Using a Pattern of Strengths and Weaknesses (PSW) for Specific Learning Disability (SLD) Identification

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Outline for Today’s Workshop

- Brief overview of SLD identification
- Review of foundational sources of information necessary for making informed decisions about PSW method for SLD identification, with an introduction to the assessment – intervention connection
- Description of the PSW method and conceptual similarities among PSW methods; description of the Dual Discrepancy/Consistency (DD/C) operational definition of SLD – a PSW method; and
- The PSW-A Component of the Cross-Battery Assessment Software System (X-BASS)
- Summary and conclusions

The Cross-Battery Assessment Approach

OVERVIEW OF SLD IDENTIFICATION
U.S. (IDEIA) – Federal Definition of SLD

“A disorder in one or more of the basic psychological processes involved in understanding or using language, spoken or written, which manifests itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Such terms include such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia”

(34 CFR 300.311(a)(5)), (34 CFR 300.309(a)(2)(ii))

• Ability-Achievement Discrepancy (AAD)
  – May allow
  – Cannot mandate
• Response-to-Intervention (RTI)
  – Must allow
  – “as part of” a comprehensive evaluation
• Alternative Research-based Approach (PSW)
All Methods of SLD Identification Are...

WTF
Methods

Ability-Achievement Discrepancy

WAIT TO FAIL

Response to Intervention

WATCH THEM FAIL
Pattern of Strengths and Weaknesses

WHY THEY FAIL

Third Option is PSW
Federal Regulations Permit the Use of a PSW Model
(34 CFR 300.311(a)(5), 34 CFR 300.309(a)(2)(II))

- Evaluation documentation must consider whether the student exhibits a pattern of strengths and weaknesses
  - In performance, achievement or both
  - Relative to age, State approved grade levels standards, or intellectual development
  - That is determined by the group to be relevant to the identification of SLD using appropriate instruments

RTI and Cognitive Assessment Data – Important for SLD Identification
Why Do Some Not Understand the Value of A Comprehensive Evaluation?
Psychologist to Parent:
– It’s been six months and your son is still not as far along as we anticipated based on the interventions we’ve been trying. At this time, we have two options.
• One, we can try another intervention that is supported by research and, therefore, is expected to work (like the other interventions we tried).
• Or two, we can take a more comprehensive look at how your son approaches tasks, how he learns, how he is smart, and what difficulties he may have when faced with new problems. That means that we can do a comprehensive evaluation of your son and get a better understanding of his strengths and weaknesses in cognitive areas that are important for learning and achievement. We believe this additional information can help us understand why your son did not respond well to intervention and what we can do differently as we continue to plan and develop educational interventions for him.

Source:

**RTI and Cognitive Assessment Data – Important for SLD Identification**

**Why Do Some Not Understand the Value of A Comprehensive Evaluation?**

**RTI and Cognitive Assessment are Not Mutually Exclusive**

• There will undoubtedly be countless arguments on each side, but none will be strong enough to convince people that one approach is clearly better than the other.

• An increasingly widespread view will likely emerge that embraces each approach as different but complementary in the identification, diagnosis, and treatment of specific learning disability.

D. P. Flanagan, 2008

**Some Housekeeping**

• Clarification of terms
– XBA v. PSW
XBA ≠ PSW

- Flanagan and colleagues’ operational definition was often called by others “XBA,” rather than being conceived of as a method that was separate from yet compatible with XBA.
- To assist with clarification, Flanagan and colleagues (2013) gave it a name—the Dual Discrepancy/Consistency operational definition of SLD.

XBA

- XBA is a method for combining tests from different batteries and predates DD/C by several years (Flanagan & McGrew, 1997; Flanagan & Ortiz, 2001).
- Unlike other “flexible battery” practices, rigorous procedures and methods accompany XBA to insure that any assessment that expands beyond the confines of a single battery is psychometrically and theoretically defensible.

XBA

- To assist in XBA and in interpretation of cross-battery data, X-BASS was developed (Ortiz, et al., 2015). X-BASS is an integration and substantial revision of the software programs that accompanied the second and third editions of Essentials of Cross-Battery Assessment (Flanagan et al., 2007, 2013).
- Although XBA can be used in the context of SLD identification, it has many other applications.
SLD Cannot be Diagnosed with a Formula

- Diagnosis of SLD can be made based on a systematic, theory- and research-based approach to examining results of a comprehensive evaluation.
- A diagnosis of SLD is a clinical judgment that is made by a private independent psychologist or a multi-disciplinary team based on a convergence of data sources that appear to be consistent with the SLD construct.
- Due to federal statutory and regulatory requirements, a classification of SLD is made in the schools following one of three methods – methods that necessitate quantification for purposes of consistency in identification and accountability – The third option (i.e., PSW) is one such method.

Prior to Developing Quantitative Method (PSW-A)–Clinical Judgment (Flanagan and colleagues 2002-2006)

What's Next?

- Review of foundational sources of information necessary for making informed decisions about PSW method for SLD identification, with emphasis on the assessment – intervention connection.
Interpretation of PSW

- Requires an understanding of contemporary theory
- Requires an understanding of the theoretical constructs that are measured by cognitive batteries
- Requires understanding of cognitive processes and abilities related to achievement
- May require cross-battery assessment to assess all the abilities and processes considered important based on referral and to follow up on aberrant test performances

D. P. Flanagan, 2017

Current and Expanded Cattell-Horn-Carroll (CHC) Model of Cognitive Abilities

(adapted from Schneider & McGrew, 2012) — Reviewed in Unit I

Sixteen broad and approximately 80 narrow abilities; approximately 9 broad and 35 narrow abilities represented on current batteries
Over Two Decades of Revisions and Refinements to Gf-Gc/CHC Theory

Chapter by McGrew: First attempt at integrating Cattell-Horn Gf-Gc Theory and John Carroll’s Three-Stratum Theory

Chapter by McGrew: Documentation of how the integrated model presented in 1997 and again in 2000 became known as CHC Theory

Chapter by Schneider and McGrew: Careful review of the literature led to some substantial modifications

Chapter by Schneider and McGrew: Most significant revisions to CHC theory to date and criteria for revisions to the CHC taxonomy


Fluid Reasoning (Gf): Gf refers to a type of thinking or reasoning that individuals use when faced with a relatively new or novel task that cannot be performed automatically. It requires the use of inductive, deductive, and quantitative reasoning when solving unfamiliar problems that are minimally dependent on prior knowledge.

Fluid reasoning

Induction (I): The ability to observe a phenomenon and discover the underlying principles or rules that determine its behavior. This ability is also known as rule inference.

General Sequential Reasoning (RG): The ability to reason logically using known premises and principles. This ability is also known as deductive reasoning or rule application.

Quantitative reasoning (RQ): The ability to reason with quantities, mathematical relations, and operators.
Comprehension-Knowledge (Gc). Gc refers to the breadth and depth of knowledge and skills (e.g., words, general information) that are acquired as a result of exposure to language, culture, general life experiences, and formal schooling. It represents the ability to comprehend and communicate culturally-valued knowledge.

Language Development (LD): The ability to learn and communicate using language. The general understanding of spoken language at the level of words, sentences, and syntax. Understanding words in context.

General Knowledge (Gk): The breadth and depth of knowledge (e.g., words, general information) in specific, practical, and worthwhile domains for everyone.

Working memory capacity

The ability to maintain and manipulate information in active attention. The mind’s mental “scratchpad” or “workbench.”

- A limited capacity system
- Mental scratch pad or workspace
- Loses information quickly through decay of memory traces, unless individual activates other cognitive resources to maintain the information in immediate awareness.

Working Memory Capacity (Gwm). The ability to encode and maintain verbal or visual information in immediate awareness and then manipulate or transform it in some way within a few seconds, which is dependent in part on focus of attention. It also includes the ability to focus attention on task-relevant stimuli and ignore task-irrelevant stimuli.

Auxiliary short-term storage (Wac): The ability to encode and maintain verbal information in primary memory.

Visual-spatial short-term storage (Wv): The ability to encode and maintain visual information in primary memory.

Attentional Control (Ac): The ability to manipulate the spotlight of attention flexibly to focus on task-relevant stimuli and ignore task-irrelevant stimuli. Sometimes aligned to a spotlight or focal attention, focus, control of attention, resource controlled attention, or executive attention.
Long-term Storage and Retrieval Has Been Separated Because It has been Shown that it Encompasses Two Relatively Distinct Abilities

**Gl**

- Learning Efficiency

**Gr**

- Retrieval Fluency

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Learning efficiency

The ability to learn, store, and consolidate new information over periods of time measured in minutes, hours, days, and years.

