An Overview of the Cross-Battery Method of Assessment and Interpretation

Assessment and Hypothesis Testing for Intervention Planning

Dawn P. Flanagan, Ph.D.
St. John’s University
and
Yale Child Study Center, Yale University School of Medicine

www.crossbattery.com
The CHC Cross-Battery Approach

• Guidelines for Test Selection and Organization
• Guidelines for Hypothesis Testing
• Guidelines for Test Interpretation
• Focus on Targets for Intervention
• Automated Program to Facilitate Interpretation and Reporting of Test Performance

What is Cross-Battery Assessment?

• An approach that neuropsychologists, and astute clinicians in other assessment-related fields, have always followed
• Flanagan and colleagues transformed the practice of crossing batteries into a method that is both psychometrically and theoretically defensible
  – A systematic method of ensuring adequate construct representation across a wide range of cognitive abilities and processes
  – A systematic method of interpreting test data from more than one battery
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)

Is XBA a Method of SLD Diagnosis?

• No. XBA is not a diagnostic method for SLD or any other ability-related educationally handicapping condition.
• This method of assessment is used typically when there is a need to measure an individual’s range of cognitive and academic capabilities comprehensively.
• Tests, methods, and approaches do not diagnose, people do.
What is XBA? Clarifications

- To apply XBA, practitioners need to understand how broad and narrow CHC abilities relate to the reason(s) for and purpose(s) of the referral.

CHC Abilities and Processes Related to Basic Reading Skills and Reading Comprehension in Children Ages 6-8 Years

(*Cross-Battery Assessment* or other Flexible Battery Approaches May Be Necessary to Measure All Important Abilities and Processes)

- Important Broad CHC Cognitive Constructs
  - GC
  - GA
  - GS
  - Gsm
  - Glr

- Important Narrow CHC Cognitive Constructs
  - LD
  - VL
  - PC
  - US
  - P
  - MA
  - NA
  - MA

- Co-normed
  - KABC-II
  - KTEA-II

- Supplemental
  - WJ III Wrd. Order

- = Strongest and most consistent significant relation

- = Consistent significant relation
Broad CHC Abilities

- Broad abilities represent “basic constitutional and longstanding characteristics of individuals that can govern or influence a great variety of behaviors in a given domain” (Carroll, 1993, p. 634).
- In general, measurement of broad abilities is done when the purpose of an evaluation is to examine the breadth of broad cognitive constructs that define overall intellectual/cognitive functioning or \( g \) within the psychometric (CHC) tradition.
- Typically, the breadth of broad cognitive constructs that may be represented in a comprehensive evaluation include, \( G_f, G_c, G_v, G_a, G_{sm}, G_{lr}, \) and \( G_s \).

Broad CHC Abilities

- The aggregate of broad abilities provides an estimate of overall intellectual/cognitive functioning or \( g \).
- It is recommended that at least two subtests be used to measure a broad ability, each subtest measuring a qualitatively different aspect of that broad ability.
- The more qualitatively different aspects of the broad ability that are assessed, the better the measurement and estimate of the broad ability.
Narrow CHC Abilities

• Narrow abilities “represent greater specializations of abilities, often in quite specific ways, that reflect the effects of experience and learning, or the adoption of particular strategies of performance” (Carroll, 1993, p. 634).
• There are certain circumstances in which a greater focus on narrow abilities is warranted. For example, if a child appears to have difficulty with memory, then it would be important to assess memory in-depth, via the use of multiple narrow ability indicators of Gsm and Glr, for example. By focusing on a broader range of narrow abilities that make up Gsm and Glr, it is possible to identify memory difficulties more precisely.

Narrow CHC Abilities

• Narrow abilities should also be represented by at least two subtests.
• Because most intelligence batteries do not contain multiple measures of the same narrow abilities (e.g., two or more tests of inductive reasoning; two or more tests of spatial relations), it is often necessary to cross batteries in an attempt to measure narrow abilities adequately.
Three Pillars of XBA

I

CHC Theory

II

CHC Broad (Stratum II)

III

CHC Narrow (Stratum I)

Broad Ability Classifications

• Guard against construct irrelevant variance
Construct Relevant/Irrelevant Variance:  
A Verbal VIQ Example

Construct Irrelevant Variance at the Subtest Level
Theory-driven Cross-Battery Factory Analyses (CB-FA, CB-CFA) – Empirical Basis for Broad Ability Classifications of Tests

- Keith (1997) – KABC, WISC-R
- Phelps et al. (2005) – WJ III, WISC-III
- Sanders et al. (2007) – WJ III, DAS
- Floyd et al. (2010) – WJ III, D-KEFS
- (2011) – WAIS-IV, WMS-IV
- Reynolds et al. (2012) – KABC-2, Wech, WJ III

First-Order Model

Five Factors

39 Indicators
(5-12 indicators per factor)

Reynolds, Keith, Flanagan, and Alfonso (2012)
Narrow Ability Classifications

• Guard against construct underrepresentation

Construct Under-Representation

WJ III Gf Example

(Note - Gf also includes the narrow ability of Quantitative Reasoning, which not included in this figure.)
Adequate Construct Representation

WJ III Gf Example

Broad Abilities

Narrow Abilities

Narrow Ability Indicators

Construct Under-representation

The most appropriate description of the ability underlying the WJ-R Gc cluster is not broad Gc as purported but rather, the narrow ability of Lexical Knowledge, which is subsumed by Gc.

