WAIS-IV

WECHSLER ADULT INTELLIGENCE SCALE – FOURTH EDITION

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Wechsler's View of Intelligence

"The global capacity of a person to act purposefully, to think rationally, and to deal effectively with his/her environment."

Wechsler, David (1939). *The measurement of adult intelligence*. Baltimore: Williams & Wilkins, p. 229.

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Revision Goals

Update Theoretical Foundations

- Eliminate Dual IQ/Index Score Structure
    - New structure consistent with WISC-IV

- Enhance Measure of Fluid Reasoning
    - Develop additional measure of fluid reasoning: Figure Weights

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Update Theoretical Foundations

- Enhance Measure of Working Memory
  - Revise Arithmetic and Digit Span to emphasize WM

- Enhance Measure of Processing Speed
  - Develop additional PS subtest: Cancellation

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Composite Scores

- Working Memory Index
  - Essential component of fluid reasoning and other higher order skills
  - Closely related to "learning"

  - See Fry & Hale, 1996; Perlow, Juttuso, & Moore, 1997; Swanson, 1996

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Composite Scores

- Processing Speed Index
  - Dynamically related to mental capacity, reading performance & development, and reasoning by conservation of resources (e.g., efficiency)
  - See Fry & Hale, 1996; Kail, 2000; Kail & Hall,1994; Kail & Salthouse, 1994)

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Mediating Factors of:

- Processing Speed

- Working Memory

Conservation **of cognitive resources**

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Increase Developmental Appropriateness

- Explicit instructions for all examinees
  - Consistent teaching provided in demonstration and sample items

- Reduce emphasis on time-bonus

- Reduce auditory discrimination demands

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Increase Developmental Appropriateness

- Reduce visual acuity demands (enlarge visual stimuli)

- Reduce emphasis on motor demands

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Enhance User-Friendliness

- Design of Test Materials
    - User-friendly record form
    - Better stimulus book layout
    - Increased portability (fewer manipulatives)
    - Separate WAIS-IV and WMS-IV Technical Manuals

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Enhance User-Friendliness: Reduced Testing Time

- WAIS-III: Average of 80 minutes to obtain FSIQ and four index scores for normative sample

- WAIS-IV: Average of 67 minutes to obtain FSIQ and four index scores for normative sample

Enhance Clinical Utility

- Additional Special Group Studies
    - Borderline Intellectual Functioning
    - Mild Cognitive Impairment
    - Autistic Disorder
    - Asperger's Disorder
    - Depression

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Enhance Clinical Utility

- ## Statistical Linkage to Measures of Memory
    - Co-normed with the Wechsler Memory Scale-IV (WMS-IV) (2009)
    - Correlational studies with WMS-III and Children's Memory Scale (CMS)

- ## Statistical Linkage to Measure of Achievement
    - WIAT-II

Enhance Clinical Utility

- Statistical Linkage to WAIS-IV/WMS-IV Advanced Clinical Solutions (2009)
  - Special Populations (e.g., Older Adults and Neuropsychologically Impaired)
  - Demographically adjusted norms
  - Premorbid prediction of intellectual functioning
  - Measures of effort, executive function, social perception, and daily living

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Improve Psychometric Properties

- Update norms
- Maintain or improve subtest and composite reliability
- Provide initial evidence of validity
- Improve floors and ceilings
  - Expand FSIQ Range to 40-160
  - WAIS-III: 45-155
- Reduce item bias

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Test Structure

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Test Structure – WAIS-IV

Verbal Comprehension Scale

Core Subtests
Similarities
Vocabulary
Information

Supplemental Subtests
Comprehension

Perceptual Reasoning Scale

Core Subtests
Block Design
Matrix Reasoning
Visual Puzzles   **New!**

Supplemental Subtests
Picture Completion
Figure Weights (16-69) only   **New!**

FSIQ

Working Memory Scale

Core Subtests
Digit Span
Arithmetic

Supplemental Subtests
Letter-Number Sequencing (16-69 only)

Processing Speed Scale

Core Subtests
Symbol Search
Coding

Supplemental Subtests
Cancellation (16-69 only) **New!**

Composite Scores

- Full Scale IQ (FSIQ)
  - Based on 10 core subtests
- Index Scores: Primary interpretation level
  - Verbal Comprehension Index (VCI) and Perceptual Reasoning Index (PRI)
    - 3 core subtests each
  - Working Memory Index and Processing Speed Index (PSI)
    - 2 core subtests each

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Composite Scores –Optional General Ability Index (GAI)

- GAI = 3 VC subtests + 3 PR subtests
  - Optional Index score
- GAI is used when examiners need to calculate a summary score that minimizes the influence of Working Memory or Processing Speed

Why might the GAI be used?

- Sometimes, one overall summary score is required by the clinician for comparison purposes
  - Many clinical conditions result in deficits in Working Memory and/or Processing Speed
    - FSIQ has greater contribution of Working Memory and Processing Speed
    - When comparing ability to Memory (i.e., WMS), appropriate to use GAI to minimize memory overlap

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Process Scores

- Block Design
  - Block Design No Time Bonus (BDN)
- Letter-Number Sequencing
  - Longest Letter-Number Sequence (LLNS)

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Process Scores

- 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)

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Subtests

Subtest Modifications

- ## 4 Subtests Dropped
  - Object Assembly, Picture Arrangement, Coding Recall (Digit Symbol-Incidental Learning), and Coding Copy (Digit Symbol-Copy)