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**Gl**

- Associative memory (MA): The ability to form a link between two previously unrelated stimuli such that the subsequent presentation of one of the stimuli serves to activate the recall of the other stimuli.

- Meaningful memory (MM): The ability to remember narratives and other forms of semantically related information.

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**Gl**: MA

- Semantic memory
- Procedural memory
- Working memory
- Executive function
**Retrieval fluency**
The rate and fluency at which individuals can access information stored in long-term memory.

- **Naming facility (NA):** The ability to rapidly name objects by their names.
- **Word fluency (PW):** The ability to rapidly produce words that share a phonological or semantic feature (e.g., fluency of retrieval of words within a phonological or semantic domain).
- **Ideational fluency (IF):** The ability to rapidly produce a series of items, words, or phrases related to a specific concept or object.
- **Figural fluency (FF):** The ability to rapidly draw or sketch as many things (or elaborations) as possible when presented with a nonmeaningful visual stimulus (e.g., a set of unique visual elements).
- **Figural flexibility (FX):** The ability to rapidly draw different solutions to figural problems.

Schneider and McGrew’s CHC-based Conceptualization of Gsm and Glr with WISC-V Subtests and Corresponding Memory Construct Highlighted

Digit Span Forward
- Numerical Span
- Distance Memory
- Immediate Memory
- Working Memory Capacity
- Retention Span

Digit Span Backward
- Letter Number Seq.
- Symbol Translation
- Naming Speed
- Literacy
- Symbol Digit Coding
- Object Number Sequencing
- Associative Memory
- Free Recall
- Multiple-Step and/or Delayed Recall
- Coding Speed
- Nonword Repetition
- Mental Rotation
- Episodic Fluency
- Verbal Attention
- Object-Number Sequencing
- Understanding Directions
- Story Recall
- Reading Recall
- Visual-Auditory Learning
- Rapid Picture Naming
- Retrieval Fluency

Figure 4.6: Conceptual map of memory-related abilities in CHC theory.


Facets in Ga

Speech
- Phonemic Coding (PC)
- Lexical Access (LA)
- phonological Storage (PL)
- Surface features (SF)

Nonverbal
- Visual-Spatial (VS)
- Life Recognition (LR)
- Visual-Motor (VM)
- Physical-Motor (PM)

PC
- Lexical Access (LA)
- phonological Storage (PL)
- Surface features (SF)

Ga
- Verbal Ability
- Nonverbal Ability

Supplement WISC-V with Ga tests from another battery (e.g., CTOPP-2; FAR; WJ IV OL)
Areas of Processing Deficit and Their Link to Areas of Academic Achievement

Phonological Processing Model

Three Kind of Phonological Processing

Phonological Awareness: Phonological awareness refers to an individual’s awareness of and access to the sound structure of his/her oral language. This awareness proceeds from word-length phonological units in compound words (e.g., cow-boy) to syllables within words; to morphemes within compounds within morphemes; and finally to individual phonemes within consonant clusters.

Phonological Memory: Phonological memory refers to coding information phonologically for temporary storage in working memory. A deficient phonological memory does not preclude either reading or listening to a noticeable extent, provided the words involved are already in the individual’s vocabulary. However, phonological memory impairments can constrain the ability to learn new written or spoken vocabulary.

Rapid Naming: Rapid naming of objects, colors, digits, or letters requires efficient retrieval of phonological information from long-term memory. The efficiency with which individuals are able to retrieve phonological codes associated with individual phonemes, word segments, or entire words should influence the degree to which phonological information is useful in decoding printed words. Measures of rapid naming require speed and processing of visual as well as phonological information.

Memory for Sound Patterns/Phonological Memory and Reading

Storage of phonological information during reading involves creating a sound-based representation of written words in working memory. Deficits in storage of phonological information result in faulty representations in memory, which lead to inaccurate application of sound rules during reading tasks. A deficit in phonological memory does not inevitably lead to poor reading of familiar material, but is more likely to impact decoding of new words, particularly words that are long enough to decode by set as a means of storing intermediate sounds. A deficit in phonological memory may impair reading comprehension for more complex sentences.
Visual Processing (Gs). Gs refers to the ability to generate visual images or pictures and analyze visual patterns and visual information. It also involves the ability to mentally simulate how complex visual patterns might look when transformed in some way (e.g., rotated).

**Visual Processing**

- **Vz**
  - Visualization: The ability to perceive complex visual patterns and mentally simulate how they might look when transformed in some way (e.g., rotated, changed in size, partially obscured, and so forth).
- **IM**
  - Imagery: The ability to voluntarily produce vivid images of objects, people, or events that are not actually present.
- **MV**
  - Visual Memory: The ability to remember complex visual images over short periods of time (less than 30 seconds).
- **SS**
  - Spatial-Swapping: The ability to quickly and accurately answer questions (visually, implying) about a set or sequence of spatial fields or patterns with multiple obstacles and identify a target configuration or identify a path through the field to a target end point.

**Processing Speed (Gs)**

- The ability to control attention to automatically perform simple and repetitive clerical-type tasks quickly. It may be thought of as mental speed or the fluency with which simple, over-learned tasks are performed.
Interpretation of PSW

- Requires an understanding of contemporary theory
- Requires an understanding of the theoretical constructs that are measured by cognitive batteries
- Requires understanding of cognitive processes and abilities related to achievement
- May require cross-battery assessment to assess all the abilities and processes considered important based on referral and to follow up on aberrant test performances

D. P. Flanagan, 2017
Narrow Ability an Other Clinical Clusters on the WJ IV COG

Number Series
Analysis-Synthesis
Memory for Words
Sentence Repetition
MS
Numbers Reversed
Number-Pattern Matching
N
Oral Vocabulary
Picture Vocabulary
VL/LD
Letter-Pattern Matching
Numbers Reversed
Verbal Attention
Number-Pattern Matching
P
Oral Vocabulary
Picture Vocabulary
VL/LD
Letter-Pattern Matching
Numbers Reversed
Verbal Attention
Number-Pattern Matching
P

CHC Extended Factors on the WJ IV COG

Gc
Gf
Gwm

Composition of the WISC-V Full Scale IQ

FSIQ
Gc
Gv
Gf
Gsm
Gs

Allowable Substitutions for Core FSIQ Subtests (Only 1 Permitted)
Information: Comprehension
Visual Puzzles: Block Design
Picture Concepts: Matrix Reasoning
Arithmetic: Digit Span
Vocabulary: Similarities
Symbol Search: Coding
Cancellation: Letter-Number Sequencing

WISC-IV FSIQ = 10 Subtests
WISC-V FSIQ = 7 Subtests

Information
Comprehension

Visual Puzzles
Block Design

Picture Concepts
Matrix Reasoning

Arithmetic
Digit Span

Vocabulary
Similarities

Symbol Search
Coding

Cancellation
Letter-Number Sequencing
### A Comparison of WISC-V Family and WJ IV Family of Batteries by CHC Construct: When To Supplement Via XBA

<table>
<thead>
<tr>
<th>WJ IV Family</th>
<th>WISC-V Family</th>
<th>CHC Construct</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### Based on 5-factor hierarchical CFA of primary and secondary subtests

### Based on construct validation literature; Extant factor analyses; CHC classifications

### No Substitutions are Permitted
Interpretation of PSW

- Requires an understanding of contemporary theory
- Requires an understanding of the theoretical constructs that are measured by cognitive batteries
- Requires understanding of cognitive processes and abilities related to achievement
- May require cross-battery assessment to assess all the abilities and processes considered important based on referral and to follow up on aberrant test performances

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Summary of Relations between CHC Abilities and Neuropsychological Processes and Reading Achievement and the Etiology of Reading Functions (Cont’d)

- Naming facility (FN); in rapid automatized naming (FAB), age-corrected scores of naming accuracy are very important during the elementary school years for reading rate and fluency or word recognition skills. Association memory (AM) and visuospatial memory (VSM) are important for the acquisition and development of basic reading skills and word reading accuracy. Phonological memory in 9th-11th grade and visual-spatial

Summary of Relations between CHC Abilities and Neuropsychological Processes and Reading Achievement and the Etiology of Reading Functions

- Language development (LBD); linguistic knowledge (LK), and language ability (LA), are important in the context of reading acquisition and development. These abilities become increasingly important as age grows. Oral language, Language Comprehension, and El (planning, organization, self-monitoring) are important for reading comprehension.

- Memory span (MS); working memory capacity (WMC), or attentional processes are important for overall reading success. Memory span is an important component of WMC. A deficit in memory span may also be important. WMC is important for reading comprehension, which involves reading, verbal reasoning, and problem solving, while integrating prior knowledge and accessing information.

