Overview

- Introduction
- Test Structure
- Administration and Scoring
- Basic Interpretation

WAIS-IV Kit - Materials
David Wechsler 1896-1981

- Author of the WAIS, WISC, WPPSI, WMS
- Adapted tasks from existing tests (e.g., Army Alpha & Army Beta; Koh’s Blocks) and incorporated them into scale
- Verbal IQ, Performance IQ, Full Scale IQ
- First to employ Deviation IQ
- A master clinician who often gave non-standardized intelligence tests

Wechsler’s Definition of Intelligence

“Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment.”


WAIS-IV Content and Structure

Ages 16 - 90

- Verbal Comprehension Scale
  - Core Subtests: Information, Similarities, Vocabulary
  - Supplemental Subtests: Comprehension
- Perceptual Reasoning Scale
  - Core Subtests: Block Design, Matrix Reasoning, Visual Puzzles
  - Supplemental Subtests: Picture Completion, Figure Weights (16-69)
- Working Memory Scale
  - Core Subtests: Arithmetic, Digit Span
  - Supplemental Subtests: Letter-Number Sequencing (16-69)
- Processing Speed Scale
  - Core Subtests: Coding, Symbol Search
  - Supplemental Subtests: Cancellation (16-69)

FSIQ

New!

New!
Introducing the WAIS-IV

“I’ll be asking you to do a number of things today. Some of the things may be really easy for you, but some may be hard. Most people do not answer every question correctly or finish every item, but please try your best. Do you have any questions?”

Subtests - Administration Order (See Record Form)

1. Block Design
2. Similarities
3. Digit Span
4. Matrix Reasoning
5. Vocabulary
6. Arithmetic
7. Symbol Search
8. Visual Puzzles
9. Information
10. Coding
11. Letter-Number Sequencing
12. Figure Weights
13. Comprehension
14. Cancellation
15. Picture Completion

Subtest Substitution

- Only ONE substitution is allowed for each index score
- NO MORE THAN TWO SUBSTITUTIONS ARE ALLOWED WHEN DERIVING THE FSIQ AND GAI
- Substitution introduces error but is preferable to prorating scores
Prorating

- Examiner uses prorating to derive a composite score when all needed subtest scores are not available.
- A prorated sum of scaled scores from two core subtests can be used to derive the VCI and PRI.
- A prorated sum of scaled scores is NOT available for deriving the WMI or PSI.

Prorating - Tables

Pages 226-228 Administration and Scoring Manual

Administration Guidelines

- Start Points: Start
- Reverse Rules: Reverse
- Discontinue Rule: Discontinue
Administration Guidelines

- Demonstration
  - Examiner explains task

- Sample Items
  - Examinee practices

- Teaching Items
  - Teach if needed and prescribed

Queries - for responses that are marginal, generalized, functional, made with hand gestures

- Prompts
- Repetition

Recording Responses

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>Administered query</td>
</tr>
<tr>
<td>P</td>
<td>Administered prompt</td>
</tr>
<tr>
<td>R</td>
<td>Repeated item</td>
</tr>
<tr>
<td>DK</td>
<td>Examinee indicated s/he did not know</td>
</tr>
<tr>
<td>NR</td>
<td>Examinee did not respond</td>
</tr>
</tbody>
</table>
Verbal Comprehension Index Subtests

Measure
- verbal concept formation
- verbal reasoning
- Knowledge acquired from one’s environment

Similarities

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Similarities</td>
<td>Examinee is presented two words that represent common objects or concepts and describes how they are similar. Measures verbal concept formation and reasoning.</td>
</tr>
</tbody>
</table>

Similarities - 12 new items

Now I am going to say two words and ask you how they are alike. How are . . . and . . . alike? How are they the same?
Vocabulary

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocabulary</td>
<td>For picture items, the examinee names the object presented visually. For verbal items, examinee defines words presented visually and orally. Measures word knowledge and verbal concept formation.</td>
</tr>
</tbody>
</table>

Vocabulary – 9 new items

**Picture Items:** “What is this?”

**Verbal Items:** “I am going to say some words. Listen carefully and tell me what each word means.”

Information

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information</td>
<td>Examinee answers questions that address a broad range of general knowledge topics. Measures ability to acquire, retain, and retrieve general factual knowledge.</td>
</tr>
</tbody>
</table>
Information - 11 new items
See Administration Manual.
Read each item verbatim.