- ## 3 New Subtests
  - Visual Puzzles, Figure Weights, Cancellation

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Subtest Modifications

- 12 Subtests Retained with Modifications
  - Similarities, Vocabulary, Information, Comprehension
  - Block Design, Matrix Reasoning, Picture Completion
  - Digit Span, Arithmetic, Letter-Number Sequencing
  - Symbol Search, Coding

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Verbal Comprehension Subtests -

- ## Similarities (SI)
  - Replaced items, Revised scoring rules, Added sample responses

- ## Vocabulary (VC)
  - Replaced items, Revised scoring rules, Added sample responses, Added picture items

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Verbal Comprehension Subtests - Changes

- ## Information (In)
  - Replaced items, Revised scoring rules, Added sample responses

- ## Comprehension (Co)
  - Replaced items, Revised scoring rules, Added sample responses

<u>Similarities</u> - name how two items or ideas are alike

- Verbal concept formation and reasoning
- Also involves
  - crystallized intelligence
  - Abstract reasoning
  - auditory comprehension
  - Memory

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<u>Similarities</u> - name how two items or ideas are alike

- Also involves
  - associative and categorical thinking
  - Distinction between nonessential and essential features
  - verbal expression

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Similarities

- Added Sample Items and Teaching Items
- All items scored 0, 1, or 2 to improve floor
- Corrective feedback
  - Sample item gets corrective feedback
  - Teaching items: for an incorrect response to the start point item and the subsequent item if they do not provide a 2 point response

Similarities

- Degree of abstraction is an critical in score determinant

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<u>Vocabulary-</u> Names the object presented or defines words that are presented visually and orally

- Word knowledge and verbal concept formation.
- It also measures an examinee's
  - crystallized intelligence,
  - fund of knowledge,
  - Learning ability,
  - long-term memory, and
  - degree of language development.

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Vocabulary

- Other abilities that may be used
  - auditory comprehension and
  - verbal expression

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Vocabulary

- Added picture items
- Note better floor and ceiling
- Note revised scoring rules
- If misheard item "Listen carefully, what does insert stimulus word mean?"
- If point to object to room "Tell me in words what that is"

Vocabulary: Queries

- 4 Responses requiring Query – give *as often as necessary*
  - Marginal: "Yes, but what else is it called?"
  - Generalized: "Yes, but what kind of ___ is it?"
  - Functional Description: "Yes, but what is it called?"
  - Hand Gestures: "Yes, but what is it called"

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<u>Information</u> - Answers questions that address a broad range
of general knowledge topic

- Measures ability to acquire, retain, and retrieve general factual knowledge.
- Also involves
  - crystallized intelligence and
  - long-term memory.

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<u>Information</u> - Answers questions that address a broad range
of general knowledge topic

- Other skills that may be used include
    - verbal perception,
    - verbal comprehension
    - verbal expression

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<u>Comprehension</u> - Questions based on understanding of general principles and social situations

- Measures
  - verbal reasoning and conceptualization,
  - verbal comprehension and expression,
  - ability to evaluate and use past experience, and
  - ability to demonstrate practical knowledgeand judgment.

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Comprehension

- Also involves
  - crystallized intelligence,
  - knowledge of conventional standards of behavior,
  - social judgment,
  - long-term memory, and
  - common sense

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<u>Block Design</u> - Views a model and/or a picture, and uses red-and-white blocks to re-create the design within a time limit

- Measures the ability to analyze and synthesize abstract visual stimuli.
- It also involves
  - nonverbal concept formation and reasoning,
  - broad visual intelligence,
  - fluid intelligence,

Block Design (BD)-

- It also involves
  - visual perception and organization,
  - simultaneous processing,
  - visual-motor coordination,
  - learning, and
  - the ability to separate figure-ground in visual stimuli

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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 from 8 to 6
  - Added Block Design-No Time Bonus (BDN) process score

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Perceptual Reasoning Subtests

- Block Design

- Remember:

  - Look for repeated errors on same side or in same quadrant of multiple designs

  - Differentiate detail errors from "violations of   configuration"

<u>Matrix Reasoning</u> - 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

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Matrix Reasoning (MR)

- Explicit instructions are included for all examinees to teach the problem-solving strategy for successful performance.
- Everyone receives the explicit instruction about the problem solving strategy given, whether right or wrong
  - Fairness
  - Eases matrix rule understanding for examinee
  - Speeds test time
- Retained 2 of 4 item types
  - Allowed for efficient and effective teaching
  - Distinct appearance cues examinee as to strategy type

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Perceptual Reasoning Subtests

- Matrix Reasoning
  - Clarified 30-second guideline
  - Retained 2 of 4 item types
  - Added sample item for each type
  - Important to give ALL examinees the standard instruction.

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<u>Picture Completion</u> - views a picture with an important part missing and identifies the missing part

- Designed to measure
    - visual perception and organization
    - concentration
    - visual recognition of essential details of objects

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Picture Completion (PCm)

- Artwork redrawn and enlarged
- Scoring criteria reviewed and modified to distinguish between those verbal responses that
  - deserve credit, and
  - those that require clarification with a pointing response
- Better ceiling

Picture Completion

- Remember:
  - May be the best subtest for eliciting word-finding difficulties and paraphasias
  - Look for impatience in dealing with stimulus material
  - Unusual scanning behaviors

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Visual Puzzles –examinee views acompleted puzzle, and selects the 3 pieces from an array to make that puzzle

- designed to measure
  - nonverbal reasoning
  - ability to analyze and synthesize abstract visual stimuli.
- Similar measures, such as Object Assembly and the Revised Minnesota Paper Form Board Test (Likert & Quasha, 1995), involves
  - visual perception,
  - broad visual intelligence,
  - fluid intelligence,
  - simultaneous processing,
  - Spatial visualization and manipulation, and
  - the ability to anticipate relationships among parts

