IQ Testing – Not Just About the Numbers

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The Reading Foundation

PART ONE
The Structure of the WISC-IV in Comparison to the WISC-III
What the Subtests Measure
What do IQ Tests Tell Us???

- Style of Learning
- Verbal Thinking Skills
- Visual Spatial Thinking Skills
- Memory
- Fine Motor Skills
- Over time, IQ’s can tell us whether children are acquiring new thinking skills at a rate commensurate with their peers

A rose is not a rose is not a rose

- Not all measures of IQ are alike
- Different measures of IQ are based upon different theories of how we think.

IQ Quandaries

- Not all IQ tests are appropriate for all children. Some tests, by virtue, of their design, will portray a child’s potential for learning. Other tests may actually portray the impact of the disability.
Human Nature?

- Unfortunately, IQ scores can be the best thing or the worst thing that has ever happened to a child.
- Expectations play a huge role in the quality of instruction that children receive.

What Measure of IQ is Appropriate?

- According to John O. Willis, Ed.D., it is important to know about a child’s profile before determining how the IQ will be measured. He recommends memory testing and language testing prior to selecting an IQ test.

Warning !!!

- Children’s performance on IQ tests can be compromised by several factors:
  - Anxiety
  - Fatigue
  - Illness
  - Poor attention/concentration
  - Poor language skills
  - Poor rapport with the evaluator
  - The quality of the test materials themselves
Wechsler Intelligence Scale for Children, Fourth Edition
David Wechsler
The Psychological Corporation

One for Everybody (almost)

- Wechsler Preschool and Primary Scale of Intelligence, Third Edition
  - ages 2 years, 6 months through 7 years, 3 months
- Wechsler Intelligence Scale for Children, Fourth Edition
  - ages 6 years, 0 months through 16 years, 11 month
- Wechsler Adult Intelligence Scale, Third Edition
  - ages 16 years through 89 years

Structure of the WISC-III

- Full Scale IQ
  - Verbal IQ
    - Verbal Comprehension Index
  - Performance IQ
    - Freedom from Distractibility Index (Working Memory)
    - Perceptual Organization Index (Perceptual Reasoning)
    - Processing Speed
Structure of the WISC-IV

WISC-IV Full Scale IQ

- Verbal Comprehension Index
- Working Memory Index
- Perceptual Reasoning Index
- Processing Speed Index

Ch-Ch-Ch-Ch-Changes

- Subtests Lost
  - Picture Arrangement
  - Object Assembly
  - Mazes
- Subtests Demoted
  - Information
  - Arithmetic
- Subtests Added
  - Picture Concepts
  - Matrix Reasoning
  - Letter-Number Sequencing
  -Cancellation
  - Word Reasoning

Verbal Comprehension Index

- Similarities (SI)
- Vocabulary (VO)
- Comprehension (CO)
- Information (IN)*
- Word Reasoning (WR)*

* Supplementary Subtests
Similarities

• Similarities is a measure of verbal reasoning skill.
  
• Question: How are boys and girls alike?
  – One point response: They are both young.
  – Two point response: They are both children
  
• This task is sensitive to vocabulary and word retrieval deficits.

Vocabulary

• This subtest measures the ability to define words orally.
  
• What does plane mean?
  – One point response: It flies.
  – Two point response: mode of transportation that flies.
  
• Sensitive to deficits in word retrieval, formulating sentences, and organizing one’s thoughts.

Comprehension

• Measures an understanding of common social and governmental practices. These are why questions or what should you do questions.
  
• What should you do if you lose your mother in a store?
  
• Why is literacy important in a society?
  
• One and two points responses.
  
• Sensitive to expressive language skill, social skills, and thinking about things in depth.
**Information**

- Measures recall of general factual data related to history, science, and geography
- What system is used for measurement in Europe?
- Who was Thomas Edison?
- Sensitive to word finding, as well as long term memory deficits

**Word Reasoning**

- Measures verbal reasoning ability – answering riddle-like questions
- What is found in the ocean?
- …and has eight legs?

**Working Memory Index**

- Digit Span (DS)
- Letter Number Sequencing (LNS)
- Arithmetic (A)*

* Supplementary Subtest
Memory

- Short-term memory is a temporary buffer zone where new learning is held briefly as a precursor to further processing.
- Working memory is a workspace where new learning is compared, contrasted, and integrated into a cohesive product.