Comprehension

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehension</td>
<td>Examinee answers questions based on his/her understanding of general principles and social situations. Measures verbal reasoning and conceptualization, verbal comprehension and expression, ability to evaluate and use past experience, ability to demonstrate practical knowledge and judgment.</td>
</tr>
</tbody>
</table>

Comprehension - 11 new items
See Administration Manual.
Read each item verbatim.
Perceptual Reasoning Index Subtests

Measure
- Perceptual and fluid reasoning
- Spatial processing
- Visual-motor integration

Changes to Perceptual Reasoning Subtests

Block Design
- Used Model and Stimulus Book for all teaching items
- Added 4-block diamond items before 9-block items
- Reduced # of items with time bonus
- Added BDN (No Time Bonus) process score

Changes to Perceptual Reasoning Subtests

Matrix Reasoning
- Retained 2 of 4 item-types (2x2 matrix items and series completion items)
- Added sample item for each type
- Clarified 30-second guideline

Picture Completion
- Enlarged visual stimuli
- Added ceiling items
# Perceptual Reasoning Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Block Design</strong></td>
<td>Working within a specified time limit, the examinee views a model and a picture, or a picture only and uses red-and-white blocks to re-create the design. Measures the ability to analyze and synthesize abstract visual stimuli.</td>
</tr>
<tr>
<td><strong>Matrix Reasoning</strong></td>
<td>The examinee views an incomplete matrix or series and selects the response option that completes the matrix or series. Involves fluid intelligence, broad visual intelligence, classification and spatial ability, knowledge of part-whole relationships, simultaneous processing, and perceptual organization</td>
</tr>
<tr>
<td><strong>Visual Puzzles</strong></td>
<td>Working within a specified time limit, the examinee views a completed puzzle and selects three response options that, when combined, reconstruct the puzzle.</td>
</tr>
</tbody>
</table>
Perceptual Reasoning Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Puzzles</td>
<td>Involves visual perception and organization, nonverbal reasoning, spatial visualization and manipulation, the ability to anticipate relationships among parts, including the ability to analyze and synthesize abstract visual stimuli.</td>
</tr>
</tbody>
</table>

Administration of Visual Puzzles (VP)

- Examinee must pick exactly 3 responses
- Demonstration Item: demonstrates task and teaches examinee not to stack pieces to get the answer and to choose exactly 3 responses
- Sample Item: practice for examinee, and teaches examinee that pieces may need to be turned to make them fit
- Items have either 20 or 30 second time limit
- Examinees receive a 10-second warning before time limit expires

Perceptual Reasoning Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure Weights</td>
<td>Working within a specified time limit, the examinee views a scale with missing weight(s) and selects the response option that keeps the scale balanced. Assesses quantitative reasoning and analogical reasoning. Involves inductive and deductive logic. Requires working memory.</td>
</tr>
</tbody>
</table>
Administration of Figure Weights

- Items have either 20- or 40-second time limit.
- Examinees receive a 10-second warning before time limit expires.
- Remember to give prompt when moving to items with 3 scales.

Perceptual Reasoning Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture Completion</td>
<td>Working within a specified time limit, the examinee views a picture with an important part missing and identifies the missing part. Measures visual perception and organization, concentration, visual recognition of essential details of objects.</td>
</tr>
</tbody>
</table>

Working Memory Index - Subtests

- attention
- concentration
- mental control
- reasoning
### Changes to Working Memory Subtests

#### Digit Span
- Added new sequencing task
- Eliminated rhyming numbers

### Working Memory Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
</table>
| Digit Span | DSF: examiner reads a sequence of numbers; examinee recalls the numbers in the same order.  
DSB: examiner reads a sequence of numbers; examinee recalls the numbers in reverse order.  
DSS: examiner reads a sequence of numbers; examinee recalls the numbers in ascending order. |