- Orthographic processing (OP); is a key term in understanding reading achievement. It involves the ability to recognize and process the visual patterns of letters and words. OP is important for the development of decoding skills and word reading accuracy. Phonological memory in 9th-11th grade and visual-spatial information may also be important.

- Phonological coding (PC); and phonological awareness (PA) are important for the development of basic reading skills and word reading accuracy. Phonological memory in 9th-11th grade and visual-spatial information may also be important.

- Comprehension; vicarious increased cognitive demand compared to naming. Familiar and gender factors have long been identified as important in naming, and more recently a popularity factor has been considered. Familiarity may influence the naming of letters, and it may be more likely for the letters to be named. Comprehension factors include language and literacy environment as well as other factors.
Summary of Relations between CHC Abilities and Neuropsychological Processes and Math Achievement and the Etiology of Math Functions

<table>
<thead>
<tr>
<th>Ability</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing problems</td>
<td>Impaired performance in problem solving, difficulty with organization and sequencing, and limited ability to monitor and self-correct errors.</td>
</tr>
<tr>
<td>Working memory (WM)</td>
<td>Impaired ability to maintain information in mind and access it efficiently for use in problem solving.</td>
</tr>
<tr>
<td>Sensory processing (SP)</td>
<td>Impaired ability to filter and integrate sensory information, leading to difficulty in attending to relevant information and filtering out distractions.</td>
</tr>
<tr>
<td>Executive functions</td>
<td>Impaired ability to plan, organize, and prioritize tasks, and to inhibit impulsive behaviors.</td>
</tr>
</tbody>
</table>

Summary of Relations between CHC Abilities and Neuropsychological Processes and Writing Achievement and the Etiology of Writing Functions

<table>
<thead>
<tr>
<th>Ability</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing problems</td>
<td>Impaired performance in writing, difficulty with organization and sequencing, and limited ability to monitor and self-correct errors.</td>
</tr>
<tr>
<td>Working memory (WM)</td>
<td>Impaired ability to maintain information in mind and access it efficiently for use in writing.</td>
</tr>
<tr>
<td>Sensory processing (SP)</td>
<td>Impaired ability to filter and integrate sensory information, leading to difficulty in attending to relevant information and filtering out distractions.</td>
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<td>Impaired ability to plan, organize, and prioritize tasks, and to inhibit impulsive behaviors.</td>
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</tbody>
</table>

General and Specific Manifestations of Broad Ability Weaknesses and Recommendations That May Facilitate Learning and Aid in Bypassing or Minimizing the Effects of Broad Ability Weaknesses

- Diagnosis of learning disabilities is often complex and controversial.
- Recommendations may include strategies for improving working memory, attention, and organizational skills.
- Early intervention can be critical for improving outcomes.
- accommodations may include extended time on tests and assignments.
Most Intelligence and Cognitive Batteries do not Measure Ga
Examples of assessments of phonological processing directly related to reading:
- PAL-II Rhyming, Syllables, Phonemes, Rimes
- KTEA-II Phonological Awareness Subtest
- NEPSY-II Phonological Processing Subtest
- WJ IV Phonological Processing Test
- DAS-II Phonological Processing Subtest
- CTOPP-II Blending and Segmenting Subtests
- FAR – Feifer Assessment of Reading
### Rapid Reference 1.11. General and Specific Manifestations of Short-Term Memory (Cm) Weaknesses

<table>
<thead>
<tr>
<th>Short-Term Memory (Cm)</th>
<th>General Manifestations of Cognitive/Neuropsychological Weaknesses</th>
<th>Specific Manifestations of Cognitive/Neuropsychological Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Story Retention</strong></td>
<td>Difficulty with following multiple oral and written instructions, remembering information long enough to apply it to the situation, or recalling a series of events (e.g., reading a story).</td>
<td>Reading Difficulties: Reading comprehension (e.g., understanding what is read), decoding multiple print words. Note taking or summarizing what has been read.</td>
</tr>
<tr>
<td><strong>Mnemonics</strong></td>
<td>Difficulty with remembering names, dates, days, time, places, or other information presented in a non-sensory format.</td>
<td>Multisensory problems and distractibility, difficulty distinguishing main idea of a story.</td>
</tr>
<tr>
<td><strong>Working Memory</strong></td>
<td>Difficulty with remembering multiple pieces of information presented in a non-sensory format.</td>
<td>Writing Difficulties: Writing multiple words, redundant in writing, writing the word on or conceptual level.</td>
</tr>
<tr>
<td><strong>Imagery</strong></td>
<td>Difficulty with remembering multiple pieces of information presented in a non-sensory format.</td>
<td>Note-taking</td>
</tr>
</tbody>
</table>

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### Rapid Reference 1.20. Factors That May Facilitate Learning and Aid in Bypassing or Minimizing the Effects of a Short-Term Memory (Cm) Deficit

<table>
<thead>
<tr>
<th>Classroom Instructional Factors</th>
<th>Instructional Materials</th>
<th>Environmental Factors</th>
<th>Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provides opportunities for repeated practice and review</td>
<td>Written materials (e.g., textbook, notes)</td>
<td>Visual materials (e.g., overheads, charts)</td>
<td>Visual practice (e.g., IL, V/HS, O)</td>
</tr>
<tr>
<td>Provides supports (e.g., accommodations, guided practice, study guides, written instructions) to supplement classroom instruction</td>
<td>Visual materials (e.g., overheads, charts)</td>
<td>Visual practice (e.g., IL, V/HS, O)</td>
<td>Visual practice (e.g., IL, V/HS, O)</td>
</tr>
</tbody>
</table>

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### Rapid Reference 1.8. General and Specific Manifestations of Long-Term Retrieval (Gr) Weaknesses

<table>
<thead>
<tr>
<th>Long-Term Retrieval (Gr)</th>
<th>General Manifestations of Cognitive/Neuropsychological Weaknesses</th>
<th>Specific Manifestations of Cognitive/Neuropsychological Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Memory</strong></td>
<td>Difficulty with retaining information long enough to apply it to the situation, or recalling a series of events (e.g., remembering a story).</td>
<td>Reading Difficulties: Reading comprehension (e.g., understanding what is read), decoding multiple print words.</td>
</tr>
<tr>
<td><strong>Mnemonics</strong></td>
<td>Difficulty with remembering names, dates, days, time, places, or other information presented in a non-sensory format.</td>
<td>Multisensory problems and distractibility, difficulty distinguishing main idea of a story.</td>
</tr>
<tr>
<td><strong>Working Memory</strong></td>
<td>Difficulty with remembering multiple pieces of information presented in a non-sensory format.</td>
<td>Writing Difficulties: Writing multiple words, redundant in writing, writing the word on or conceptual level.</td>
</tr>
<tr>
<td><strong>Imagination</strong></td>
<td>Difficulty with remembering multiple pieces of information presented in a non-sensory format.</td>
<td>Note-taking</td>
</tr>
</tbody>
</table>

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See Chapter 4 in Essentials of Cross-Battery Assessment (Flanagan, Ortiz, & Alfonso, 2013).

Relations between Gv Abilities and Reading Achievement

- **Gv – Orthographic processing**

  Orthography (Wagner & Barker, 1994)
  
  The system of marks that make up the English language, including upper and lower case letters, numbers, and punctuation marks
Assessing Visual Processing Related to Reading

• Visual processing must be assessed using *orthography* (letters, words and numbers) rather than abstract designs or familiar pictures

![123 ABC]

Assessing Orthographic Processing Related to Reading

• Examples of assessments of orthographic processing directly related to reading:
  – Test of Silent Word Reading Fluency-2 (TOSWRF-2)
  – Test of Irregular Word Reading Efficiency (TIWRE)
  – Test of Orthographic Competence (TOC)
  – Process Assessment of the Learner (PAL-II)
  – Early Reading Assessment (ERA)
  – Feifer Assessment of Reading (FAR)

See Chapter 4 in *Essentials of Cross-Battery Assessment* (Flanagan, Ortiz, & Alfonso, 2013)
See Chapter 1 in *Essentials of Planning, Selecting, and Tailoring Interventions for Unique Learners* (Mascolo, Alfonso, & Flanagan, 2014)
You May Consider Using a Parent/Teacher Form to Assist in Documenting General and Specific Manifestations of Cognitive Weaknesses

General and Specific Manifestations of Cognitive Ability Weaknesses in SLD Identification

A specific learning disability (SLD) involves the presence of a cognitive processing weakness in one or more areas that is educationally or practically related to a documented academic weakness. While the primary focus of standardized and documented cognitive ability weaknesses is standardized test scores, establishing reproducible validity for a cognitive deficit involves the organization and analysis of additional data. For example, additional data that may be relevant in support of the presence of cognitive ability weaknesses include information from different testing scales, parent and teacher interviews, classroom observation, prior evaluations, work sample analysis, and interviews with peers or past teachers, counselors, and other professionals who have worked with the student. Below is a list of general and specific ways in which cognitive ability deficits manifest in academic performance, specifically academic performance.