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Key Points of
Visual Puzzles (VP) Administration

- 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

Figure Weights (FW)

- New Subtest – Supplementary
- 16-69 only
- Emphasis on quantitative reasoning
- A specified time limit
- Requires no motor skills

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<u>Figure Weights</u> - Views a scale with missing weight(s) and selects response option that keeps the scale balanced

- Assesses
  - visual perception and organization,
  - concentration
  - visual recognition of essential details of   objects

Key Points of Figure Weights Administration

- Demonstration Item A: demonstrates operation of scale

- Demonstration Item B: teaches the task

- Sample Item: practice for examinee

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Key Points of Figure Weights Administration

- 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 3-scale items

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Working Memory Index (WMI) Subtests

WMI measures simultaneous and sequential processing, attention, and concentration

Working Memory Subtests

- Digit Span (DS)
  - Added Sequencing task
  - Eliminated phonetically similar intra-trial numbers (5/9)
  - All three tasks contribute to Digit Span subtest score

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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

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Why Add DS Sequencing?

- DS score criticized - Forward doesn't really place much of a demand on WM until later trials
  - has to chunk or use strategies
- Sequencing increases load of working memory for the DS subtest

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Why Add DS Sequencing?

- All three still administered:
  - Forward provides floor for low ability examinees
  - Forward also seems to be a warm-up precursor task for
  - Backward DS
    - lost floor on Backward when Forward wasn't given in a pilot study
  - Sequencing increases load of working memory and added to ceiling

Arithmetic- Examinee mentally solves a series of arithmetic problems

- Measures
    - mental manipulation
    - concentration,
    - attention,
    - short- and long-term memory,
    - numerical reasoning ability, and
    - Mental alertness

Arithmetic (AR)-

- May also involve
  - sequential processing
  - fluid, quantitative, and logical reasoning
  - quantitative knowledge

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Arithmetic

- Omitted references to English measurement system and currency
- Decreased emphasis on mathematical skills to increase emphasis on working memory

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Arithmetic

- Allowed to start at first item for examinees with significant delays(normally item 5)

- Sample item introduces;

- Items 1 and 2 are teaching items with corrective feedback

Arithmetic

- Remember:
  - Observe the nature of the errors – such as:
  - Retrieval errors
  - Minor calculation errors
  - Language errors
  - Lack of conceptual understanding

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Letter-Number Sequencing - Hears 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

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Letter-Number Sequencing (LNS) -

- May also involve
  - information processing
  - cognitive flexibility
  - fluid intelligence

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Letter-Number Sequencing

- Eliminated phonetically similar intratrial numbers and letters   (e.g., B and C, B and 3)
- Omitted use of L, I, O, and zero
- Implemented graduated teaching strategy

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Letter-Number Sequencing

- In response, still allow either letters or numbers first on actual items (though not on teaching and sample items)
  - Data suggests it makes no difference in ability of examinee
  - Asking for one way only simplifies instructions
- No longer above age 70 secondary to difficulty and to lower time of battery

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Letter-Number Sequencing

- Remember:
  - Compare errors on letters vs. numbers
  - Look for inconsistency and warm-up effects at individual string lengths

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Processing Speed (PSI) Subtests

PSI subtests measure the speed of mental and graphomotor processing

Key Points of Symbol Search Administration

- Demonstration and Sample items
  - Demonstration item teaches the task
  - Sample item allows examinee to practice
- Time limit = 120"
- Examinee marks either matching symbol in search group or "NO" box
  - Allows for qualitative examination of errors

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Symbol Search

Remember:

- ✓ One of most important uses for this subtest is score comparison with *Coding*

- ✓ Allows pulling out fine motor (graphomotor) speed from mental processing speed

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Processing Speed Subtests

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

Key Points of 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

Key Points of Cancellation Administration

- For test items, open booklet to expose entire 11x17 spread

- Examinee must complete items from the left to the right, all the way across the row

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General Administration Considerations

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General Administration Considerations

- Use general rules for any testing situation with rapport, timing, arrangement of test materials, etc

- Instructions may be repeated upon request unless stated otherwise. Do not stop timing for this or any required prompt.

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General Administration Considerations

- Untimed tests: 30 second guideline
  - Do not apply rigidly
  - After 30 s if unproductive/no answer "Do you have an answer?"
    - No or unproductive: "Let's move on"
  - If examinee performing well takes more time as difficulty increases, adjust the timing of this prompt and grant additional time.
  - Although unusual, credit spontaneously provided correct answer to *untimed* items even if you have moved on.

Demonstration, Sample, Teaching Items

- Many subtests have Demo items to explain task

- Many have Sample items to practice with feedback

- Many have Teaching items -- marked with a †

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Demonstration, Sample, Teaching Items

- Corrective Feedback, when allowed, occurs after response and does NOT change the score on the item.
  - Familiarize on novel tasks
  - Ensure understanding task
  - Help performance
- Give feedback only as allowed and in manner allowed
- No additional help on other test items

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General Administration Issues - Changes

- Vocabulary and Instructions simplified
- More Sample responses
- Clarified Scoring rules
- Bulleted Key Points in manual

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General Administration Issues

- Items grouped together and marked with Query (Q) must be queried
  - Scoring Queried responses
    - No improvement, retain score of original response
    - Elaboration at same point value but taken together with original response = higher points is scored at the higher point level

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General Administration Issues

- Spoiled Responses: Scored 0. Shows fundamental misconception. Initial response credible or potentially so, but elaboration revealed clear misunderstanding

- Poor Response: No improvement but not a fundamental misconception. Score as appropriate.