### Why the changes in Digit Span (DS)?

- The shift from one Digit Span task to another requires cognitive flexibility and mental alertness.
- *Digit Span Forward* involves rote learning and memory, attention, encoding, and auditory processing.
- *Digit Span Backward* involves working memory, transformation of information, mental manipulation, and visuospatial imaging.
- *Digit Span Sequencing* is similar to other tasks that are designed to measure working memory and mental manipulation.
Changes to Working Memory Subtests

**Arithmetic**
- Omitted reference to English measurement system and currency
- Decreased emphasis on mathematical skills and increased emphasis on working memory

Working Memory Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arithmetic</td>
<td>Working within a specified time limit, the examinee mentally solves a series of arithmetic problems. Measures mental manipulation, concentration, attention, short- and long-term memory, numerical reasoning ability, and mental alertness.</td>
</tr>
</tbody>
</table>

Arithmetic

**Introduction**

“Now I am going to read you some problems. Listen carefully, you can only ask me to read each problem one more time.”
Changes to Working Memory Subtests

Letter-Number Sequencing
- Eliminated rhyming numbers and letters
- Omitted use of L, I, O, and zero
- Implemented graduated teaching strategy

Working Memory Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter-Number Sequencing</td>
<td>The examinee is read a sequence of numbers and letters and recalls the numbers in ascending order and the letters in alphabetical order. Involves sequential processing, mental manipulation, attention, concentration, memory span, short-term auditory memory.</td>
</tr>
</tbody>
</table>

Processing Speed Index - Subtests

Measure
- ability to quickly and correctly scan, sequence, and discriminate simple visual information
- short-term visual memory
- attention
- visual-motor coordination
### Processing Speed Index - Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symbol Search</td>
<td>Working within a specified time limit, the examinee scans a search group and indicates whether one of the symbols in the target group matches. Measures processing speed, short-term visual memory, visual-motor coordination, visual discrimination, psychomotor speed, speed of mental operation, attention, concentration.</td>
</tr>
</tbody>
</table>

### Changes to Processing Speed Subtests

**Symbol Search**
- Enlarged symbols
- Revised format and instructions

### Symbol Search Administration
- Demonstration and Sample items
  - Demonstration item teaches the task
  - Sample item allows examinee to practice
- Time limit = 120 seconds
- Examinee marks either matching symbol in search group or “NO” box
  - Allows for qualitative examination of errors
Processing Speed Index - Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coding</td>
<td>Using a key, the examinee copies symbols that are paired with numbers within a specified time limit. Measures processing speed, short-term visual memory, psychomotor speed, visual perception, visual-motor coordination, visual scanning ability, attention, concentration.</td>
</tr>
</tbody>
</table>

Changes to Processing Speed Subtests

Coding
- Enlarged symbols and writing space
- Redesigned for more equivalent item difficulty across task
- Revised instructions for consistency with WISC-IV

Processing Speed Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancellation</td>
<td>Working within a specified time limit, the examinee scans a structured arrangement of shapes and marks target shapes. Measures processing speed, visual selective attention, vigilance, perceptual speed, visual-motor ability.</td>
</tr>
</tbody>
</table>
Cancellation - Administration

- Demonstration and Sample items for each test item
  - Demonstration item teaches the task
  - Sample item allows examinee to practice
- Two test items; Time limit 45 seconds each

Scoring

- Calculate raw score for each subtest.
- Convert raw scores to scaled scores.
- Generate sums of scaled scores [indexes, Full Scale].
- Convert sums of scaled scores to composite scores.
- Perform discrepancy comparisons.
- Identify subtest strengths and weaknesses.
- Conduct optional process analysis.

Age Groups - 13

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Subtest Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:0 - 17:11</td>
<td>45:0 - 54:11</td>
</tr>
<tr>
<td>18:0 - 19:11</td>
<td>55:0 - 64:11</td>
</tr>
<tr>
<td>20:0 - 24:11</td>
<td>65:0 - 69:11</td>
</tr>
<tr>
<td>25:0 - 29:11</td>
<td>70:0 - 74:11</td>
</tr>
<tr>
<td>30:0 - 34:11</td>
<td>75:0 - 79:11</td>
</tr>
<tr>
<td>35:0 - 44:11</td>
<td>80:0 - 84:11</td>
</tr>
<tr>
<td>45:0 - 54:11</td>
<td>85:0 - 90:11</td>
</tr>
</tbody>
</table>
Reference Group Scores (Ages 20:0 to 34:11)

Typically used for research or to address a very specific clinical question (how does individual perform on the WAIS-IV subtests in comparison to this age-group).