- Place special emphasis on the student's strengths and weaknesses as identified in the Section on Cognitive Weaknesses.
- Use standardized testing to identify specific areas of difficulty and tailor instruction to address these weaknesses.
- Encourage the student to use strategies and techniques that can help compensate for their weaknesses.
- Provide additional resources, such as tutoring or accommodations, as needed.
- Regularly review progress and make adjustments to the student's learning plan as necessary.
- Encourage the student to develop self-advocacy skills to help them navigate their academic challenges.

You May Consider Using a Parent/Teacher Form to Assist in Documenting General and Specific Manifestations of Cognitive Weaknesses

You May Consider Using a Parent/Teacher Form to Assist in Documenting General and Specific Manifestations of Cognitive Weaknesses

You May Consider Using a Parent/Teacher Form to Assist in Documenting General and Specific Manifestations of Cognitive Weaknesses
When you know why, “HOW” is made easier
The Person Who Made This Shirt Had Difficulty in What CHC Domain?

Gc

The Person Who Hung the Clock Had Difficulty in What CHC Domain?

Gv

The Person Who Placed Numbers on the Pole Had a Strength in What CHC Domain?

Gf


**These Jobs/Careers Involve High Ability in What Primary CHC Domain?**

- Librarian
- Short order cook
- Day Trader
- Receptionist, operator

Based on logical deductions given demands of the job.

**These Jobs/Careers Involve High Ability in What Primary CHC Domain?**

- Teaching English, language arts, drama, and debate at k-12 or postsecondary institutions
- professional writer; creative writer
- News correspondent

Based on logical deductions given demands of the job; see also McGrew and Flanagan (1998) for research support.

**These Jobs/Careers Involve High Ability in What Primary CHC Domain?**

- Musician
- Conductor
- Music Teacher – fundamentals of pitch and rhythm
- Taking oral dictation

Based on logical deductions given demands of the job; see also McGrew and Flanagan (1998) for research support.
These Jobs/Careers Involve High Ability in What Primary CHC Domain?

- Air Traffic Controllers
- Detectives/FBI Agents
- Researchers

Based on logical deductions given demands of the job.

These Jobs/Careers Involve High Ability in What Primary CHC Domain?

- Architecture and engineering
- Mathematician
- Auto mechanics and machine maintenance
- Welding and plumbing

Based on logical deductions given demands of the job; see also McGrew and Flanagan (1998) for research support.

The Person Who Created this Maze Had Difficulty in What CHC Domain?

Based on specific characteristics of the maze design.
Someone has difficulty with what CHC ability?

- Requires an understanding of contemporary theory
- Requires an understanding of the theoretical constructs that are measured by cognitive batteries
- Requires understanding of cognitive processes and abilities related to achievement
- May require cross-battery assessment to assess all the abilities and processes considered important based on referral and to follow up on aberrant test performances

Interpretation of PSW

- Important for
  - Testing hypotheses
  - Following up on aberrant score performance
  - Measuring constructs not found on the core battery but considered important based on referral information

Cross-Battery Assessment

- Important for
  - Testing hypotheses
  - Following up on aberrant score performance
  - Measuring constructs not found on the core battery but considered important based on referral information

<table>
<thead>
<tr>
<th>Visual Memory (Vv)</th>
<th>Full Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>98</td>
<td>76</td>
</tr>
</tbody>
</table>

D. P. Flanagan, 2017

Gv: Visualization

Picture Recognition

Vz: Visual Memory

MV: Memory for Visual Information
HISTORY AND DEFINITION

The Cross-Battery Assessment Approach

Findings of Woodcock’s (1990) Joint Factor Analysis of Cognitive Batteries

- The WJ-R measured eight broad Gf-Gc cognitive abilities, while the other intelligence tests measured between three and five.
- When not using the WJ-R, it was suggested that clinicians "cross" batteries to obtain the information necessary for a particular evaluation.

The Need for Cross-Battery Assessment

A WISC-III detective strives to use ingenuity, clinical sense, a thorough grounding in psychological theory and research, and a willingness to administer supplementary cognitive tests to reveal the dynamics of a child's scaled-score profile.

(Kaufman, 1994)
### Definition of Cross-Battery Assessment

- A time-efficient method of organizing and interpreting cognitive and academic abilities and neuropsychological processes using more than one instrument in a manner that is psychometrically and theoretically defensible.
- Allows practitioners to measure reliably a wider (and/or more in-depth) range of cognitive, academic, and neuropsychological constructs than that represented by any given stand-alone assessment battery.

“The WJ-R provides additional tests to assist with adequate representation of Gc, Gsm, and Ga.”

### Representation of CHC Abilities on Batteries Published Prior to 2000 (Flanagan, 2003)

<table>
<thead>
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</tr>
</tbody>
</table>

The XBA is used to systematically fill the holes in ability batteries to increase breadth and depth of measurement as may be required by the referral.
Construct Representation on the WISC

<table>
<thead>
<tr>
<th>WISC-R</th>
<th>WISC-III</th>
<th>WISC-IV</th>
<th>WISC-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ga,Gf/Gq</td>
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<td>Ga,Gf</td>
<td>Not represented</td>
</tr>
<tr>
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<td>Underrepresented</td>
<td>Ga,Gf,Gc,Gv</td>
<td>Adequate Representation</td>
</tr>
<tr>
<td>Adequate</td>
<td>Adequate</td>
<td>Adequate</td>
<td>Adequate</td>
</tr>
</tbody>
</table>

Cross-Battery Assessment Enters the Field


VIQ/PIQ: Construct Irrelevant Variance VIQ/PIQ Dropped

Most Current Contributions of the XBA Approach to Psychological Evaluation

Refinements and Extensions to the Cross-Battery Approach

Significantly improved evidence base

Significantly improved and expanded software programs
- Data Management and Interpretive Assistant
- Pattern of Strengths and Weaknesses Analyzer
- Culture-Language Interpretive Matrix

All three programs have been integrated into one software system that substantially improves upon functionality and psychometrics
The Cattell-Horn-Carroll (CHC) Theory as Defined by Schneider and McGrew (2012) with revisions and refinements underway based on their chapter in...

Broad ability classifications of tests were necessary to guard against *construct irrelevant variance* in assessment.

Broad ability classifications were based on theory-driven cross-battery factor analyses.

Broad ability classifications also informed by factor analyses reported in current test manuals and expert consensus (Flanagan et al., 2013).

**Theory-driven Cross-Battery Factor Analyses 1990-2014**

Broad and Narrow CHC Abilities Measured and Not Measured by the Weschler Scales Moving Beyond Within-Battery Factor Analysis


Note: Subtests in bold, uppercase type indicate that they were included in at least three cross-battery factor analyses (published consensus studies). Subtests in italic indicate that they were included in at least one cross-battery factor analysis or results of multiple analyses were consistent. Subtests in lower case type indicate that they were included in only one cross-battery factor analysis or results of multiple analyses were inconsistent. Subtests in lowercase type indicate that they were included in at least three cross-battery factor analyses (published consensus studies) and within-battery factor analyses.

- Narrow ability classifications of tests were necessary to guard against *construct underrepresentation* in assessment.
- Narrow ability classifications were based largely on the results of content validity (expert consensus) studies.
See Appendix L in Essentials of Cross-Battery Assessment (3e) for Details of Expert Consensus Study

Neuropsychological domain classifications were intended to provide practitioners with more interpretive options and to facilitate the integration of psychometric and neuropsychological theories.
CLASSIFY ALL TESTS ACCORDING TO NEUROPSYCHOLOGICAL DOMAIN: A KABC-II example

<table>
<thead>
<tr>
<th>Broad Domain</th>
<th>Narrow Domain</th>
<th>CHC Theory and Neuropsychological Domains</th>
<th>Foundation</th>
<th>Relations Among Abilities, Processes and Academic Skills</th>
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</thead>
<tbody>
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<td>Alertness</td>
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</tr>
<tr>
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<td>Language</td>
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<td>Visual Memory</td>
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</tr>
</tbody>
</table>

Note: A checkmark (✓) indicates a relevant classification. A dash (-) indicates a relevant classification and missing primary neuropsychological domain classification.