Digit Span

- This is a combined measure of both short-term and working memory.
- Digits Forward - STM
- Digits in Reverse – WM
- Each may be scored separately.

Letter-Number Sequencing

- Measures working memory
- Repeating randomly presented numbers and letters alphanumerically
Arithmetic

- Solving oral word problems in your head.
- This is really an achievement test.
- Measures mental math ability and listening.

Questions and Answers

Perceptual Reasoning Scale

- Block Design (BD)
- Picture Concepts (PC)
- Matrix Reasoning (MR)
- Picture Completion (PC)*

* Supplementary Subtest
Visual Spatial Thinking

- These skills are important because they support the acquisition of math and the conceptual learning that is part of the sciences. Those who can’t perceive structure have difficulty taking in new learning in an organized fashion. Unstructured information is difficult to recall.

Block Design

- Measures the ability to reproduce a geometric design with colored blocks while being timed.
- Measures how well children perceive shapes and structures in space. For some children, this is a measure of the ability to organize a motor response.

Picture Concepts

- Measures the ability to select pictures (one from each row) with common features or themes.
- Sensitive to memory for pictures
- Sensitive to verbal categorization skill.
Matrix Reasoning

- Measure of nonverbal fluid reasoning, spatial organization, and visual discrimination.

![Matrix Reasoning Example](image)

**Picture Completion**

- Identifying the missing parts of pictures by pointing or by words
- Sensitive word finding or expressive language difficulty
- Sensitive to the ability to visualize pictures
Picture Completion

Processing Speed Index
• Coding (CD)
• Symbol Search (SS)
• Cancellation (CA)

Coding
• Measures fine motor clerical skill

1 2 3 4 5 6
( + = < [ )

3 4 1 6 2 5
Symbol Search

- Measures visual memory for abstract symbols and clerical speed

% & % @ # $ YES NO
# & $ ? % = YES NO

Cancellation

- Measures visual awareness and response speed
Next Week….

- Discussion of different profiles on the WISC-IV
- Discussion of different types of IQ tests
- Strategies for advocates

Part Two

Discussion of different profiles on the WISC-IV
Discussion of different types of IQ tests
Strategies for Advocates
A Full Scale IQ is Not For All

• A Full Scale IQ will not be an appropriate or meaningful measure of a child's intelligence when children have large differences between their verbal skills and their visual-spatial skills.

What Would Wechsler do?

• According to the WISC IV manual:
  – Children with special needs….it is important not to attribute low performance on a cognitive test to low intellectual ability when, in fact, it may be attributable to physical, language, or sensory difficulties. Depending on the nature of the difficulty and the test administered, the child’s performance may result in scores that underestimate intellectual capacity if the test is administered in the standard fashion.

The manual recommends:

• Prior to testing a child with physical, language, or sensory difficulties, become familiar with the child’s limitations and preferred mode of communication, both of which may necessitate deviations from standard procedure….
  – WISC IV Manual, page 11
Wait a Minute….

• The test authors are not suggesting that changes can be made to the rules for administration, but that, rather, we may give consideration to the child as an individual when interpreting scores. This means that we may give increased weight to certain index groupings as measures of intellectual ability or potential to learn.

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The Minute Lesson - Test Scores

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<thead>
<tr>
<th>Percentile Rank</th>
<th>1-4</th>
<th>4-11</th>
<th>11-23</th>
<th>23-40</th>
<th>40-60</th>
<th>60-77</th>
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<td>82-88</td>
<td>89-96</td>
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<td>112-118</td>
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<td>7</td>
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<td>14-15</td>
<td>16-19</td>
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<td>Stanine</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
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<td>9</td>
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Language-Based LD Profile

<table>
<thead>
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<th>Standard Score</th>
<th>Percentile Rank</th>
<th>Stanine</th>
</tr>
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<tbody>
<tr>
<td>Verbal Comprehension</td>
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<tr>
<td>Working Memory</td>
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<td>Perceptual Reasoning</td>
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<td>Processing Speed</td>
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<tr>
<td>Full Scale IQ</td>
<td>91</td>
<td>27</td>
<td>4</td>
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Where do we go from here?

- Refer for audiological evaluation
- Refer for speech and language evaluation
- Most classroom teachers use language to convey their curriculum. These children are at high risk for frustration, academic failure, behavior challenges, and depression.