Reference Group Scores (Ages 20:0 to 34:11)

These scores do not capture the normal variations that occur by age
- Example: our processing speed decreases as we age. If we use this reference group to evaluate the performance of a 60-year-old, his/her scores will be low.

Process Scores

- Block Design
  - Block Design No Time Bonus (BDN)

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

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

- WAIS-IV Scoring Assistant
- WAIS-IV Report Writer

What should we do now that VIQ and PIQ are not part of the WAIS?

**Page 9 - Technical Manual**

“The terms VCI and PRI should be substituted for the terms VIQ and PIQ in clinical decision making and other situations where VIQ and PIQ were used.”

Composite Scores

**Full Scale IQ**
- Based on 10 core subtests

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

**General Ability Index = VCI + PRI**
- Optional Index score
What is the GAI?

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

\[
\text{GAI} = \text{sum of scaled scores for VCI subtests and PRI subtests}
\]

General Ability Index

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

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

Deriving and Analyzing the GAI

Step 1. Obtain the General Ability Sum of Scaled Scores
Step 2. Determine the GAI Score (Table C.1 - Tech Manual)
Step 3. Perform the FSIQ-GAI Discrepancy Comparison (Tables C.2, C.3 - Tech Manual)
Table C.2 - Technical Manual

Table C.2 was updated since original publication of WAIS-IV. Go to

Suggested Procedures for Basic Profile Analysis

Step 1. Report and Describe the FSIQ
Step 2. Report and Describe the Index Scores (VCI, PRI, WMI, PSI)
Step 3. Evaluate Index-Level Discrepancy Comparisons
Step 4. Evaluate Subtest Strengths and Weaknesses

Suggested Procedures for Basic Profile Analysis

Step 5. Evaluate Subtest-Level Discrepancy Comparisons
Step 6. (Optional) Evaluate the Pattern of Scores Within Subtests

[Is there a pattern of correct and then few incorrect? or Is there substantial item scatter?]
Application

Dr. Wechsler: What we measure with tests of intelligence is . . . the capacity of the individual to understand the world around him and his ability to cope with its challenges.

Remember: Many Factors can Influence Performance!

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

Input and Output Demands of Tasks
### WAIS-IV Scores (Female 40-8)

<table>
<thead>
<tr>
<th>Index/Subtest</th>
<th>Composite Score</th>
<th>Scaled Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Comprehension</td>
<td>112</td>
<td>101</td>
</tr>
<tr>
<td>Similarities</td>
<td>12</td>
<td>101</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>13</td>
<td>101</td>
</tr>
<tr>
<td>Information</td>
<td>12</td>
<td>101</td>
</tr>
<tr>
<td>Working Memory</td>
<td>114</td>
<td>101</td>
</tr>
<tr>
<td>Digit Span</td>
<td>13</td>
<td>101</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>12</td>
<td>101</td>
</tr>
<tr>
<td>Full Scale IQ</td>
<td>101</td>
<td>General Ability Index = 101</td>
</tr>
</tbody>
</table>

### Abilities Measured

- **Verbal Comprehension Scale**
  - Core Subtests: Similarities, Vocabulary, Information, Comprehension
  - Supplemental Subtests: Digit Span, Arithmetic

- **Perceptual Reasoning Scale**
  - Core Subtests: Block Design, Matrix Reasoning, Visual Puzzles
  - Supplemental Subtests: Symbol Search, Figure Weights (16-49)

- **Working Memory Scale**
  - Core Subtests: Digit Span, Arithmetic
  - Supplemental Subtests: Letter-Number Sequencing (16-69)

- **Processing Speed Scale**
  - Core Subtests: Symbol Search, Coding
  - Supplemental Subtests: Cancellation (16-69)