(Note - Gc includes other narrow abilities not included in this figure.)

LS - Listening Ability
K0 - General Information
VL - Lexical Knowledge
The most appropriate description of the ability underlying the WJ-III Gc cluster is broad Gc as purported.

(Note - Gc includes other narrow abilities not included in this figure.)

LD – Language Development
K0 - General Information
VL - Lexical Knowledge

Content Validity or Expert Consensus Studies – Empirical basis for Narrow Ability Classifications

Flanagan, Ortiz, Alfonso, and Mascolo (2006); New Expert Consensus Reported in Essentials of Cross-Battery Assessment, 3e (2012; expected release date: December)
XBA Guiding Principles

I. Select a battery that best addresses the referral concerns
   – 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 XBA averages
XBA Guiding Principles

III. Select tests classified through an acceptable method
   – Factor Analyses or Expert Consensus
     - Use relatively *PURE* CHC indicators
       - See Appendix B
     - Use 2 or more qualitatively different narrow indicators to represent each domain
       - Better representation with more diversity in narrow abilities
## XBA Guiding Principles

### IV. When broad abilities are underrepresented, go out of battery

- **Two qualitatively different indicators from another battery**
XBA Guiding Principles

V. When crossing batteries use tests developed and normed within a few years
   – Flynn effect

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

Examples of XBA and FAQs

• Does WJ III Compuscore Yield Interpretable CHC Clusters?
  – Interpretation is based on your knowledge of psychometrics, theory, research, and your own clinical experience
  – You must look at subtest scores and the difference between them
  – Clinical observations are equally important
  – Error Analysis and Testing Limits also yield valuable information
IMPLEMENTING XBA
STEP BY STEP
Implementation of XBA: **Step 1**

- **Selection of an Intelligence Battery**
  - **Consider:**
    - Age and Developmental level
    - Floor and Ceiling
    - English language proficiency
    - Cultural Loading
    - Linguistic Demand
    - Specific referral concerns
      - SLD
      - MR (Intellectually Disabled)
      - Gifted

Implementation of XBA: **Step 2**

- **Identify the CHC Broad Abilities** that are measured by the selected intelligence battery
  - **Page 49** (XBA, 2007):

  - **Adequate** = battery has at least 2 qualitatively different indicators of the broad ability.
  - **Underrepresented** = only one narrow aspect of the broad ability is included.
  - **Not measured**
Implementation of XBA: Step 2

- If underrepresented or not measured:
  - Look out of battery to supplement
  - Pages 51-53 (XBA, 2007)
Implementation of XBA: Step 3

- Identify the CHC *Narrow Abilities and Processes* that are measured by the selected intelligence battery.

- When warranted:
  - Review relations between abilities, processes and achievement on p. 40
  - Use pp. 55-61 to help you find subtests based on the CHC Narrow Ability or Process
### Table 2.2: Examples of XBAs for Seven Intelligence Batteries

<table>
<thead>
<tr>
<th>CHC Structure of the KABC-II</th>
<th>Supplemental Tests via Cross-Battery Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>g</strong></td>
<td><strong>Glr</strong></td>
</tr>
<tr>
<td><strong>Gsm</strong></td>
<td><strong>Gsm</strong></td>
</tr>
<tr>
<td><strong>Gv</strong></td>
<td><strong>Gsm</strong></td>
</tr>
<tr>
<td><strong>Gf</strong></td>
<td><strong>Gf</strong></td>
</tr>
<tr>
<td><strong>Gc</strong></td>
<td><strong>Gc</strong></td>
</tr>
<tr>
<td><strong>Ga</strong></td>
<td><strong>Ga</strong></td>
</tr>
<tr>
<td><strong>Gs</strong></td>
<td><strong>Gs</strong></td>
</tr>
<tr>
<td><strong>Gsm</strong></td>
<td><strong>Gsm</strong></td>
</tr>
</tbody>
</table>

### CHC Structure of the KABC-II

- **g**: g
- **Glr**: g
- **Gsm**: g
- **Gv**: g
- **Gf**: g
- **Gc**: g
- **Ga**: g
- **Gs**: g
- **Gsm**: g

#### CHC Components
- **Glr**: g
- **Gsm**: g
- **Gv**: g
- **Gf**: g
- **Gc**: g
- **Ga**: g
- **Gs**: g
- **Gsm**: g
Implementation of XBA: Step 4

- Administer and Score Selected Intelligence Battery and Supplemental tests
  - *Follow directions specified by the test publisher’s standardization procedures.*
Implementation of XBA: Step 5

- Enter Scores into the XBA Data Management and Interpretive Assistant (XBA DMIA)

Insert CD-Rom
Enable Macros for Proper Functioning of Program
XBA DMIA

- Be sure to understand the rules underlying the interpretive decisions yielded by this program
- Table 3.1 (contains the *general rules of thumb* that are used for determining nonunitary and noninterpretable clusters on each intelligence test tab of the XBA DMIA)
- Appendix F (more specific criteria than those contained in Table 3.1)