Source: Appendix F in Essentials of Cross-Battery Assessment, Third edition (Flanagan, Ortiz, & Allinno, 2013)

Additionally, the Carroll’s Horn-Carroll (CHC) theory of intelligence and its operationalization in a Cross-Battery Assessment procedure may also improve school psychology assessment practice and facilitate the integration of neuropsychological methodology in school-based assessments. The CHC model is based on more than half a century of research on psychometric, developmental, hierarchical, and empirical evidence (Flanagan & MacKenzie, 1992; Flanagan & MacKenzie, 1995). The CHC model includes a single model of intelligence, with four subtests, namely, Verbal, Visual-Spatial, Freedom of Association, and Coding, which are highly related but may differ in theoretical specifications (Carroll, 1997). The CHC and Cross-Battery Assessment approaches share assessment practice from IQ composite to neurodevelopmental functions. This approach can be facilitated by training in contemporary psychometric models (Flanagan, Ortiz, & Allinno, 2007). Furthermore, integrating Cross-Battery Assessment approaches within a global hypothesis-testing approach (Hale & Fornelli, 2004) may provide the best “alternatives” method that meets federal requirements for a comprehensive evaluation.

Foundation

- Important for informing diagnosis of specific learning disabilities
- Important for developing educational strategies, and selecting and tailoring interventions
Summary of Relations between CHC Abilities and Specific Areas of Academic Achievement

<table>
<thead>
<tr>
<th>Reading achievement</th>
<th>Math achievement</th>
<th>Writing achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptual speed (P)</td>
<td>Calculation fluency</td>
<td>Written expression</td>
</tr>
<tr>
<td>Orthographic Processing</td>
<td>Spelling</td>
<td>Synthesizing, writing fluency, and text generation ability</td>
</tr>
<tr>
<td>Naming facility (NA)</td>
<td>Retrieval of common letter patterns in visual and written expression</td>
<td>Story writing (primarily before about grade 5)</td>
</tr>
<tr>
<td>Phonic coding (PC)</td>
<td>Calculation</td>
<td>Language development (LD), lexical knowledge (VL), and listening abilities</td>
</tr>
<tr>
<td>Working memory capacity (WM)</td>
<td>Reasoning inductively and deductively with numbers</td>
<td>Executive functions, such as attention, planning, and self-monitoring</td>
</tr>
<tr>
<td>Phonological memory</td>
<td>Oral Language, and number comparisons related to overall age.</td>
<td>Reasoning inductively and deductively with numbers</td>
</tr>
<tr>
<td>Working memory capacity (WM)</td>
<td>Auditory short-term memory and attention</td>
<td>Executive functions, such as attention, planning, and self-monitoring</td>
</tr>
<tr>
<td>Phonological memory</td>
<td>Short-term memory and attention</td>
<td>Executive functions, such as attention, planning, and self-monitoring</td>
</tr>
</tbody>
</table>

GUIDING PRINCIPLES – VERY BRIEF REVIEW

The Cross-Battery Assessment Approach

XBA Guiding Principles

I. Select a battery that best addresses the referral concerns and that is the best fit for the student
   - Consider co-normed tests first

II. Use clusters based on actual norms when they are available
   - Clusters yielded from the actual test battery rather than formulae based on subtest reliabilities and intercorrelations (although differences between actual norm-based clusters and those generated via formulae are negligible).
A Comparison of Two-Subtest Clusters Generated Three Different Ways

M1: XBA Mean
M2: WISC-IV Norms
M3: Cluster Generator

 EFI = Matrix Reasoning + Figure Weights + Picture Concepts + Arithmetic

X-BASS: Sum of Scaled Scores = 37
X-BASS: Sum of Scaled Scores = 30

XBA Guiding Principle: Use Actual Norms Whenever They Are Available
Actual Norms and X-BASS Composites

When differences occur they are negligible (i.e., not significant). X-BASS composites are derived using the most psychometrically defensible procedures.

XBA Guiding Principles

III. Select tests classified through an acceptable method
- Joint or Cross-Battery Factor Analyses and/or Expert Consensus
  - There is more agreement than disagreement in the field on the broad and narrow abilities that are measured by subtests on popular batteries
- See XBA-CHC Test List on the INDEX tab in X-BASS v2.0

Reference & Information

Cross-Battery Assessment Software System (X-BASS v2.0)
Test References list - DQ, SIQ & Numinosum Classifications
Specialty Test Reference List - Primary Mental Abilities

Communicative Skills, Language and Reading Comprehension

Cross-Battery Assessment System (X-BASS) v2.0

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Representation of Broad and Narrow Abilities

- Use two or more qualitatively different narrow ability indicators to represent each broad ability domain
- Use two or more qualitatively similar narrow ability indicators to represent each narrow ability domain
- Is a single subtest ever enough?
  - Only when converging data sources exist to support the score – ecological validity
  - Risky with low scores
  - Remember: Single measures make for poor measurement

XBA Guiding Principles

IV. When broad abilities are underrepresented, go out of battery
  - Two qualitatively different indicators from another battery
  - Or one qualitatively different indicator and use XBA Analyzer Tab to create a broad ability composite

V. When crossing batteries use tests developed and normed within a few years of one another
  - Flynn effect
  - All tests in Cross-Battery book and X-BASS were normed within about 10-12 years of one another

VI. Select tests from the smallest number of batteries
  - To minimize error that may be the result of differences in norm sample characteristics

VII. Establish ecological validity for test findings – e.g., manifestation of weaknesses or deficits
What’s Next?

Description of the PSW method and conceptual similarities among PSW methods; description of the Dual Discrepancy/Consistency (DD/C) operational definition of SLD – a PSW method; and understanding of the SLD construct.

An Operational Definition of SLD

Flanagan, Ortiz, Alfonso, and Mascolo

- Definition first presented in 2002
- Revised and updated in 2006
- Updated in 2007
An Operational Definition of SLD

Revised and updated in 2011
Updated in Essentials of Cross-battery Assessment, 3e (2013) and renamed:
Dual Discrepancy/Consistency (DD/C) Method
Operationalized in X-BASS (2017) – most sophisticated and psychometrically defensible PSW model to date

The Dual Discrepancy/Consistency (DD/C) Operational Definition of SLD

<table>
<thead>
<tr>
<th>Item</th>
<th>Name of SLD</th>
<th>Format Evaluations</th>
<th>Examples of Computer Methods of Evaluation (CMOEs)</th>
<th>Criteria for SLD</th>
<th>DD/C Operational Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tbody>
</table>


The Dual Discrepancy/Consistency (DD/C) Operational Definition of SLD (Continued)

Alternative Research-Based Approaches to SLD Identification

• **PSW Methods:**
  - Flanagan, Ortiz, Alfonso, & Mascolo (2002-Present)
    - Dual-Discrepancy/Consistency (within the context of an Operational Definition of SLD and a broader approach to “best practices” in CHC-based assessment) – automated in X-BASS
    - Discrepancy/Consistency (PASS Model; CAS-2 battery) – battery specific
    - Concordance-discordance model (based on neuropsych theory within the context of an hypothesis testing approach) – not automated
  - Dehn & Szasz – Psychological Processing Analyzer-5
    - (remarkably similar to the PSW-A component of X-BASS, although not as comprehensive, or psychometrically sophisticated, or theoretically driven)
  - WISC-V
    - two discrepancy comparisons for PSW – automated in WIAT-III, KTEA-III scoring programs

The Focus Here is on the DD/C Model

• **PSW Methods:**
  - Flanagan, Ortiz, Alfonso, & Mascolo (2002-Present)
    - Dual-Discrepancy/Consistency (within the context of an Operational Definition of SLD and a broader approach to “best practices” in CHC-based assessment) – automated in X-BASS
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  - WISC-V
    - two discrepancy comparisons for PSW – automated in WIAT-III, KTEA-III scoring programs

Conceptual Understanding of the Dual Discrepancy/Consistency (DD/C) Method

Flanagan, Ortiz, and Alfonso (2002 - 2017)
Essential Elements of PSW based on DD/C
Operational Definition of SLD
Flanagan, Ortiz, and Alfonso (2002-2017)

- Level I: Academic weakness (SS < 90; more typically below 85)
  - Must also meet criteria for unexpected underachievement
  - Not all weaknesses are unexpected (to determine unexpected use X-BASS)

- Level II: Exclusionary factors must be ruled out as the primary cause of the academic skill weaknesses
  - It is not unusual to find one or more exclusionary factors that contribute to academic weaknesses
  - Use exclusionary factors form to ensure accountability

Identification of SLD

- Involves more than just examining scores from standardized tests
  - A convergence of data sources is necessary
  - Data should be gathered via different methods
  - Exclusionary factors must be considered and examined systematically

Exclusionary Factors Form

X-BASS (Flanagan, Ortiz, & Alfonso, 2015-2017) is necessary to conduct the DD/C PSW analysis
Flanagan et al.’s DD/C Definition of SLD: Level II – Review of Exclusionary Factors

**Evaluation and Consideration of Exclusionary Factors for SLD Identification**

An evaluation of specific learning disability (SLD) requires an evaluation and consideration of factors other than a disability in one or more basic psychological processes that may be the primary cause of a student’s academic difficulty. These factors include (but are not limited to) vision/ hearing, or near vision, intellectual disability (ID), emotional/behavioral or psychological disturbances, environmental or economic disadvantages, cultural and linguistic factors (e.g., limited English proficiency), and/ or modalities for learning and physical health factors. These factors may be evaluated via behavior rating scales, parent and teacher interviews, classroom observations, attendance records, social development history, family history, vision/auditory status, medical records, prior evaluations, and interviews with parents or other caregivers who have worked with the student. Non-exempt to the fact that students with (and without) SLD often have one or more factors listed below that contribute to academic and learning difficulties. However, the practitioner must rule out any of these factors being the primary cause of a student’s academic and learning difficulties to maintain SLD as a viable classification/ diagnosis.