Speech and Language Testing

- Both receptive and expressive language skills
  - Sentence structure
  - Vocabulary
  - Grammar
- Older students should have higher level language skills assessed:
  - Inferencing
  - Abstract and Figurative Language
  - Using Context to Determine Meaning
  - Pragmatics – how to use language effectively
Let’s Not Forget Reading…

• Receptive language challenges will also compromise reading comprehension.
• If you can’t understand it through your ears, you will not understand it in print.

….And Written Expression

• Expressive language deficits will compromise a student’s ability to express his or her thoughts on paper.

Nonverbal Learning Disability Profile

<table>
<thead>
<tr>
<th>Index</th>
<th>Standard Score</th>
<th>Percentile Rank</th>
<th>Stanine</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>Working Memory</td>
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<td>34</td>
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<td>Perceptual Reasoning</td>
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<td>Processing Speed</td>
<td>68</td>
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<tr>
<td>Full Scale IQ</td>
<td>81</td>
<td>10</td>
<td>2</td>
</tr>
</tbody>
</table>
Nonverbal Learning Disabilities Profile

- Refer for vision evaluation
- Refer for speech and language evaluation
- Refer for occupational therapy evaluation
- High risk for difficulty with math, written expression, and social skills.
- These children encounter greater difficulty at the middle school and high school levels.

Executive Functioning Profile

<table>
<thead>
<tr>
<th>Index</th>
<th>Standard Score</th>
<th>Percentile Rank</th>
<th>Stanine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Comprehension</td>
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<td>45</td>
<td>5</td>
</tr>
<tr>
<td>Working Memory</td>
<td>62</td>
<td>01</td>
<td>1</td>
</tr>
<tr>
<td>Perceptual Reasoning</td>
<td>100</td>
<td>50</td>
<td>5</td>
</tr>
<tr>
<td>Processing Speed</td>
<td>88</td>
<td>02</td>
<td>1</td>
</tr>
<tr>
<td>Full Scale IQ</td>
<td>81</td>
<td>10</td>
<td>2</td>
</tr>
</tbody>
</table>
Executive Functioning Profile

VCI – Verbal Comprehension Index
PRI – Perceptual Reasoning Index
WMI – Working Memory Index
PSI – Processing Speed

Dumont-Willis Indexes

<table>
<thead>
<tr>
<th></th>
<th>Standard Score</th>
<th>Percentile Rank</th>
<th>Stanine</th>
</tr>
</thead>
<tbody>
<tr>
<td>DWI I (VCI+PRI)</td>
<td>99</td>
<td>45</td>
<td>5</td>
</tr>
<tr>
<td>DWI II (WMI + PSI)</td>
<td>57</td>
<td>01</td>
<td>1</td>
</tr>
</tbody>
</table>

General Ability Index

- The Full Scale IQ (FSIQ) of the WISC-IV is comprised of four subtests (40% of the total) that are relatively weak measures of general intellectual ability (Working Memory and Processing Speed Indexes) and only six (60%) subtests that measure higher-order intellectual abilities (Verbal Comprehension and Perceptual Organization).
- The GAI has been made available by The Psychological Corporation for children whose overall measure of intellectual ability is compromised by deficits in lower order skills, such as Working Memory and Processing Speed.
Dumont-Willis Index I and II

- Dumont and Willis provide two alternative composite scores, which are derived, respectively, from the three subtests that enter the VCI and the three subtests that enter the PRI and from the four subtests that enter the WMI and the PSI.
- [http://alpha.fdu.edu/psychology/WISCIV_DWI.htm](http://alpha.fdu.edu/psychology/WISCIV_DWI.htm)
- The disadvantage is that these scores were not developed by The Psychological Corporation. The advantage is that there are two indexes, one for higher-level thinking skills, and a second collective score for processing speed and working memory.