### Table 3.1 Criteria Used to Determine a Nonunitary or Noninterpretable Cluster for Seven Intelligence Batteries

<table>
<thead>
<tr>
<th>Battery (Source)</th>
<th>Cluster(s)</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISC-IV</td>
<td>VCI and PRI</td>
<td>A difference between highest and lowest scaled scores of $\geq 5$ points (i.e., $\geq 1.5$ SDs)</td>
</tr>
<tr>
<td></td>
<td>WMI, PSI, Gf Cluster, Gc Cluster</td>
<td>A difference between scaled scores of $\geq 5$ points (i.e., $\geq 1.5$ SDs)</td>
</tr>
<tr>
<td></td>
<td>FSIQ</td>
<td>A difference between highest and lowest Index of $\geq 23$ standard score points (i.e., $\geq 1.5$ SDs)</td>
</tr>
<tr>
<td></td>
<td>GAI</td>
<td>A difference between VCI and PRI of $\geq 23$ standard score points (i.e., $\geq 1.5$ SDs)</td>
</tr>
<tr>
<td>WAIS-III</td>
<td>VCI, PVI, WMI, VIQ, and PIQ</td>
<td>A difference between highest and lowest scaled scores of $\geq 5$ points (i.e., $\geq 1.5$ SDs)</td>
</tr>
<tr>
<td></td>
<td>PSI, Gc and Gv</td>
<td>A difference between scaled scores of $\geq 5$ points (i.e., $\geq 1.5$ SDs)</td>
</tr>
<tr>
<td></td>
<td>FSIQ</td>
<td>A difference between highest and lowest Index of $\geq 23$ standard score points (i.e., $\geq 1.5$ SDs)</td>
</tr>
</tbody>
</table>
GUIDELINES FOR TEST INTERPRETATION

Guidelines for Test Interpretation

- Interpreting two scores representing either a Broad or Narrow Ability/Processing Domain:

  - Mean of two scores is reported when:
    1. difference is less than 15 points (unitary)
    2. difference is ≥15 but the scores are within the same normative range (nonunitary, but clinically interpretable)
      - Both scores are < 85
      - Both scores are > 85 and < 115
      - Both scores are > 115
    3. No mean is calculated when the difference is ≥15 and the scores are within different normative ranges (nonunitary)
Two Scores Representing Either a Broad or Narrow Ability or Process

<table>
<thead>
<tr>
<th>CRYSTALLIZED KNOWLEDGE (Gc)</th>
<th>Subtest Standard Score</th>
<th>Converted Standard Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AUDITORY PROCESSING (Ga)</th>
<th>Subtest Standard Score</th>
<th>Converted Standard Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>130</td>
<td>130</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FLUID REASONING (Ga)</th>
<th>Subtest Standard Score</th>
<th>Converted Standard Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>62</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>78</td>
<td>78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROCESSING SPEED (Ga)</th>
<th>Subtest Standard Score</th>
<th>Converted Standard Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>82</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>97</td>
<td>97</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SHORT-TERM MEMORY (Gm)</th>
<th>Subtest Standard Score</th>
<th>Converted Standard Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>83</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td>65</td>
<td>65</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>READING-WRITING ABILITY-WRITING (Gw-W)</th>
<th>Subtest Standard Score</th>
<th>Converted Standard Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SAMPLE INTERPRETIVE STATEMENT

Both SS < 85

The WJ III Comprehension-Knowledge or Crystallized Intelligence (Gc) Factor represents Jim’s ability to reason with previously learned information. An individual’s Gc ability develops largely as a function of formal and informal educational opportunities and experiences and is highly dependent on exposure to mainstream U.S. culture. Jim’s Gc ability was assessed by tasks that required him to state a word either similar or opposite in meaning to a word presented and to name familiar and unfamiliar pictured objects (Verbal Comprehension = 79; 8th percentile; Below Average/Normative Weakness). In addition, Jim was required to answer orally presented questions regarding the common or typical characteristics of certain objects (General Information = 73; 4th percentile; Below Average/Normative Weakness). The difference between Jim’s performances on the test that make up the Gc domain is not statistically significant, indicating that he performed similarly on these tests. Jim’s Gc cluster of 75 (71-78) is ranked at the 5th percentile and is classified as Below Average/Normative Weakness. This finding suggests that Jim has a deficit in a basic psychological process (i.e., reasoning with verbal information), a finding that should play an essential role in developing educational interventions.

XBA pp. 96-97
Guidelines for Test Interpretation

When using the CHC Tab of the XBA-DMIA, mean scores are calculated for 3 scores when:

1. All scores are within the same normative range
2. The magnitude of the difference between any score with any other score is < 15.
3. Two-subtest cluster and an outlier are reported when (page 98):
   1. The difference between standard scores for two tests is <15 and the difference between the third score and both of these scores is ≥15.
   2. Two scores fall within the same normative range and the third score differs from both of those scores by ≥15.
   3. The difference between ssa and ssb is ≤15 and the difference between ssc and ssb is ≤15 and the difference between ssa and ssc is > 15, then ssb is averaged with ssa or ssc, depending on the normative range in which the scores fall.