---

**Flanagan et al.’s DD/C Definition of SLD: Level II – Review of Exclusionary Factors**

<table>
<thead>
<tr>
<th>Vision (Check all that apply):</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Vision test recent (within 1 year)</td>
</tr>
<tr>
<td>☐ Vision test outdated (&gt; 1 year)</td>
</tr>
<tr>
<td>☐ Failed</td>
</tr>
<tr>
<td>☐ Wear Glasses</td>
</tr>
</tbody>
</table>

**Past: Name of disorder:________________________**

**Failed: Vision difficulties suspected or observed (e.g., difficulty with far or near point copying, inconsistent numbers in written math work, margining or missing core visual tasks such as reading, copying)****

**Notes:**

Form downloadable on CD that accompanies Essentials of Cross-Battery Assessment, 3e [Flanagan, Ortiz, & Alfonso, 2013]

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**Flanagan et al.’s DD/C Definition of SLD: Level II – Review of Exclusionary Factors**

<table>
<thead>
<tr>
<th>Hearing (Check all that apply):</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Hearing test recent (within 1 year)</td>
</tr>
<tr>
<td>☐ Hearing test outdated (&gt; 1 year)</td>
</tr>
<tr>
<td>☐ Failed</td>
</tr>
<tr>
<td>☐ Use Hearing Aids</td>
</tr>
</tbody>
</table>

**Past: Name of disorder:________________________**

**Failed: Hearing difficulties suspected in the referral (e.g., frequent requests for repetition of auditory information, mispronounced words, attempts to self-accommodate by moving closer to vocal source, obvious attempts to, speak more loudly)****

**Notes:**

Form downloadable on CD that accompanies Essentials of Cross-Battery Assessment, 3e [Flanagan, Ortiz, & Alfonso, 2013]
Flanagan et al.'s DD/C Definition of SLD: Level II – Review of Exclusionary Factors

Environmental/Economic Factors (Check All that Apply):
- Limited access to educational materials in the home
- History of educational neglect
- Congenital failure to provide instructional support
- Economic considerations precluded treatment
- Limited educational space (e.g., no space of identified issues, e.g., filling a prescription, replacing broken glasses, tutoring)
- Temporary housing situation

NOTES:

Form downloadable on CD that accompanies Essentials of Cross-Battery Assessment, 3e (Flanagan, Ortiz, & Alfonso, 2013)

Flanagan et al.'s DD/C Definition of SLD: Level II – Review of Exclusionary Factors

Categorical Factors (Check All that Apply):
- Limited Number of Years in U.S. (___)
- Language other than English spoken in home
- No History of Early Developmental Problems in Primary Language (___ years)
- Current Primary Language Proficiency:
- Current English Language Proficiency:
- Academic Knowledge Development (Circle most appropriate)
- Parental Educational and Socio-Economic Level

NOTES:

Form downloadable on CD that accompanies Essentials of Cross-Battery Assessment, 3e (Flanagan, Ortiz, & Alfonso, 2013)

Flanagan et al.'s DD/C Definition of SLD: Level II – Review of Exclusionary Factors

Physical/Health Factors (Check All that Apply):
- Limited access to healthcare
- Minimal documentation of health history/medical problems
- Chronic health conditions (Specify):___
- Migraine
- Temporary health condition (Date/Duration:___) Hospitalization (Date:___)
- History of Medical Condition (Date Diagnosed:___)
- Medical Treatment (Specify)
- Repeated visits to the school nurse
- Repeated visits to doctor
- Medication (type, dosage, frequency, duration:___)

NOTES:

Form downloadable on CD that accompanies Essentials of Cross-Battery Assessment, 3e (Flanagan, Ortiz, & Alfonso, 2013)
### Flanagan et al.'s DD/C Definition of SLD: Level II – Review of Exclusionary Factors

<table>
<thead>
<tr>
<th>Instructional Factors of Work All That Apply:</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Interrupted schooling (e.g., early entry, no entry) Specify why:</td>
</tr>
<tr>
<td>☐ Non-graded curriculum (e.g., advanced)</td>
</tr>
<tr>
<td>☐ New teacher (year is months):</td>
</tr>
</tbody>
</table>

**NOTES:**

Determination of Primary and Contributory Causes of Academic Weaknesses and Learning Difficulties (Check Only):
- Based on the available data, it is reasonable to conclude that one or more factors is primarily responsible for the student’s observed learning difficulties. Specify:
- Based on the available data, it is reasonable to conclude that one or more factors contribute to the student’s observed learning difficulties. Specify:
- No factors listed here appear to be the primary cause of the student’s academic weaknesses and learning difficulties.

Form downloadable on CD that accompanies Essentials of Cross-Battery Assessment, 3e (Flanagan, Ortiz, & Alfonso, 2013)

### Essential Elements of PSW based on DD/C

**Operational Definition of SLD**

Flanagan, Ortiz, and Alfonso (2002–2017)

- Level 1: Cognitive weaknesses (below 90, more typically below 85)
  - Mark also make errors for the domain(s) evaluated
  - Test of cognitive weaknesses not domain specific (e.g., determine domain specific X-BASS)
  - Generally low average ability across most cognitive areas does not meet the criterion of a domain-specific cognitive weakness

- Level 2: Support a “dual discrepancy” and a “consistency” with at least average ability to think and reason
  - Discrepancy 1: Difference between cognitive strengths and academic weaknesses is significant; difference between actual and predicted (from general ability or the Facilitating Cognitive Composite [FCC]) performance is unusual (base rate of about 10%) – supports domain-specific cognitive weaknesses
  - Discrepancy 2: Difference between cognitive strengths and academic weaknesses is significant; difference between actual and predicted (from general ability or FCC) performance is unusual (base rate of about 10%) – supports unexpected underachievement
  - Consistency: Empirical or ecologically valid relationship between cognitive and academic weaknesses

**X-BASS** (Flanagan, Ortiz, & Alfonso, 2015–2017) is necessary to conduct the DD/C PSW analysis

### Consistency – Don’t Assume a Perfect Prediction

Not all academic weaknesses have corresponding cognitive weaknesses

Cognitive processing weaknesses do not guarantee that there will be academic weaknesses – they simply raise the risk (Flanagan & Schneider, 2016)

*Relationship is probabilistic, not deterministic, as some have erroneously assumed (e.g., Kranzler et al., 2016)*
Not All Definitions of SLD Assume at Least Average Overall Ability

The Dual Discrepancy/Consistency (DD/C) Operational Definition of SLD Requires at Least Average Overall Ability to Think and Reason Despite Some Cognitive Processing Deficits

Is At Least Average Overall Ability Consistent with the SLD Construct?

Individuals with SLD have At Least Average Overall Ability

- The children often have average or above intelligence and good memory in other respects
- Hinshelwood, 1902

“Historical Perspective” Information from Nancy Mather, NVASP 2011
Many of the children have a high degree of intelligence

Orton, 1937

“It seems probably that psychometric tests as ordinarily employed give an entirely erroneous and unfair estimate of the intellectual capacity of these children” (p. 582)

Orton, 1925

• Remedial training must continue until reading is in harmony with the child’s other capacities and achievement
• Some children of superior intelligence struggle to learn to read
• Monroe, M. (1932)
Individuals with SLD have At Least Average Overall Ability

• “Sometimes children of good general intelligence show retardation in some of the specific skills which compose an intelligence test” (p. 22)

• Monroe and Backus (1937)

"Historical Perspective" Information from Nancy Mather, NYASP 2011

Individuals with SLD have At Least Average Overall Ability

• “...generalized integrity and deficiency in learning (p. 9)...there is a deficit in learning in the presence of basic integrity” (p. 25).