IQs over Time

- IQ tend to be stable over time.
- Children who are nonreaders may experience a decrease in their verbal scores as they become older.
  ✓ Vocabulary
  ✓ Similarities
  ✓ Comprehension
  ✓ Information

Caution

- The WISC IV provides different scores than the WISC III for children with learning disabilities.
- This is due to the fact that the WISC IV and the WISC III measure different skills.
- [http://alpha.fdu.edu/psychology/melissa_farrall_WISCIV.htm](http://alpha.fdu.edu/psychology/melissa_farrall_WISCIV.htm)
Decreases in Scores

- Have the examiner check for errors.
- Compare performance on individual subtests.
- Consider whether the decrease represents a lack of progress of regression by comparing raw scores.
- Recheck hearing and vision.
- Consider whether there have been changes in attention and focus, as well as the possible roles of depression, anxiety, and/or sleep disorders.
- Rule out lack of rapport with the evaluator.
- Ask the child why he or she thinks that there may be a difference.
- Check again for scoring errors.
- Refer for a comprehensive neurological evaluation.

Differential Ability Scales

- The DAS has two preschool levels:
  - Ages 2:6 – 3:5
  - Ages 3:6 – 5:11
- School-Age Level:
  - Ages 6:00 – 17:11

The DAS II is due out later this month.
Differential Ability Scales

- Verbal Ability
  - Word Definitions
  - Similarities

- Nonverbal Reasoning Ability
  - Matrices
  - Sequential and Quantitative Reasoning

- Spatial Ability
  - Recall of Designs
  - Pattern Construction

More on the DAS

- Diagnostic Subtests
  - Recall of Digits
  - Recall of Objects
  - Speed of Information Processing

  Note: Colin Elliot does not include these tasks in the General Conceptual Ability (GCA) because they do not correlate well with overall intelligence.

More Thoughts on the DAS

- We expect the second edition of the DAS to be out shortly.
- We will have to see whether the structure of the new DAS will change.
- As it stands, the DAS is a good measure for students with weak memory and slow processing speed. These scores are not included in the General Ability Scale.
- It is also good for students with discrepancies between subtests. The DAS tells us when not to calculate a cluster score.
Leiter International Performance Scales, Revised

- Full Scale IQ
  - Fluid Reasoning
  - Repeated Patterns
  - Sequential Order
  - Visualization
    - Figure Ground
    - Form Completion
    - Design Analogies
    - Paper Folding
    - Figure Rotation

Leiter Scales - Revised

- The Leiter-R was designed to provide a valid measure of intelligence in children and adults who could not be reliably assessed using traditional intelligence tests. This population includes: communication disorders, cognitive delays, hearing impairments, motor impairments, traumatic brain injury, attention-deficit disorder, and certain types of learning disabilities.

Leiter-R

- For individuals from 2 years, 0 months to 20 years, 11 months
Leiter – R
• Directions are pantomimed
• Individuals demonstrate their knowledge by pointing to responses or by moving cards.

Warning!!
• The Leiter-R is not an appropriate test for individuals with significant visual impairments or deficits in visual discrimination, visualization, or nonverbal fluid reasoning.

What should we learn from testing?
• How is my child performing with respect to his peers?
• What skills does my child have?
• Does my child have strengths?
• What skills does my child lack?
• What does my child need to work on?
• What strategies and/or types of instruction would be helpful for my child?
What does IQ testing tell us about reading and writing?

- We know that the discrepancy formula is a wait-to-fail model.
- IQ testing actually tells us little about the skills that children need to learn how to decode and spell.
  - Phonological Awareness
  - Rapid Naming

A low IQ does not predict reading failure!!!

- Joseph K. Torgesen is basing his research on children with IQs of 75 or above.
- [www.aft.org/pubs-reports/american_educator/issues/fall04/reading.htm](http://www.aft.org/pubs-reports/american_educator/issues/fall04/reading.htm)

IQ Testing

- IQ testing provides us with information about why many children struggle in school. Examples:
  - Nonverbal Learning Disabilities- these children have difficulty understanding many of the visual aids that are typically used in classrooms.
  - Language-based Learning Disabilities – these children have difficulties in specific aspects of reading comprehension, math reasoning, calculation, and written expression. Children with weak vocabulary, for example, require direct systematic instruction in word roots, prefixes, and suffixes.
Be Aware!!!

- Beware of statements regarding styles of learning.
- Visual learners are at a disadvantage in the classroom.
- Verbal learners may require speech and language therapy.

Kinesthetic Style of Learning

- Children who have been identified with a kinesthetic style of learning are at a profound disadvantage.

Not all Scores are Valid

- Children who struggle with challenges, such as impulsivity, inattention, anxiety, and depression may not demonstrate their knowledge effectively. The most important decision that an evaluator can make is to determine whether the scores should be reported or not.