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

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Prorating

- 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

- FSIQ: If only 2 subtest scores are used for VCI and/or PRI, use the prorated sum of scaled scores for the index(indices) that were prorated (Table A.8)

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Prorating FSIQ When Only One WMI or PSI Subtest is Administered-

- FSIQ: If only ONE subtest score is available for WMI or PSI use a prorated sum of scaled scores (Table A.9)
- If both substitution and proration are required to derive GAI or FSIQ, ONE substitution and ONE prorated sum of scaled scores are allowed, but ONLY on DIFFERENT Index Scores
  – FSIQ can be derived from prorated sum of scaled scores on VCI and sum of scaled scores for the 3 other Index scores with ONE substitution on only ONE of the remaining 3 Indices

Prorating WMI and PSI

- Age 70 – 90: Because the optional subtests were not standardized at these age levels, you cannot use them as a substitute for the calculation of the WMI or PSI

  – so cannot calculate these indices but can get a prorated FSIQ

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Process Scores

- Process scores may not be substituted for any subtest score nor contribute to any composite score.

- Designed to help with interpretation

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Process Scores

- Block Design
  - Block Design No Time Bonus (BDN)
- Digit Span
  - Digit Span Forward (DSF), Digit Span Backward (DSB), Digit Span Sequencing (DSS)
  - Longest Digit Span Forward (LDSF), Longest Digit Span Backward (LDSB), Longest Digit Span Sequence (LDSS)
- Letter-Number Sequencing
  - Longest Letter-Number Sequence (LLNS)

Psychometric Properties and Initial Evidence of Validity

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Composite Reliabilities

Composite	WAIS-IV (16-90)	WAIS-III (16-89)	WISC-IV (6-16)
VCI (VIQ)	.96	.96 (.97)	.94
POI/PRI (PIQ)	.95	.93 (.94)	.92
WMI	.94	.94	.92
PSI	.90	.88	.88
FSIQ	.98	.98	.97

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Correlations with the WAIS-III

Composite	Correlations
VCI	.91
VCI-VIQ	.89
PRI	.84
PRI-PIQ	.83
WMI	.87
PSI	.86
FSIQ	.94

N=240. Counterbalanced order.

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Correlations with the WISC-IV

Composite	Correlations
VCI	.88
PRI	.77
WMI	.78
PSI	.77
FSIQ	.91

N=157. Counterbalanced order.

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Confirmatory Factor Analysis

FSIQ

VCI
(Verbal Comprehension)

PRI
(Perceptual Reasoning)

WMI
(Working Memory)

PSI
(Processing Speed)

Vocabulary
Similarities
Information

Block Design
Matrix Reasoning
Visual Puzzles

Digit Span
Arithmetic

Symbol Search
Coding

Comprehension

Figure Weights
Picture Completion

Letter-Number Seq.

Cancellation

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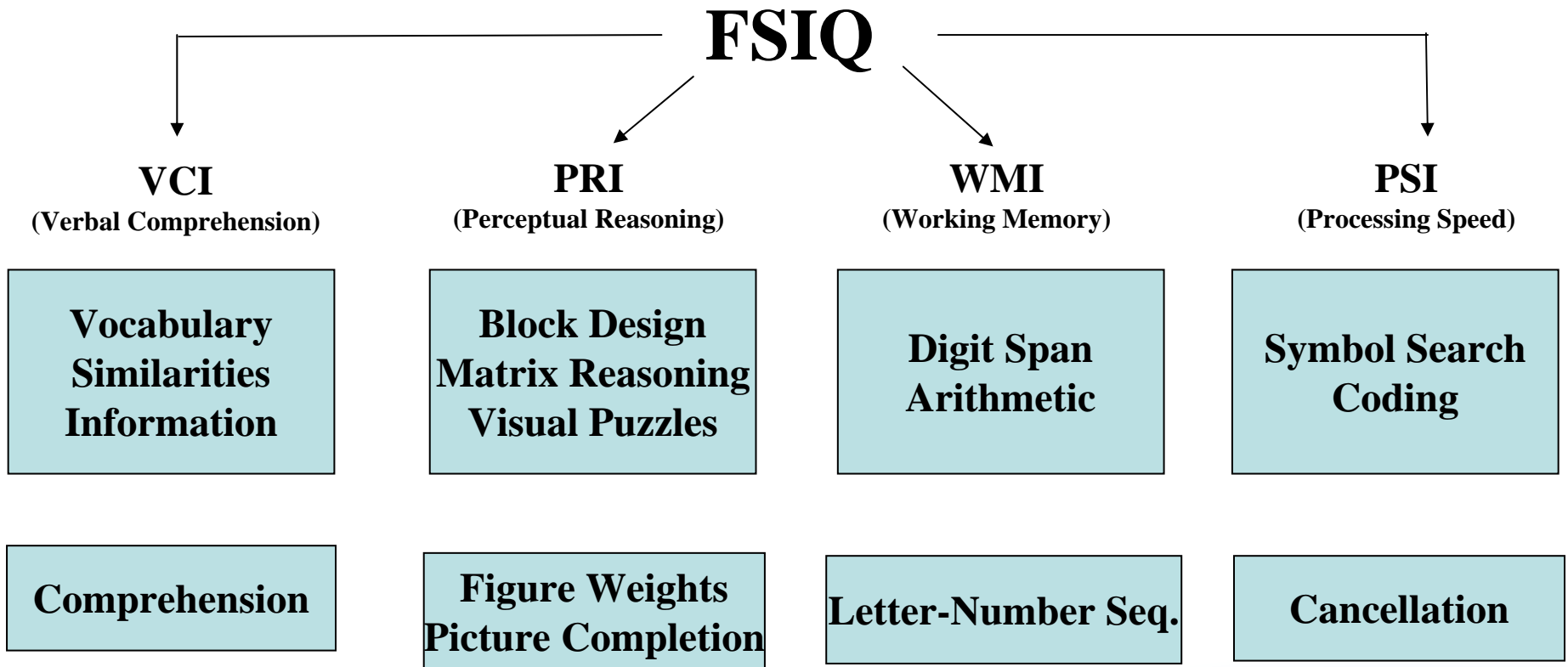
WAIS-IV Clinical Studies