3 Subtests in XBA

- When do you examine 3 subtests (using CHC tab of the XBA DMIA)?
  - Significant difference between two tests that form a norm based cluster and it is considered necessary to follow up on lower of two scores
  - Result: 3 subtests that together do not share a common norm group
  - Predicament: What is the best way to interpret that constellation of 3 subtest scores?
    - Option 1: cross-battery interpretive guidelines
    - Option 2: clinical judgment
    - Option 3: combination of 1 and 2 (probably the best option)
    - Option 4: other??
Three scores within the same normative range
(3 subtest cluster is reported)

Average Range/Within Normal Limits

Three scores within the same normative range
(3 subtest cluster is reported)

Outside and Below Normal Limits
Three scores within the same normative range (3 subtest cluster is reported)

Outside and Above Normal Limits

The difference between each score with every other score is < 15 (3 subtest cluster is reported)

SSA – SSB = < 15; SSA – SSC = < 15; SSB – SSC = < 15
The difference between each score with every other score is < 15 (3 subtest cluster is reported)

Average Range/Within Normal Limits

70 85 100 115 130

SSA – SSB = < 15; SSA – SSC = < 15; SSB – SSC = < 15

The difference between standard scores for two tests is <15 and the difference between the third score and both of these scores is >15

Average Range/Within Normal Limits

70 85 100 115 130

SSA – SSB = < 15; SSA – SSC = > 15; SSB – SSC = > 15
The difference between standard scores for two tests is <15 and the difference between the third score and both of these scores is ≥15.

SSB − SSC = < 15; SSB − SSA = ≥ 15; SSC − SSA = ≥ 15

Two scores fall within the same normative range (but are ≥15) and the third score differs from both of those scores by ≥15.

SSA − SSB = ≥15; SSA − SSC = ≥ 15; SSB − SSC = ≥ 15
two scores fall within the same normative range (but are ≥15) and the third score differs from both of those scores by ≥15

\[
\text{SSA} - \text{SSB} = \geq 15; \quad \text{SSA} - \text{SSC} = \geq 15; \quad \text{SSB} - \text{SSC} = \geq 15
\]

The difference between \( ssa \) and \( ssb \) is <15 and the difference between \(ssc\) and \( ssb\) is <15 and the difference between \( ssa\) and \(ssc\) is ≥15, then \( ssb\) is averaged with \( ssa\) or \(ssc\), depending on the normative range in which the scores fall
XBA: What’s new and what are the issues?

Questions and Answers
Understanding 85-115

<table>
<thead>
<tr>
<th>Standard Score Range</th>
<th>Percentile Range</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 70</td>
<td>&lt;2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>Lower Extreme</td>
</tr>
<tr>
<td>70-84</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; to 14&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Well Below Average/Normative Weakness</td>
</tr>
<tr>
<td>85-89</td>
<td>16&lt;sup&gt;th&lt;/sup&gt; to 23&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>Low Average*</td>
</tr>
<tr>
<td>90-110</td>
<td>25&lt;sup&gt;th&lt;/sup&gt; to 75&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Average*</td>
</tr>
<tr>
<td>111-115</td>
<td>77&lt;sup&gt;th&lt;/sup&gt; to 84&lt;sup&gt;th&lt;/sup&gt;</td>
<td>High Average*</td>
</tr>
<tr>
<td>116-129</td>
<td>86&lt;sup&gt;th&lt;/sup&gt; to 97&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Well Above Average/Normative Strength</td>
</tr>
<tr>
<td>&gt;130</td>
<td>&gt;97&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Upper Extreme</td>
</tr>
</tbody>
</table>

*Within Normal Limits (range in which most people perform)

Focus on 80-89 Range Needed

<table>
<thead>
<tr>
<th>Standard Score</th>
<th>Percentile Range</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 70</td>
<td>&lt;2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>Extremely Below Average/Intellectual Disability Range</td>
</tr>
<tr>
<td>70-79</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; to 8&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Well Below Average/Normative Deficit</td>
</tr>
<tr>
<td>80-89</td>
<td>9&lt;sup&gt;th&lt;/sup&gt; to 24&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Below Average/Relative to Normative Weakness</td>
</tr>
<tr>
<td>90-109</td>
<td>25&lt;sup&gt;th&lt;/sup&gt; to 74&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Average</td>
</tr>
<tr>
<td>110-119</td>
<td>75&lt;sup&gt;th&lt;/sup&gt; to 90&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Above Average/Relative to Normative Strength</td>
</tr>
<tr>
<td>120-129</td>
<td>91&lt;sup&gt;st&lt;/sup&gt; to 97&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Well Above Average/Normative Strength</td>
</tr>
<tr>
<td>&gt;130</td>
<td>&gt;98&lt;sup&gt;th&lt;/sup&gt;</td>
<td>Extremely Above Average/Intellectually Gifted Range</td>
</tr>
</tbody>
</table>

Note: Normative deficits are typically associated with scores that are approximately 1SD or more below the normative mean. Normative strengths are approximately 1SD or more above the normative mean.

Broad v. Narrow

• Research demonstrates relations mainly between narrow abilities and processes and various academic skills
• Broad CHC abilities are more overarching mental capacities and weaknesses at this level place constraints on learning and achievement
• Narrow abilities and processes are more specific mental capacities. Weaknesses in narrow CHC areas may be remediated, compensated for, or accommodated – all of which serve to limit their adverse affects on learning and achievement

Essentials of Cross-Battery Assessment, 3rd Edition

• “Outlier” will be replaced with “Divergent Score”
• We do not eliminate data of any kind
  – Explain it’s utility or lack thereof within the context of the case
Aren’t XBA and the “Operational Definition of SLD” the same thing?

- No. Part of the Operational Definition of SLD (Flanagan et al., 2002, 2006, 2007, 2011) involves understanding a student’s unique pattern of cognitive ability and processing strengths and weaknesses. The XBA approach is one method that may be used for this purpose.