Individuals with SLD have At Least Average Overall Ability

"The clearest expression of a special disability is consistently low scores on a series of tests in a given subject combined with average or superior scores on tests in other subjects. Such scores can be arranged in a ‘neuropsychological profile.’ For example, in one of a reading disability, a child might obtain scores placing him in the ninth grade in arithmetic...and in the third grade in reading. Here we would have evidence of a striking reading disability.” (p. 43).


"Historical Perspective” Information from Nancy Mather, NYASP 2011
All historical approaches to SLD emphasize the spared or intact abilities that stand in stark contrast to the deficient abilities.

Kaufman, 2008, pp. 7-8

“Weaknesses in word reading and spelling surrounded by a sea of strengths”

Overcoming Dyslexia

Individuals with SLD have At Least Average Overall Ability

• Learning Disabilities Association of Canada
  • “Learning Disabilities refer to a number of disorders which may affect the acquisition, organization, retention, understanding or use of verbal or nonverbal information. **These disorders affect learning in individuals who otherwise demonstrate at least average abilities essential for thinking and/or reasoning**”
  • Source: www.ldac-acta.ca/en/learn-more/id-defined.html
Individuals with SLD have At Least Average Overall Ability

By failing to differentially diagnose SLD from other conditions that impede learning, such as intellectual disability, pervasive developmental disorders, and overall below average ability to learn and achieve, the SLD construct loses its meaning and there is a tendency (albeit well intentioned) to accept anyone under the SLD rubric who has learning difficulties for reasons other than specific cognitive dysfunction...


What’s Next?

The PSW-A Component of X-BASS

Introduction and Functionality of the PSW-A Component of X-BASS

- Entering scores and interpreting output
- Guidance on selecting scores for inclusion in PSW Analysis
PWS Analysis Following the Dual Discrepancy/Consistency (DD/C) Model Using X-BASS

- Requires Estimates of Seven Cognitive Abilities and Processes
  - Gf
  - Gc
  - Glr
  - Gsm
  - Gv
  - Ga
  - Gs

- These 7 are necessary for the calculation of the g-value, FCC, and ICC
  - Other areas that may be included in the PWS Analysis, but do not contribute to the g-value, ICC, or FCC
  - Speed of Logical Access
  - Cognitive Efficiency

- Estimates Do Not Need to be Broad Cognitive Ability Estimates. Examples:
  - Broad CHC Estimate
    - Most likely in the areas of Gf, Gc, and Gv
    - WISC V Gvis estimate of Vz only
  - Narrow CHC Estimate
    - Likely in Ga (e.g., Phonological Processing) and Gs (e.g., Perceptual Speed)
    - More than one CHC Estimate is OK

- For example, in the area of Gf, one estimate of GfA and close estimate of GfC is OK

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X-BASS Welcome Screen

Cross-Battery Assessment Software System (X-BASS® v2.0)

- Essentials of Cross-Battery Assessment
- Cross-Battery Assessment Main Menu
- Cross-Battery Assessment Design
- Cross-Battery Assessment Administration
- Cross-Battery Assessment Interpretation
- Cross-Battery Assessment Report

Start the Test Record Management

- Time of Completion
- Date of Completion
- Administered By
- Notes

Stop

---

Cross-Battery Assessment Software System (X-BASS® v2.0)
PSW Component of X-BASS

- Transfer best estimates of CHC abilities and academic scores to XBA Organizer Tab
- From XBA Organizer tab, select estimates to be used in PSW analysis (use select all button)
- View output
- Select different cognitive and academic weaknesses for analysis if necessary
- Print interpretation of results

Cross-Battery Assessment System (X-BASS v2.0)

Criteria for Concern

- Significant or substantial?
  - Yes
  - No

Follow-up Recommendations

- Do the results suggest a need for follow-up?
  - Yes, recommended for follow-up
  - No

Clinical Judgment Needed

- No

Additional Subtests were Administered
10 New Clinical Composite Based on Actual Norms
Calculated Automatically on the WISC-V Tab

Summary of the New Clinical Composites for the WISC-V

<table>
<thead>
<tr>
<th>Clinical Composite</th>
<th>Subtest Composites</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working Memory (WM)</td>
<td>Digit Span, Span X Digit, Digit Symbol</td>
<td>Provides a balance of Memory Span and Working Memory and is consistent with the composition of the Digit Span subtest on the WISC-V IV.</td>
</tr>
<tr>
<td>Verbal Comprehension (VC)</td>
<td>Similarities, Vocabulary, Information</td>
<td>Provides a robust estimate of VIQ, as compared to the Verbal Comprehension Index (VCI), spanning two major ability domains: VIQ (General Information) and VCI (Verbal Comprehension).</td>
</tr>
<tr>
<td>Perceptual Speed (PS)</td>
<td>Matrix Reasoning, Figure Weights, Pattern Concepts, Letter-Number Coding</td>
<td>Provides a robust estimate of VIQ, as compared to the Fluid Reasoning Index (FRI), spanning three major ability domains, including Induction (I), General Sequential Reasoning (GSR), and Qualitative Reasoning (QR).</td>
</tr>
<tr>
<td>Executive Function (EF)</td>
<td>Symbol Search, Letter-Number Sequencing, Symbol Translation</td>
<td>Provides an estimate of executive function, involving mental flexibility and problem-solving cognitive processes.</td>
</tr>
</tbody>
</table>

Summary of the New Clinical Composites for the WISC-V (Cont’d)

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digit Span</td>
<td>Provides a balance of Memory Span and Working Memory and is consistent with the composition of the Digit Span subtest on the WISC-V IV.</td>
</tr>
<tr>
<td>Similarities</td>
<td>Similarities, Vocabulary, Information</td>
</tr>
<tr>
<td>Matrix Reasoning</td>
<td>Matrix Reasoning, Figure Weights, Pattern Concepts, Letter-Number Coding</td>
</tr>
<tr>
<td>Symbol Search</td>
<td>Provides an estimate of executive function, involving mental flexibility and problem-solving cognitive processes.</td>
</tr>
</tbody>
</table>
10 New Clinical Composite Based on Actual Norms
Calculated Automatically on the WISC-V Tab

Note: The more scores that make up a composite, the larger the difference needs to be between highest minus lowest score for a noncohesive composite. Large differences are common in the general population. Nevertheless, when large differences are present, the composite may obscure important information about the individual's strengths and weaknesses.

Check Boxes for Transfer to XBA Analyzer Tab
for Analysis of Variability

XBA Analyzer Tab Provides the SAME Composite
No difference between Actual Norms and the Composite Generated by X-BASS

X-BASS composites based on the most psychometrically defensible means of calculating composites when actual norms are not available.
What if I wanted to do something else? Can I Generate a Different Composite or Composites Based on my Clinical Judgment?

Note: This version of X-BASS not yet released; available to X-BASS v2.0 users free in 4-6 weeks.
**X-BASS: “XBA Analyzer Tab”**

<table>
<thead>
<tr>
<th>OXYTALLIZED INTELLIGENCE (O.I.)</th>
<th>CRYSTALLIZED INTELLIGENCE (C.I.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crystallized Intelligence (O.I.)</td>
<td>Crystalized Intelligence (C.I.)</td>
</tr>
<tr>
<td>WNP 1-3 Volumes (V, Y, Z)</td>
<td>WNP 2 Volumes (V, Y)</td>
</tr>
<tr>
<td>WNP 1-3 Vocabulary (O, I)</td>
<td>WNP 2 Vocabulary (O, I)</td>
</tr>
<tr>
<td>WNP 1-3 Comprehension (C, R)</td>
<td>WNP 2 Comprehension (C, R)</td>
</tr>
<tr>
<td>Other</td>
<td>Other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PREDICTED</th>
<th>OBSERVED</th>
<th>COMPLIANT</th>
<th>CONFORMITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FLUID REASONING (F.R.)**

- **FC: Fluid Reasoning**
  - Evaluate the degree of fluid reasoning in individuals.
  - Consider factors such as the ability to reason logically and abstractly.

---

**Example Calculation**

- **Step 1:** Identify the type of reasoning task.
- **Step 2:** Compare the observed scores with the predicted scores.
- **Step 3:** Adjust the scores based on the conforming factors.

---

**Graphic Representation**

- **Diagram 1:** Illustration of the reasoning process.
- **Diagram 2:** Flowchart of the decision-making steps.
- **Diagram 3:** Graphical representation of the reasoning outcomes.