- Gifted Intellectual Functioning
- Intellectual Disability: Mild Severity
- Intellectual Disability: Moderate Severity
- Learning Disorder: Mathematics

- ADHD
- Autistic Disorder
- Asperger's Disorder
- Borderline Intellectual Functioning
- Learning Disorder: Reading

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WAIS-IV Clinical Studies (Continued)

- TBI (Traumatic Brain Injury)
- Depression
- Mild Cognitive Impairment
- Probable Dementia of the Alzheimer's Type

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Gifted Intellectual Functioning

Composite	Clinical Mean	Control Mean	Mean Diff.	p value	Effect Size
VCI	127.2	106.2	-21.06	<.01	-1.75
PRI	119.6	102.7	-16.85	<.01	-1.33
WMI	123.3	105.5	-17.82	<.01	-1.35
PSI	112.4	102.1	-10.38	<.01	-.70
FSIQ	126.5	105.3	-21.15	<.01	-1.78

N=34

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Intellectual Disability: Mild Severity

Composite	Clinical Mean	Control Mean	Mean Diff.	*p* value	Effect Size
VCI	65.9	96.6	30.68	<.01	2.83
PRI	65.4	100.1	34.66	<.01	3.07
WMI	61.5	97.4	35.85	<.01	3.32
PSI	63.8	100.2	36.45	<.01	2.69
FSIQ	58.5	98.1	39.59	<.01	4.01

N=73

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Intellectual Disability: Mod. Severity

Composite	Clinical Mean	Control Mean	Mean Diff.	*p* value	Effect Size
VCI	56.8	97.4	40.61	<.01	3.58
PRI	55.0	96.7	41.68	<.01	3.54
WMI	53.1	97.1	44.03	<.01	4.00
PSI	53.8	98.9	45.10	<.01	3.50
FSIQ	48.2	96.9	48.71	<. 01	4.24

N=31

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Borderline Intellectual Functioning

Composite	Clinical Mean	Control Mean	Mean Diff.	p value	Effect Size
VCI	77.3	96.2	18.89	<.01	1.59
PRI	75.8	99.7	23.89	<.01	1.95
WMI	74.2	96.6	22.37	<.01	1.78
PSI	80.9	96.9	15.96	<.01	1.36
FSIQ	72.7	96.9	24.22	<.01	2.16

N=27

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Learning Disorder: Reading

Composite	Clinical Mean	Control Mean	Mean Diff.	*p* value	Effect Size
VCI	89.5	98.6	9.06	<.01	.61
PRI	91.1	97.3	6.24	.04	.48
WMI	88.9	101.1	12.21	<.01	.90
PSI	94.5	97.1	2.59	.40	.22
FSIQ	88.7	97.9	9.18	<.01	.71

N=34

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Learning Disorder: Mathematics

Composite	Clinical Mean	Control Mean	Mean Diff.	p value	Effect Size
VCI	91.2	97.7	6.56	.03	.48
PRI	86.8	97.3	10.44	<.01	.83
WMI	84.1	98.7	14.63	<.01	1.14
PSI	93.2	96.8	3.56	.14	.30
FSIQ	86.2	96.8	10.59	<.01	.93

N=41

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ADHD

Composite	Clinical Mean	Control Mean	Mean Diff.	p value	Effect Size
VCI	100.9	102.8	1.93	.51	.12
PRI	98.6	103.4	4.82	.08	.34
WMI	94.7	100.6	5.91	.02	.43
PSI	94.0	100.4	6.36	.01	.49
FSIQ	96.9	102.4	5.52	.02	.39

N=44

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Traumatic Brain Injury

Composite	Clinical Mean	Control Mean	Mean Diff.	*p* value	Effect Size
VCI	92.1	100.8	8.73	.03	.52
PRI	86.1	100.7	14.64	<.01	.94
WMI	85.3	97.9	12.59	<.01	.78
PSI	80.5	97.6	17.09	<.01	.97
FSIQ	83.9	99.4	15.50	<.01	.93

N=22

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Autistic Disorder

Composite	Clinical Mean	Control Mean	Mean Diff.	*p* value	Effect Size
VCI	80.9	101.1	20.19	<.01	1.85
PRI	89.7	104.5	14.81	.02	.91
WMI	85.7	103.9	18.19	<.01	1.45
PSI	75.1	97.9	22.81	<.01	1.96
FSIQ	79.8	102.5	22.69	<.01	1.95

N=16

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Asperger's Disorder

Composite	Clinical Mean	Control Mean	Mean Diff.	p value	Effect Size
VCI	104.5	105.9	1.35	.71	.08
PRI	100.0	103.7	3.70	.22	.25
WMI	96.0	105.1	9.13	<.01	.59
PSI	88.4	100.7	12.33	<.01	.91
FSIQ	97.5	104.9	7.35	.02	.50