Are converting scores and averaging them voodoo psychometrics?
“Our Instruments Were Not Intended to be Used That Way”

• Says who?
• WISC-IV doesn’t measure Glr and Ga
  – Either supplement or fail to gather potentially important information
• What do we do with aberrant score performances?
  – Either follow up or explain that results are indeterminate
• What do we do when we have hypotheses about referral issues based on our initial evaluation?
  – Don’t test them? Explain to the parent that such hypotheses are viable, but cannot be tested, as testing them would require using a battery that was normed on a different sample than the initial battery?
  – Explain further that until publishing companies publish the type of far-reaching and extensive battery of tests that would be necessary to test any and all hypotheses that may emerge based on an initial evaluation, there is no way to follow up at this time?
• WJ III and SB5 Standardization Phase
  – Facilitates flexible battery assessment
  – WJ III Manual has a Selective Testing Table
• KABC-II Authors Recommend XBA (see their Essentials book)
“Our Instruments Were Not Intended to be Used That Way”

- We do “Assessment” in our profession
  - Assessment is the process of gathering and discussing information from multiple and diverse sources in order to develop a deep understanding of what students know, understand, and can do with their knowledge as a result of their educational experiences; the process culminates when assessment results are used to improve subsequent learning
  http://tep.uoregon.edu/workshops/teachertraining/learnercentered/assessing/definition.html

- But some (many?) claim that assessment can only be accomplished reliably and validly when every single tool, measure, scale, and observation is standardized together on a large nationally representative sample of the general population (Canivez on the NASP listserv)
  - Realistic? Are we paid to estimate g from a WASI? Or to find out why a child is having difficulty learning?
  - Laboratory v. classroom
  - Group v. individual

Why do I need XBA if I have the WJ III?

Hypothesis Testing
Follow up on Aberrant Score Performances
Better Narrow Ability Representation
Orthographic Processing
Executive Functioning
Manipulatives
Less Language
After an Initial Evaluation, Follow-up Assessment is Often Necessary

- Hypothesis Testing
- Testing of the Limits
- Error Analysis
- Demand Analysis
- Process Approach

May Require Moving the Level of Assessment Activities from Psychoeducational to Neuropsychological
<table>
<thead>
<tr>
<th>WISC-IV Index subtest</th>
<th>Suggestions for testing limits when child performs poorly on subtest</th>
<th>Suggestions for instructional modifications when child performs poorly on subtest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Comprehension/Similarities</td>
<td>Present pictures of the words in an item pair when asking how they are alike (e.g., use clip-art photos or generate Web-based images for each item pair) Generate common features between item pairs and ask which feature is most similar to the two items (e.g., for the item pair pineapple and grape, the choices may be they are both good for you; they are both fruits, they both grow)</td>
<td>Use visual prompts to support reasoning by pairing visuals with written/oral information (e.g., when teaching new concepts) Use visual prompts to aid retrieval (e.g., a picture starter to assist with writing tasks) Ensure that the child understands academic material before requiring him or her to reason with the information Externalize the reasoning process: Provide an oral or written list of steps that may be used by the child when activities call for reasoning and higher-level thinking and learning</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Use the words to be defined in a sentence Provide a picture of the word when asking the child to define the word Ask the child if he or she can provide any information about the word (e.g., for the word steeple, the child might know that it is part of a building)</td>
<td>For questions that require multiple responses, model a relevant response or an exact initial response for the child (e.g., if a child needs to write a short essay about how to prepare for a vacation, a teacher might offer a first actual step or say, “When I went on vacation, one thing I did was buy plane tickets”) Personalize learning for the child to reduce the need to make abstractions</td>
</tr>
<tr>
<td>Comprehension (Information)</td>
<td>For items requiring multiple “reasons,” provide the child with an actual primer or a relevant primer (e.g., if the question relates to reasons for turning off a TV when you leave the room, you might offer an actual primer (e.g., “One reason is because we are done watching”) or you might offer a relevant primer (e.g., “One reason we use coupons is to save money, what is one reason we turn off TV?”) Make an abstract question more meaningful. If the child had difficulty with the question, “What is the thing to do if you find someone’s house keys?” then when testing limits, you might say, “Imagine that you lost your house keys in the park and someone else found them. What should the person who found your keys do with them? Ask the child if he or she has seen or heard of the facts, items, or objects before Ask the child if he or she remembers learning about the</td>
<td>Use text previews for reading comprehension tasks to activate prior knowledge and/or provide an overview of new topics Have the child review a glossary of terms before engaging in</td>
</tr>
</tbody>
</table>

