to review vocabulary.
- Verbalize what is going to be learned. For example, say each new vocabulary word both aloud and silently. Emphasize verbal cues, directions, and memory strategies.