N=40

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Depression

Composite	Clinical Mean	Control Mean	Mean Diff.	p value	Effect Size
VCI	101.8	101.6	-.17	.95	-.01
PRI	97.8	99.1	1.27	.59	.09
WMI	99.5	98.2	-1.27	.62	-.09
PSI	95.8	99.4	3.61	.18	.26
FSIQ	98.6	99.4	.83	.73	.05

N=41

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Mild Cognitive Impairment – Inclusion Criteria

- Meets American Academy of Neurology criteria
  - objective evidence of cognitive impairment in memory or another cognitive domain (e.g., language, perception)
  - may have history of decline from previously normal level of cognitive functioning
  - may have preserved basic daily functioning

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Mild Cognitive Impairment – Inclusion Criteria

- Meets American Academy of Neurology criteria
  - if memory loss is present, there is no evidence of other obvious medical, neurological, or psychiatric causes for the memory loss
  - does not meet criteria for any type of dementia
  - cognitive complaints are not consistent with normal aging

Mild Cognitive Impairment

Composite	Clinical Mean	Control Mean	Mean Diff.	*p* value	Effect Size
VCI	99.0	106.1	7.13	<.01	.49
PRI	93.9	102.4	8.43	<.01	.61
WMI	96.6	104.7	8.13	<.01	.54
PSI	94.9	102.2	7.33	.05	.53
FSIQ	94.8	104.8	10.00	<.01	.72

N=53

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Probable Alzheimer's Dementia Group Inclusion Criteria

- 1984 NINCDS-ADRDA criteria
  - dementia,
  - deficits in two or more areas of cognition,
  - progressive decline in memory and other cognitive functions,
  - no disturbance in consciousness and an absence of systemic disorders or brain disease that may account for the decline

# Probable Alzheimer's Dementia Group Inclusion Criteria

- 2007 revised NINCDS-ADRDA criteria
  - episodic memory impairment for > 6 months w/objective testing results
  - evidence of medial temporal lobe atrophy as evidenced with:
    - MRI, a cerebrospinal fluid biomarker, PET functional neuroimaging, or proven Alzheimer's dementia autosomal mutation within the individual's immediate family
  - The 1984 criteria were used because the 2007 criteria were not available when the sample was defined

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Comparison of 3 Clinical Cases
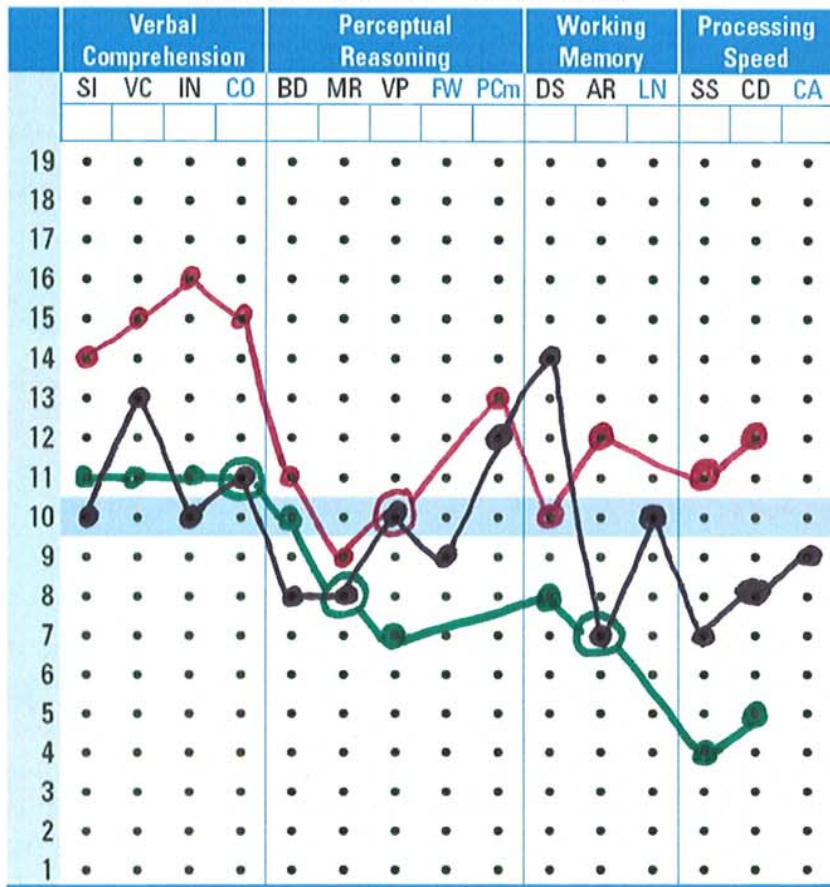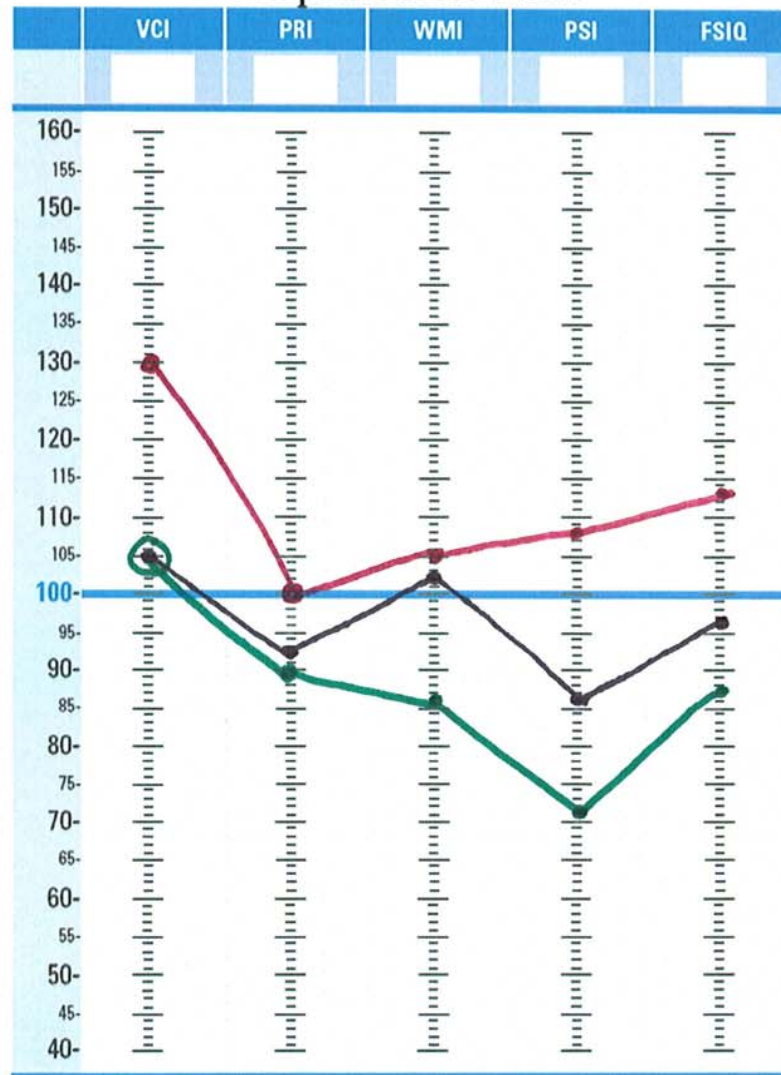
Red: Depression case
Black: Mild Cognitive Impairment case
Green: Alzheimer's case