---

**Additional Notes**

- **Note 1:** Detailed explanation of the reasoning tasks.
- **Note 2:** Importance of considering various factors in fluid reasoning.
- **Note 3:** Recommendations for improving fluid reasoning skills.
X-BASS: "XBA Analyzer Tab"

<table>
<thead>
<tr>
<th>CRYSTALLIZED INTELLIGENCE (Gc)</th>
<th>score</th>
<th>Converted Standard Score</th>
<th>Composite Score Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISC-V Similarities (Sc-V, VIQ)</td>
<td>7</td>
<td>85</td>
<td>A</td>
</tr>
<tr>
<td>WISC-V Vocabulary (Sc-VQ)</td>
<td>10</td>
<td>85</td>
<td>B</td>
</tr>
<tr>
<td>WISC-V Information (Sc-WI)</td>
<td>9</td>
<td>85</td>
<td>B</td>
</tr>
<tr>
<td>WISC-V Comprehension (Sc-PI)</td>
<td>9</td>
<td>80</td>
<td>A</td>
</tr>
</tbody>
</table>

Use Alternative Composite(s) SS: 80 97 PR: 8 42

Score configuration and interpretation:
At least one alternative composite has been formed using the scores entered into the domain. For any scores between 80-97 inclusive that may have been used to form a composite, additional data and information should exist to support inclusion in the composite as either a strength or a weakness.

---

Cross-Battery Assessment Software System (X-BASS® v2.1)

Gf Organizer and Score Summary

---

X-BASS: WISC-V Tab and GF Subtest Scaled Scores Transferred to XBA Analyzer Tab

GF Section of XBA Analyzer Tab
This is a situation where some have claimed that XBA leads to “over-testing.” [The apparent “need” to follow up with another Gf subtest – in this case Gf:RG – is to get a cohesive composite. However, this may or may not be necessary, depending on available data sources.] Note that over-testing only happens when the practitioner does not understand his or her data.

The question in this situation is: How do I represent the “average” part of Gf in my PSW analysis without “over-testing” in “average” areas?

Is administration of Pictorial Sequences “chasing” the high score? No, not unless there is solid ecological validity for the initial Gf:RG performance. If ecological validity is available, then consider the following...

Evidence from multiple data sources indicates that Gf:RG (and reasoning with numbers) is not posing any problems for the student at this time.

Multiple data sources include: Teacher report, multiple work samples, math problem solving, grades in math.
Use “Other Data Entry Tab”

Type the name of your “composite”, enter score; transfer to Data Organizer tab

X-BASS: WISC-V Tab and Gsm Subtest Scaled Scores Transferred to XBA Analyzer Tab
Supplement the WISC-V with tests from CTOPP-2 for Ga: Phonetic Coding

Top Row for all areas in XBA Analyzer Tab includes the names of Tests and Batteries that do not have their own separate tab in X-BASS. Use the drop down menu in the top row in the Ga domain to find the CTOPP-2.

CTOPP2 Manual does not include critical values for determining cohesion of composites
Supplement the WISC-V with tests from CTOPP-2 for Ga: Phonetic Coding

Subtests
- Elision (ss = 8)
- Blending Words (ss = 9)
- Phoneme Awareness (ss = 9)

Composite
Phonological Awareness (SS = 91)

CTOPP2 Manual does not include critical values for determining cohesion of composites. Enter the composite in the top row; select the subtests that make up the composite; and enter the scaled scores for each subtest and X-BASS will evaluate cohesion.

X-BASS Builds in the Guiding Principle: Use Actual Norms Whenever they are Available
Supplement the WISC-V with tests from CTOPP-2 for Ga: Phonetic Coding

X-BASS Builds in the Guiding Principle: Use Actual Norms Whenever they are Available

Transfer Phonological Awareness Composite to Data Organizer Tab

WIAT-III Tab

WIAT-III Tab
7 CHC Estimates Have Been Transferred to the Data Organizer Tab

Scroll below the cognitive domains to see the academic/SLD areas

8 Achievement Subtest Scores Have Been Transferred to the Data Organizer Tab
When determining cognitive areas of strength and weakness, consider whether an ability or process likely facilitates or inhibits overall learning and specific academic skill acquisition and development.
Note: You may have a strength and a weakness within a broad ability domain (Gf and Gc in this example) – the score representing a strength contributes to the FCC, and the score representing a weakness contributes to the ICC.
Summary and Conclusions

PSW Model Provides Information About Important Markers for SLD

- Overall cognitive ability is at least average despite specific cognitive processing weaknesses – FCC (top oval)
  - Weaknesses relative to most people (< 85)
  - Weaknesses because they are significantly lower than FCC
  - Weaknesses because difference between actual and predicted performance is unusual in the general population
  - SLD is specific, not general
- Specific cognitive processing weaknesses – ICC or individual weaknesses as reported in bottom left oval
  - Weaknesses relative to most people (< 85)
  - Weaknesses because they are significantly lower than FCC
  - Weaknesses because difference between actual and predicted performance is unusual in the general population
  - Unexpected underachievement
- Academic weaknesses – as reported in bottom right oval
  - Weaknesses relative to most people (< 85)
  - Weaknesses because they are significantly lower than FCC
  - Weaknesses because difference between actual and predicted performance is unusual in the general population
  - Unexpected underachievement
- May have academic areas of strength (reported in top oval as they are expected to be consistent with the FCC)

PSW Models: The Controversy

- Given its increasing popularity, research on the PSW approach is emerging.
- One emerging body of research indicates that there is a lack of agreement among PSW models.
  - This research also suggests that PSW models are effective at determining who is not SLD, but they are not as effective at determining who is SLD.
  - PSW methods are appropriate for differential diagnosis of learning disability in:
    - Reading (e.g., Feifer, Gerhardstein, Flanagan, Fitzer, & Hichs, 2014),
    - Math (e.g., Kubis, Smith, Post, Udenfried, Waldie, & Komis, 2016), and
    - Written expression (e.g., Hanwa, Kubis, White, Waldie, & Mcleod, 2016).
  - Valid points are made about potential weaknesses of PSW models in this literature.
- Another emerging body of research provides support for a neuropsychological/cognitive processing PSW approach (Hale et al., 2010 White Paper).
  - This research shows the relevance of PSW methods for differential diagnosis of learning disability in:
  - Reading (e.g., Feifer, Gerhardstein, Flanagan, Fitzer, & Hichs, 2014),
  - Math (e.g., Kubis, Smith, Post, Udenfried, Waldie, & Komis, 2016), and
  - Written expression (e.g., Hanwa, Kubis, White, Waldie, & Mcleod, 2016).
  - Valid points are made about the potential strengths of PSW models in this literature.
- While valid points are made for and against the use of PSW models, the results of the studies that have been published to date are impacted by methodological preferences used to analyze the data as well as the accuracy/inaccuracy of the assumptions made about each PSW model.
PSW Models: The Controversy

- There will be arguments for and against PSW over the next several years.

- All methods have limitations; PSW is no exception. Nevertheless, it most certainly can be used effectively to inform SLD diagnosis.

- Until the critics produce a better method, PSW will predominate and the battles will focus on which PSW method should be used in the schools.

Bottom Line

- There is no SLD litmus test; the more well-versed you are in different approaches and methods, the more information you will gain about the student (including how to best help him or her).

Identification of SLD

- Involves more than just examining scores from standardized tests or progress monitoring data
  - A convergence of data sources is necessary
  - Data should be gathered via different methods
  - Exclusionary factors must be considered and examined systematically
Three Important Tasks for All School Personnel

• Work to ensure that RTI is up and running well, most especially in the early grades
• Work closely with teachers to create a supportive environment for students where they can access the curriculum at their instructional level

Three Important Tasks for All School Personnel

• Conduct comprehensive assessments of students who do not respond as expected to quality instruction and intervention
  – Include cognitive/neuropsychological tests
  – Connect assessment findings to instructional strategies and interventions

XBA and X-BASS Online Certification Program
All Webinars Newly Recorded!

Cross-Battery Assessment

The Cross-Battery Assessment (XBA) Competency-Based Certification Program in webinars taught and offered by Drs. John H. Flanagan, Robert G. Olson, and Vincent C. Smith. The program includes an assessment training workshop and proficiency in cross battery assessment using the new X-BASS software. This webinar training program is taught by the leading experts in XBA, including Drs. John H. Flanagan, Assistant Professor of Psychology and Education, Duke University, and Vincent C. Smith, Ph.D., Professor of Psychology and Education, University of Michigan. Complete program information and online registration can be found at http://www.schoolneuropsych.com/certification.php

www.schoolneuropsych.com
Questions?

Special thanks to Drs. Dawn Flanagan and Sam Ortiz for sharing their slides based on the work of Flanagan, Ortiz, and Alfonso (2013, 2017).

Alfonso@Gonzaga.Edu