Some Relevant Information from Crossbattery.com
### WAIS-IV CHC Classifications

<table>
<thead>
<tr>
<th>WAIS-IV Subtest</th>
<th>CHC Broad Ability(ies)</th>
<th>CHC Narrow Ability(ies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic</td>
<td>Fluid Reasoning (GF), Short-Term Memory (Gsm); Quantitative Knowledge (Gq)</td>
<td>Quantitative Reasoning (RQ); Working Memory (MW); Math Achievement (A3)</td>
</tr>
<tr>
<td>Block Design</td>
<td>Visual Processing (Gv)</td>
<td>Visualization (Vz)</td>
</tr>
<tr>
<td>Cancellation</td>
<td>Processing Speed (Gs)</td>
<td>Perceptual Speed (P)</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Crystallized Knowledge (Gc)</td>
<td>General (Verbal) Information (K0)</td>
</tr>
<tr>
<td>Digit Span</td>
<td>Short-Term Memory (Gsm)</td>
<td>Memory Span (MS), Working Memory Capacity (MW)</td>
</tr>
<tr>
<td>Coding</td>
<td>Processing Speed (Gs)</td>
<td>Rate-of-Test-Taking (R9)</td>
</tr>
<tr>
<td>Figure Weights</td>
<td>Fluid Reasoning (GF)</td>
<td>Quantitative Reasoning (RQ)</td>
</tr>
<tr>
<td>Information</td>
<td>Crystallized Knowledge (Gc)</td>
<td>General (Verbal) Information (K0)</td>
</tr>
<tr>
<td>Letter-Number Sequencing</td>
<td>Short-Term Memory (Gsm)</td>
<td>Working Memory (MW)</td>
</tr>
<tr>
<td>Matrix Reasoning</td>
<td>Fluid Reasoning (GF)</td>
<td>Induction (I)</td>
</tr>
<tr>
<td>Picture Completion</td>
<td>Visual Processing (Gv), Crystallized Knowledge (Gc)</td>
<td>Flexibility of Closure (CF); General (verbal) Information (K0)</td>
</tr>
<tr>
<td>Similarities</td>
<td>Crystallized Knowledge (Gc), Fluid Reasoning (GF)</td>
<td>Lexical Knowledge (VL), Induction (I)</td>
</tr>
<tr>
<td>Symbol Search</td>
<td>Processing Speed (Gs)</td>
<td>Perceptual Speed (P)</td>
</tr>
<tr>
<td>Visual Puzzles</td>
<td>Visual Processing (Gv)</td>
<td>Visualization (Vz)</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Crystallized Knowledge (Gc)</td>
<td>Lexical Knowledge (VL)</td>
</tr>
</tbody>
</table>


### WIAT-III CHC Classifications

<table>
<thead>
<tr>
<th>WIAT-III Subtest</th>
<th>CHC Broad Ability(ies)</th>
<th>CHC Narrow Ability(ies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alphabet Writing Fluency</td>
<td>Reading/Writing Ability (Grw)</td>
<td>Writing Speed/Fluency (WS)</td>
</tr>
<tr>
<td>Early Reading Skills</td>
<td>Auditory Processing (Go); Reading/Writing Ability (Grw)</td>
<td>Phonetic Coding (PC); Reading Decoding (RD)</td>
</tr>
<tr>
<td>Essay Composition</td>
<td>Reading/Writing Ability (Grw)</td>
<td>Writing Ability (WA), English Usage Knowledge (EU)</td>
</tr>
<tr>
<td>Listening Comprehension</td>
<td>Crystallized Knowledge (Gc)</td>
<td>Lexical Knowledge (VL), Listening Ability (LS)</td>
</tr>
<tr>
<td>Math Fluency Addition</td>
<td>Processing Speed (Gs)</td>
<td>Number Facility (N)</td>
</tr>
<tr>
<td>Math Fluency Multiplication</td>
<td>Processing Speed (Gs)</td>
<td>Number Facility (N)</td>
</tr>
<tr>
<td>Math Fluency Subtraction</td>
<td>Processing Speed (Gs)</td>
<td>Number Facility (N)</td>
</tr>
<tr>
<td>Math Problem Solving</td>
<td>Fluid Reasoning (GF)</td>
<td>Quantitative Reasoning (RQ)</td>
</tr>
<tr>
<td>Numerical Operations</td>
<td>Quantitative Knowledge (Gq)</td>
<td>Mathematical Achievement (A3)</td>
</tr>
<tr>
<td>Oral Expression</td>
<td>Crystallized Knowledge (Gc); Long-Term Storage and Retrieval (Gr); Short-Term Memory (Gsm)</td>
<td>Lexical Knowledge (VL); Ideational Fluency (PI); Memory Span (MS)</td>
</tr>
<tr>
<td>Oral Reading Fluency</td>
<td>Reading/Writing Ability (Grw); Processing Speed</td>
<td>Reading Speed (RS); Rate of Test Taking (RS)</td>
</tr>
<tr>
<td>Pseudoword Decoding</td>
<td>Reading/Writing Ability (Grw)</td>
<td>Reading Decoding (RD)</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>Reading/Writing Ability (Grw)</td>
<td>Reading Comprehension (RC)</td>
</tr>
<tr>
<td>Sentence Composition</td>
<td>Reading/Writing Ability (Grw)</td>
<td>English Usage (EU), Writing Ability (WA)</td>
</tr>
<tr>
<td>Spelling</td>
<td>Reading/Writing Ability (Grw)</td>
<td>Spelling Ability (SG)</td>
</tr>
<tr>
<td>Word Reading</td>
<td>Reading/Writing Ability (Grw)</td>
<td>Reading Decoding (RD)</td>
</tr>
</tbody>
</table>
Crossbattery.com -> Downloads

XBA DMIA v1.5 Beta

Programming Update by Agnieszka M. Dynda, Original programming by Elizabeth O. Lichtenberger
This program is based on Essentials of Cross-Battery Assessment (2nd Edition) (2007)
By Daniel P. Flanagan, Samuel D. Ortle, and Vincent C. Alleman

The following tests are named in this program: WISC IV, WAIS IV, WIAT III Copyright © Pearson Assessments;

This program does not convert raw scores to any metric. Users of this program are responsible for following the respective test publishers’ administration and scoring guidelines. That is, all scores entered into this program must be derived from the norms and procedures provided by the respective test publishers.