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What is the purpose of the evaluation?

- Consider the key referral questions that you were asked to address-
  - Does this individual have the mental capacity to make independent decisions?
  - What cognitive strengths does this person present that relate to his/her ability to function in a work/community/school setting?
    - What cognitive limitations are present?

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What is the purpose of the evaluation?

- Consider the key referral questions that you were asked to address-
  - Does this individual qualify for SSI/other types of disability services?
  - As this person enters college, what cognitive strengths or limitations should be considered in the selection of courses, etc.?

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What is the purpose of the evaluation?

- Consider the key referral questions that you were asked to address-

- Depending on the type of question you are addressing, your interpretation needs will vary.

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Interpretation Guidelines

Interpretation and Assessment Purpose-

- General Eligibility: often requires the summary scores (FSIQ, VCI, PRI, PSI, and WMI, and/or GAI)
  - Still should integrate multiple sources of information
- Program Planning/Treatment: will require a finer level of analysis and potentially greater integration of results and drill down through additional assessment

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A Process Approach to Interpretation

Full Scale

Indexes

Subtests

Items

Task Component Processes
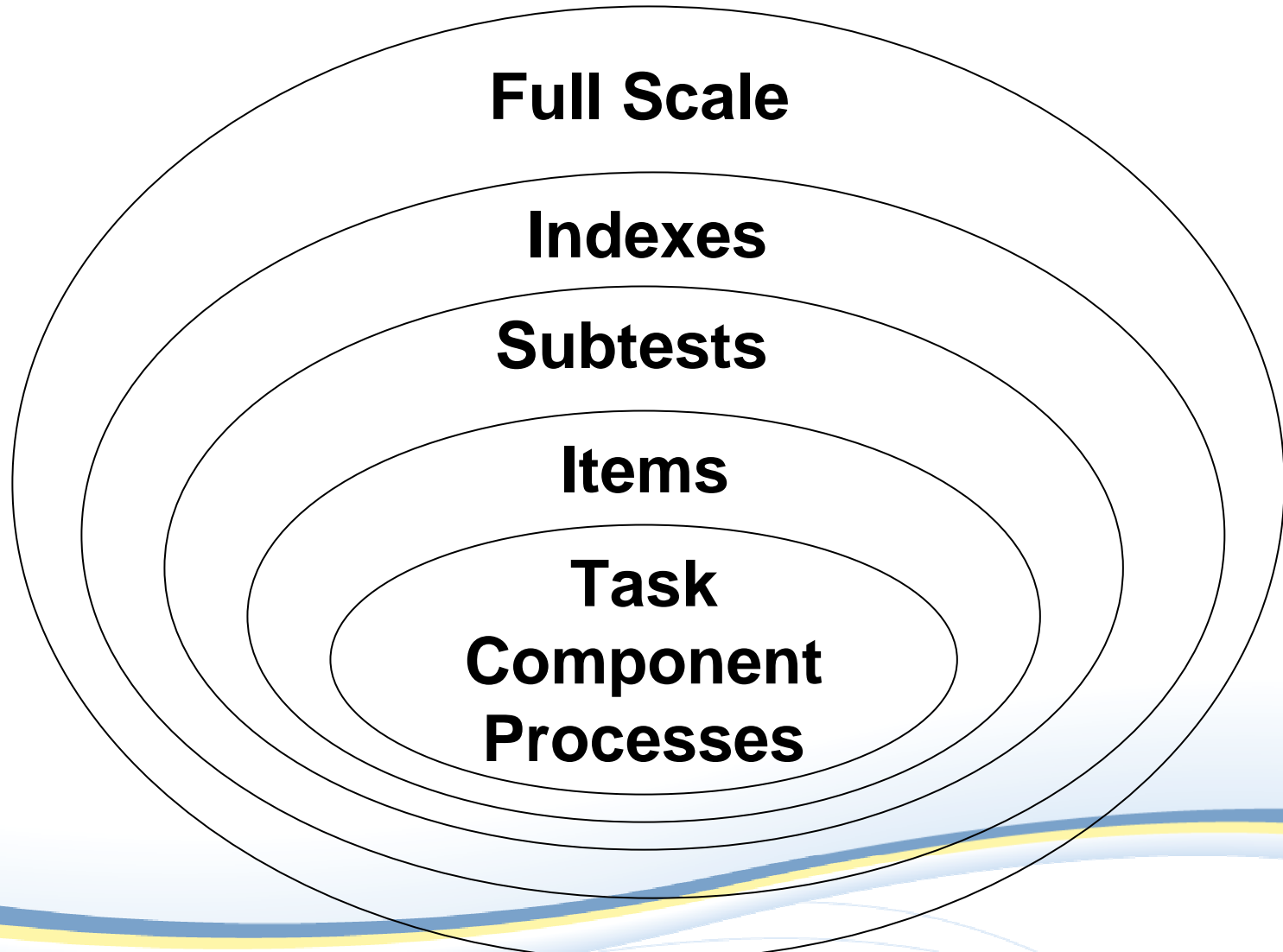
Table 6.3 Descriptive Classifications of Composite Score Ranges

