

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.

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WAIS-IV Content and Structure
Ages 16 - 90

<p>Verbal Comprehension Scale</p> <p><i>Core Subtests</i> Similarities Vocabulary Information</p> <p><i>Supplemental Subtests</i> Comprehension</p>	<p>Perceptual Reasoning Scale</p> <p><i>Core Subtests</i> Block Design Matrix Reasoning Visual Puzzles <i>New!</i></p> <p><i>Supplemental Subtests</i> Picture Completion Figure Weights (16-69) <i>New!</i></p>
<p>Full Scale</p>	
<p>Working Memory Scale</p> <p><i>Core Subtests</i> Digit Span Arithmetic</p> <p><i>Supplemental Subtests</i> Letter-Number Sequencing (16-69)</p>	<p>Processing Speed Scale</p> <p><i>Core Subtests</i> Symbol Search Coding</p> <p><i>Supplemental Subtests</i> Cancellation (16-69) <i>New!</i></p>

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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

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WIAT-III: 7 Domain Composite Scores

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

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What do the measures offer?

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

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Mediating Factors

Processing Speed
Working Memory

Conservation of cognitive resources

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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).

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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.

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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

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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

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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.

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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)

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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

Grade	Items
1	1 - 18
2	5 - 24
3	11 - 31
4	25 - 45
5	32 - 53
6	38 - 59
7	46 - 67
8	54 - 75
9-12*	60 - 84

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WIAT-III: Reading Comprehension

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.

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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.

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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.

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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.

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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).

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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).

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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.

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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

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.*

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**

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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

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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.

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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.

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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)

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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

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**Suggested Procedures for
Basic Profile Analysis**

Step 5. Evaluate Subtest-Level
Discrepancy Comparisons

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

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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)

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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.

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Thinking About Interpretation

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

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Factors that can Influence Performance

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

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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.

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Goals and Objectives

Reading Comprehension

Literal

Items with Errors: 51, 56, 60, 66

Annual Goal

- Given a/an (circle: expository, narrative) passage at a ____ reading level, the student will read the passage (circle: aloud, silently) and then answer ____ (circle: oral, written), (circle: open-ended, multiple-choice, true/false, yes/no) literal comprehension questions with ____ percent accuracy, looking back to the passage as needed to answer the questions.

Short-Term Objectives

- Given a/an (circle: expository, narrative) passage at a ____ reading level, the student will read the passage (circle: aloud, silently), listen to each of ____ oral, open-ended literal comprehension questions, and then point to/read the part of the passage that explicitly provides the answer to each question with ____ percent accuracy.
- Given a/an (circle: expository, narrative) passage at a ____ reading level, the student will read the passage (circle: aloud, silently) and then answer ____ (circle: oral, written), (circle: open-ended, multiple-choice, true/false, yes/no) literal comprehension questions about who, what, when, where, and why facts that were explicitly stated in the passage with ____ percent accuracy, looking back to the passage as needed to answer the questions.

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Sample Data

June16 - Age 19:1

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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.

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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.

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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?

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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.

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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

<i>Index/Subtest</i>	<i>Composite Score/ Scaled Score</i>	<i>Index/Subtest</i>	<i>Composite Score/ Scaled Score</i>
<i>Verbal Comprehension</i>	116	<i>Perceptual Reasoning</i>	115
Information	11	Block Design	12
Similarities	13	Matrix Reasoning	13
Vocabulary	15	Visual Puzzles	13
<i>Working Memory</i>	86	<i>Processing Speed</i>	84
Arithmetic	9	Coding	5
Digit Span	6	Symbol Search	9
Full Scale IQ 104		General Ability Index 118	

Index-Level Discrepancy Comparisons

Comparison	Score 1	Score 2	Difference	Critical Value .05	Significant Difference Y / N	Base Rate Overall Sample
VCI - PRI	116	115	1	9.29	N	48.2
VCI - WMI	116	86	30	9.29	Y	1.5
VCI - PSI	116	84	32	10.99	Y	2.6
PRI - WMI	115	86	29	10.17	Y	1.7
PRI - PSI	115	84	31	11.75	Y	2.3
WMI - PSI	86	84	2	11.75	N	45.7
FSIQ - GAI	104	118	-14	3.41	Y	0.2

Verbal Comprehension Subtests

Vocabulary

Relative Strength

Measures

- ability to verbalize meaningful concepts
- ability to retrieve information from long-term memory

Information

Relative Weakness

Measures

- fund of general knowledge

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

Working Memory Process Score Summary

Process Score	Raw Score	Scaled Score	Percentile Rank	Base Rate
Digit Span Forward	5	3	1	--
Digit Span Backward	8	9	37	--
Digit Span Sequencing	8	9	37	--
Longest Digit Span Forward	3	--	--	100
Longest Digit Span Backward	7	--	--	15.5
Longest Digit Span Sequence	5	--	--	88.5

Digit Span

Process Level Discrepancy Comparisons

Process Comparison	Score 1	Score 2	Diff.	Critical Value .05	Sign. Diff. Y / N	Base Rate
DSF - DSB	3	9	-6	3.65	Y	3.4
DSF - DSS	3	9	-6	3.6	Y	4.6
DSB - DSS	9	9	0	3.56	N	
Longest DSF - Longest DSB	3	7	-4	--	--	0
Longest DSF - Longest DSS	3	5	-2	--	--	6.5
Longest DSB - Longest DSS	7	5	2	--	--	3

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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.