Directions

Clear Previously Entered Data by Clicking on Clear Data button:

Enter examinee’s name, date of evaluation, and date of birth on red lines below

Examinee Name: [Field]
Examinee Age: [Field]
Date of Evaluation (mm/dd/yyyy): [Field]
Date of Birth (mm/dd/yyyy): [Field]

Entering Data for Cognitive Batteries

- Cognitive batteries are listed on separate tabs at the bottom of this program.
- Locate the cognitive battery used in your assessment and click on the tab for that battery.
- Enter the examinee’s obtained scores.
- The program automatically calculates select composites (e.g., specific clinical clusters), provides percentile ranks, and gives descriptive categories for each.
- The program indicates which clusters are interpretable/not interpretable and graphs only those that are interpretable on the “Graph” tab for that battery.

Contact

Any questions, comments, or problems noted in the use of this program may be forwarded to Vincent C. Alleman, Ph.D., at the following email address: alleman@boisestate.edu

---

<table>
<thead>
<tr>
<th>Cognitive Subtest or Index</th>
<th>Score</th>
<th>Converted Score</th>
<th>Confidence Interval</th>
<th>Percentile Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISC IV/WAIS III</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VERBAL COMPREHENSION INDEX (VCI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PERCEPTUAL REASONING INDEX (PRI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WORKING MEMORY INDEX (WMI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROCESSING SPEED INDEX (PSI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL READING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BASIC READING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>READING COMP. AND FLUENCY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WRITTEN EXPRESSION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATHEMATICS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH FLUENCY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORAL LANGUAGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other Data To Be Graphed (e.g., cluster, index, or composite score)

<table>
<thead>
<tr>
<th>Score</th>
<th>Converted Score</th>
<th>Confidence Interval</th>
<th>Percentile Rank</th>
</tr>
</thead>
</table>

Other Data With Single Subtest Scores

<table>
<thead>
<tr>
<th>Score</th>
<th>Converted Score</th>
<th>Confidence Interval</th>
<th>Percentile Rank</th>
</tr>
</thead>
</table>

4/16/2012
XBA is Commonplace – Acknowledge the Procedure in Your Report

• The results presented in this report were compiled from tests that do not share a common norm group; however, test results have been interpreted following the cross-battery approach and integrated with data from other sources including educational records, parent/teacher interviews, behavioral observations, work samples, and other test findings to ensure ecological validity. Standardization was followed for all test administrations. No single test or procedure was used as the sole criterion for classification, eligibility or educational planning. Unless otherwise noted, the results of this evaluation are considered a reliable and valid estimate of [Student’s Name] demonstrated skills and abilities at this time.

Adapted from D. Miller (2010)

New Features in XBA3

• Expands coverage of CHC theory to include abilities represented in the expanded model (e.g., Gh-tactile abilities, Gk-kinesthetic abilities; Flanagan et al., 2010; Schneider & McGrew, 2012).

![Image of XBA3 diagram]
New Features in XBA3

• Includes current intelligence batteries (i.e., WJ III, WPPSI-III, WPPSI-IV, WISC-IV, SB5, KABC-II, DAS-II, and WAIS-IV)
• Includes academic achievement batteries and tests (e.g., WJ III, KTEA-II, WIAT-III, KeyMath, WRMT-3)
• Includes neuropsychological instruments (e.g., D-KEFS, NEPSY-II)
• Includes special purpose tests (e.g., speech-language tests, memory tests, phonological processing tests).
• Over 700 tests and subtests were classified according to CHC theory only or both CHC theory and neuropsychological domains (e.g., sensory-motor, visual-spatial, speed and efficiency, executive).

New Features in XBA3

• Includes inter-rater reliability statistics for the majority of new tests that were classified according to CHC theory.
• Classifies all achievement tests according to IDEA area of specific learning disability (e.g., reading decoding tests were classified as tests of Basic Reading Skill; math reasoning tests were classified as tests of Math Problem Solving).
New Features in XBA3

• Compares all cognitive and achievement tests with regard to the nature of their stimuli and task demands.

<table>
<thead>
<tr>
<th>Battery with Reading Comp Subtest</th>
<th>Cloze Format</th>
<th>Open-Ended Questions</th>
<th>Literal Questions</th>
<th>Inferential Questions</th>
<th>Examinee can Refer back to Text</th>
<th>Multiple Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAB-3</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KTEA-II</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WJ III</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>GORT-4</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIAT-III</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PIAT-R/NU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>

New Features in XBA3

• Calculates all cross-battery composites in a psychometrically defensible way, using median estimates of subtest reliability and subtest intercorrelations. These estimates were derived from a comprehensive review of test manuals as well as other data sources.

• CHC Tab calculates composites based on a consideration of subtest reliability and subtest intercorrelations – no more averaging
New Features in XBA3

• Summarizes current research on the relations between cognitive abilities and processes and academic skills and places even greater emphasis on forming narrow CHC ability clusters given their importance in predicting academic performance.