Composite Score Range	Descriptive Classification	Percent Included	
		Theoretical Normal Curve	Actual Sample[a]
130 and above	Very Superior	2.5	2.3
120–129	Superior	7.2	6.8
110–119	High Average	16.6	17.1
90–109	Average	49.5	50.2
80–89	Low Average	15.6	15.0
70–79	Borderline	6.5	6.1
69 and below	Extremely Low	2.1	2.5

[a] The percentages shown are for the FSIQ and are based on the total normative sample ($N = 2,200$). The percentages obtained f the other composite scores are very similar.

ed Procedures for Basic Profile Analysis

Interpreting Index Scores

1. Enter the various index standard scores on the Analysis page from the Summary page.
2. Calculate the difference between scores.
3. Use appropriate Table (or Scoring Asst,) to identify Critical Value by age.
4. Use appropriate table(or SA) to identify the Base Rate.

Composite Score Differences

Discrepancy Comparisons	Scaled Score 1	Scaled Score 2	Diff.	Critical Value	Sig. Diff. Y/N	Base Rate
VCI - PRI	112	92	20	11	Y	6.1%
VCI - WMI	112	102	10	11.38	N	22.9%
VCI - PSI	112	91	21	12.12	Y	9.7%
PRI - WMI	92	102	-10	11.38	N	24.5%
PRI - PSI	92	91	1	12.12	N	49.3%
WMI - PSI	102	91	11	12.46	N	24.1%

Base Rate by Overall Sample
Statistical Significance (Critical Values) at the .05 level

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Statistical Significance of Index Score Differences

- A statistically significant difference between scores, for example between the VCI and the PRI scores, refers to the likelihood that obtaining such a difference by chance is very low (e.g., $p < .05$) if the true difference between the scores is 0 (Matarazzo & Herman, 1985).

- The level of significance reflects the level of confidence the examiner can have that the difference between the scores, called the difference score, is a true difference.

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Frequency of Index Score Differences

- The prevalence or frequency of an observed score difference in the general population also referred to as the base rate.

- Often the difference between composite scores (e.g., VCI and PRI) is significant in the statistical sense but is not infrequent.

Frequency of Index Score Differences

- The statistical significance of differences between scores and the rarity of the difference are two different issues and consequently have different implications for test interpretation. (Matarazzo & Herman, 1985; Payne & Jones, 1957; Sattler, 2001; and Silverstein, 1981.)

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The Basic Score Analysis Process-

- Report and describe FSIQ
- Report and describe Index Scores
    - VCI, PRI, WMI, PSI
- Evaluate discrepancies in performance across Indexes
- Evaluate areas of relative strength and weakness in subtests
    - Evaluate subtest discrepancies
- Integrate information with "real life" observations and experiences

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Basic Score Analysis Procedures

- Optional – Analyze patterns of performance within subtests
  - Example: person who answers 15 items and then hits ceiling performed differently than a person that took 30 items, still gets 15 correct, but there was a lot of scatter in reaching the ceiling

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Basic Score Analysis Procedures

- Optional – Conduct Process Score Analyses
  - Helps in understanding the conditions under which a person performs well, and those where difficulty is encountered
  - Provides a "drill down" to further evaluate capabilities
  - May be useful for program planning

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Reference Group Scores (20 to 34-11)

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

- These scores do not capture the normal variations that occur by age
  - Example: our processing speed decreases as we age, scores will look very bad if compared to this reference group when we are 60 ☹

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Thinking About Interpretation-

- **Input Requirements**
  - e.g., Hearing, Vision, Motor, etc…
- **Output Requirements**
  - Minimal verbal expression to maximal verbal expression required.
  - Minimal motor output required to maximal motor output required.

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Thinking About Interpretation-

- Output Requirements
  - Maximal structure and organization provided to minimal amount of structure and organization required.
  - Maximal amount of contextual information provided to minimal amount of contextual information provided.

Thinking About Interpretation

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

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Who should I contact for WAIS-IV content-related questions?

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