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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).

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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.

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Further Questions

- Is there a discrepancy between June16's ability and achievement?
- What are his academic strengths and needs?

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Ability Score Type: WAIS-IV GAI Ability Score: 118

Ability–Achievement Discrepancy Analysis

WIAT-III Composite	Predicted WIAT-III Score	Actual WIAT-III Score	Expected Diff.	Critical Value .05	Sign. Diff. Y/N	Base rate
Oral Language	114	98	16	10.15	Y	≤5%
Basic Reading	110	91	19	5.01	Y	≤10%
Written Expression	111	90	21	7.25	Y	≤5%
Mathematics	112	124	-12	6.05	Y *	N/A
Math Fluency	109	111	-2	7.07	N	N/A

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Ability Score Type: WAIS-IV GAI Ability Score: 118

Ability–Achievement Discrepancy Analysis

WIAT-III Subtest	Predicted WIAT-III Score	Actual WIAT-III Score	Expected Diff.	Critical Value .05	Sign. Diff. Y/N	Base Rate
Listening Comprehension	112	113	-1	13.92	N	N/A
Receptive Vocabulary		117				
Oral Discourse Comprehension		103				
Reading Comprehension	112	90	22	13.25	Y	≤5%
Word Reading	111	94	17	6.02	Y	≤10%
Pseudoword Decoding	108	89	19	5.52	Y	≤10%

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Ability Score Type: WAIS-IV GAI Ability Score: 118

Ability–Achievement Discrepancy Analysis

WIAT-III Subtest	Predicted WIAT-III Score	Actual WIAT-III Score	Expected Diff.	Critical Value .05	Sign. Diff. Y/N	Base Rate
Oral Expression	114	84	30	11.32	Y	≤1%
Expressive Vocabulary		103				
Oral Word Fluency		74				
Sentence Repetition		85				

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Ability Score Type: WAIS-IV GAI Ability Score: 118

Ability–Achievement Discrepancy Analysis

WIAT–III Subtest	Predicted WIAT-III Score	Actual WIAT-III Score	Expected Diff.	Critical Value .05	Sign. Diff. Y/N	Base Rate
Spelling	110	103	7	6.54	Y	>15%
Sentence Composition	108	83	25	10.87	Y	≤5%
Sentence Combining		91				
Sentence Building		77				
Essay Composition	107	92	15	10.37	Y	≤15%
Grammar & Mech.	107	78	29	11.92	Y	≤5%

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Ability Score Type: WAIS-IV GAI Ability Score: 118

Ability–Achievement Discrepancy Analysis

WIAT–III Subtest	Predicted WIAT-III Score	Actual WIAT-III Score	Expected Diff.	Critical Value .05	Sign. Diff. Y/N	Base Rate
Math Problem-Solving	111	117	-6	7.82	N	N/A
Numerical Operations	112	127	-15	6.75	Y*	N/A
Math Fluency Addition	109	103	6	10.91	N	N/A
Math Fluency Subtraction	109	112	-3	10.51	N	N/A
Math Fluency Multiplication	108	116	-8	10.00	N	N/A

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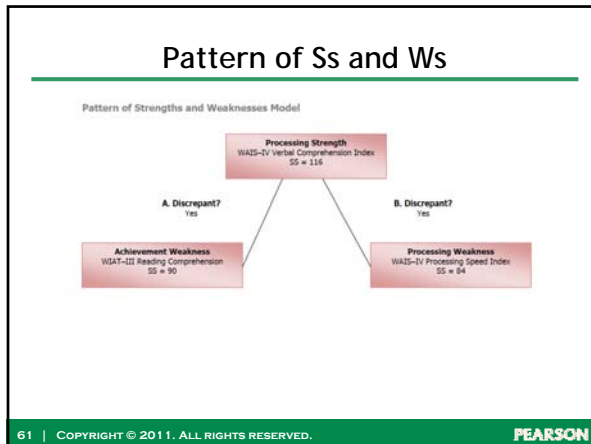
Pattern of Ss and Ws

Pattern of Strengths and Weaknesses Analysis

Area of Achievement Weakness	WIAT–III	Reading Comprehension: 90				
Area of Processing Weakness	WAIS–IV	PSI: 84				
Area of Processing Strength	WAIS–IV	VCI: 116				
Comparison	Relative Strength Score	Relative Weakness Score	Difference	Critical Value .05	Significant Difference Y / N	Supports SLD hypothesis? Yes / No
A Processing Strength / Achievement Weakness	116	90	26	13.47	Y	Yes
B Processing Strength / Processing Weakness	116	84	32	11.00	Y	Yes

The PSW model is intended to help practitioners generate hypotheses regarding clinical diagnoses. This analysis should always be used within a comprehensive evaluation that incorporates multiple sources of information.

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Conclusions

- The data indicate reading comprehension skills (= 90) are a weakness relative to higher-order conceptualization and reasoning abilities (GAI = 118).
- The weakness in reading comprehension is due to a weakness in processing routine information quickly.
- June16 is unable to name words effortlessly and this reduces the mental energy he has available for the complex task of comprehension.

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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.

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