New Features in XBA3

• The DMIA was revised extensively. Some revisions included:
  – More test tabs for achievement tests and combinations of cognitive and achievement tests
  – CHC tab calculates clusters based on subtest reliabilities and intercorrelations
  – CHC tab drop-down menus include cognitive, achievement and neuropsychological tests
  – Includes interpretive statements
  – Easier to navigate from tab to tab
  – Produces statements regarding whether or not follow up is considered necessary in any given domain and provides a rationale
New Features in XBA3

• The SLD Assistant was revised extensively and renamed, The Pattern of Strengths and Weaknesses Analyzer (PSW-A).
• Includes a comprehensive approach to identification of specific learning disabilities (SLD) following Flanagan and colleagues (2002, 2006, 2007, 2011, 2012) operational definition of SLD. Their definition was renamed, the Comprehensive Pattern of Strengths and Weaknesses SLD Model (C-PSW-SLD).
• Includes examples of how the cross-battery approach and the C-PSW-SLD model are used within the context of various state and district criteria for SLD identification.
• Includes guidelines for and examples of linking findings of cognitive weaknesses or deficits to intervention (including educational strategies, accommodations, compensatory strategies, and curricular modifications).

New Features in XBA3

• The Culture-Language and Interpretive Matrix (C-LIM) was revised. It includes current cognitive and intelligence batteries, special purpose tests, and selected neuropsychological instruments.
New Features in XBA3

• The C-LIM now provides additional features for evaluating individuals based on varying levels of language proficiency, acculturative knowledge, and/or giftedness.

• The C-LIM also allows for an examination of cognitive performance by the influences of language or culture independently.
  
  – May have greater utility for speech language pathologists

Go back to main handout
Purpose of the C-LIM

- To address the question of whether the obtained results reflect cultural or linguistic differences or whether they indicate the presence of some type of disability.

OR

- The “difference vs. disorder” question.
- Rule out (or in) culture and language difference as a primary cause of academic difficulties
Culture and Language Matrix developed by Flanagan and Ortiz (2001)

<table>
<thead>
<tr>
<th>DEGREE OF CULTURAL LOADING</th>
<th>LOW</th>
<th>MODERATE</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEGREE OF LINGUISTIC DEMAND</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matrix Reasoning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancellation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand Movements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Face Recognition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pattern Reasoning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triangles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlantis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlantis – Delayed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rebus - Delayed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symbol Search</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digit Span</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Block Counting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rover</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number Recall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rebus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arithmetic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Picture Concepts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word Order</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conceptual Thinking</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General Guidelines for Expected Patterns of Test Performance for Diverse Individuals (Ortiz, 2005)

<table>
<thead>
<tr>
<th>DEGREE OF CULTURAL LOADING</th>
<th>LOW</th>
<th>MODERATE</th>
<th>HIGH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEGREE OF LINGUISTIC DEMAND</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slightly Different: 3-5 points</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Markedly Different: 7-10 points</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slightly Different: 5-7 points</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Markedly Different: 7-10 points</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slightly Different: 7-10 points</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Markedly Different: 10-15 points</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Slightly Different: Includes individuals with high levels of English language proficiency (e.g., advanced BICS/emerging CALP) and high acculturation, but still not entirely comparable to mainstream U.S. English speakers. Examples include individuals who have resided in the U.S. for more than 7 years or who have parents with at least a high school education, and who demonstrate native-like proficiency in English language conversation and solid literacy skills.

Different: Includes individuals with moderate levels of English language proficiency (e.g., intermediate to advanced BICS) and moderate levels of acculturation. Examples include individuals who have resided in the U.S. for 3-7 years and who have learned English well enough to communicate, but whose parents are limited English speakers with only some formal schooling, and improving but below grade level literacy skills.

Markedly Different: Includes individuals with low to very low levels of English language proficiency (e.g., early BICS) and low or very low levels of acculturation. Examples include individuals who have just arrived in the U.S. or who may have been in the U.S. 3 years or less, with little or no prior formal education, who are just beginning to develop conversational abilities and whose literacy skills are also just emerging.
Cultural and Linguistic Classification of Tests: Addressing Validity in Diagnosis and Interpretation

Pattern of Scores on the Wechsler Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Monolingual</th>
<th>Bilingual</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
<td>103.75</td>
<td>87.67</td>
<td>-16.08</td>
</tr>
<tr>
<td>INF</td>
<td>99.57</td>
<td>86.30</td>
<td>-13.27</td>
</tr>
<tr>
<td>SIM</td>
<td>103.68</td>
<td>91.12</td>
<td>-12.56</td>
</tr>
<tr>
<td>COM</td>
<td>100.66</td>
<td>89.88</td>
<td>-10.78</td>
</tr>
<tr>
<td>ARI</td>
<td>98.11</td>
<td>89.35</td>
<td>-8.76</td>
</tr>
<tr>
<td>CD</td>
<td>105.57</td>
<td>98.21</td>
<td>-7.36</td>
</tr>
<tr>
<td>PC</td>
<td>99.91</td>
<td>97.92</td>
<td>-1.99</td>
</tr>
<tr>
<td>PA</td>
<td>97.36</td>
<td>96.14</td>
<td>-1.22</td>
</tr>
<tr>
<td>OA</td>
<td>96.89</td>
<td>96.70</td>
<td>-0.19</td>
</tr>
<tr>
<td>BD</td>
<td>97.08</td>
<td>97.29</td>
<td>0.21</td>
</tr>
</tbody>
</table>


English Language Learners – Elementary School Sample

Mean subtest scores across ten Wechsler subtests

English Language Learners – Preschool Sample

Mean subtest scores across the six DAS subtests


English Language Learners – Elementary School Sample

Mean WJ III GIA across the four levels of language proficiency on the New York State ESL Achievement Test

Mean subtest scores across the seven WJ III subtests according to language proficiency level on the NYSELSAT