### WAIS-IV Scores (Male 17-1)

<table>
<thead>
<tr>
<th>Index/Subtest</th>
<th>Composite Score</th>
<th>Scaled Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Comprehension</td>
<td>120</td>
<td>112</td>
</tr>
<tr>
<td>Similarities</td>
<td>14</td>
<td>115</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>16</td>
<td>115</td>
</tr>
<tr>
<td>Information</td>
<td>11</td>
<td>115</td>
</tr>
<tr>
<td>Working Memory</td>
<td>89</td>
<td>115</td>
</tr>
<tr>
<td>Digit Span</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Full Scale IQ</td>
<td>112</td>
<td>General Ability Index = 121</td>
</tr>
</tbody>
</table>

- **FSIQ**
  - Core Subtests: Similarities, Vocabulary, Information, Comprehension
  - Supplemental Subtests: Digit Span, Arithmetic

- **Processing Speed Scale**
  - Core Subtests: Symbol Search, Cancellation (16-69)
  - Supplemental Subtests: Figure Weights (16-49)

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**WAIS-IV Normative Sample**

- Ages 16-90
- Normative sample: N = 2,200
  - 200 examinees per age band for ages 16-69
  - 100 examinees per age band for ages 70-90
- National sample stratified by:
  - Sex
  - Education Level (age 16-19: parent educ.)
  - Ethnicity
  - Region

**Composite Reliabilities**

<table>
<thead>
<tr>
<th>Composite</th>
<th>WAIS-IV (16-90)</th>
<th>WAIS-III (16-89)</th>
<th>WISC-IV (6-16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCI (VIQ)</td>
<td>.96</td>
<td>.96 (.97)</td>
<td>.94</td>
</tr>
<tr>
<td>POI/PRI (PIQ)</td>
<td>.95</td>
<td>.93 (.94)</td>
<td>.92</td>
</tr>
<tr>
<td>WMI</td>
<td>.94</td>
<td>.94</td>
<td>.92</td>
</tr>
<tr>
<td>PSI</td>
<td>.90</td>
<td>.88</td>
<td>.88</td>
</tr>
<tr>
<td>FSIQ</td>
<td>.98</td>
<td>.98</td>
<td>.97</td>
</tr>
</tbody>
</table>

**Core Subtests: Ages 16-90**

Fit of 10 Core: AGFI=.97, RMSEA=.05
WAIS-IV Validity Studies

See Technical Manual
E.g., WISC-IV, WMS-IV, CMS, WIAT-II/WIAT-III

WAIS-IV Clinical Studies
– Intellectual Disability: Mild Severity
– Intellectual Disability: Moderate Severity
– Borderline Intellectual Functioning
– Gifted Intellectual Functioning
– Autistic Disorder
– Asperger’s Disorder

WAIS-IV Clinical Studies
– Learning Disability: Reading
– Learning Disability: Math
– ADHD
– TBI
– Mild Cognitive Impairment
– Dementia of the Alzheimer’s Type
– Depression
## Intellectual Disability: Mild Severity

<table>
<thead>
<tr>
<th>Composite</th>
<th>Clinical Mean</th>
<th>Control Mean</th>
<th>Mean Diff.</th>
<th>p value</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCI</td>
<td>65.9</td>
<td>96.6</td>
<td>30.68</td>
<td>&lt;.01</td>
<td>2.83</td>
</tr>
<tr>
<td>PRI</td>
<td>65.4</td>
<td>100.1</td>
<td>34.66</td>
<td>&lt;.01</td>
<td>3.07</td>
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<tr>
<td>WMI</td>
<td>61.5</td>
<td>97.4</td>
<td>35.85</td>
<td>&lt;.01</td>
<td>3.32</td>
</tr>
<tr>
<td>PSI</td>
<td>63.8</td>
<td>100.2</td>
<td>36.45</td>
<td>&lt;.01</td>
<td>2.69</td>
</tr>
<tr>
<td>FSIQ</td>
<td>58.5</td>
<td>98.1</td>
<td>39.59</td>
<td>&lt;.01</td>
<td>4.01</td>
</tr>
</tbody>
</table>

n = 73