One

OVERVIEW

Why did this student score so low on WISC-V Arithmetic? Is it a problem with calculation speed, working memory, or math computation? It would help to be sure, so I could decide what to recommend.

I wonder if her visual working memory, if I could measure it, would be in the average range like her WISC-V Auditory Working Memory Index? It's important to know, so I can be surer about what accommodations to recommend.

These WISC-V results are odd. What do they mean? The child received a scaled score of 5 on Block Design but a scaled score of 10 on Visual Puzzles.

If this child didn't have to retrieve information and could just recognize it instead, would it maybe help as a modification?

These questions, and many others, can be addressed using the Wechsler Intelligence Scale for Children–Fifth Edition Integrated (WISC-V Integrated; Wechsler & Kaplan, 2015). The WISC-V Integrated is a companion measure of the most widely used intelligence test for children in the world, the Wechsler Intelligence Scale for Children–Fifth Edition (WISC-V; Wechsler, 2014). It enables practitioners to learn more about the cognitive processes and test-taking behaviors that affect performance on the WISC-V that also affect school performance.

The WISC-V was a substantial revision of this popular test, which continues the progressive trend of recent Wechsler intelligence scale revisions that mirror contemporary advances in intelligence theory, neuropsychology, cognitive neuroscience, and psychometric methodology. Major modifications were made to the content and structure of the WISC-V to reflect these advances. The WISC-V Integrated subtests can be used to understand WISC-V results in greater detail to enable practitioners to test hypotheses about WISC-V results and to inform intervention recommendations.

For example, where the WISC-V has Verbal Comprehension subtests (Similarities, Vocabulary, Information, and Comprehension), which each requires verbal expression of the responses, the WISC-V Integrated has multiple-choice versions of these subtests with the same items that allow selection of a response from among options that are read aloud to the child and viewed in a stimulus book. These are ideally suited for obtaining an estimate of verbal abilities without requiring expressive language.

The WISC-V Integrated also contains two index scores: the Multiple Choice Verbal Comprehension Index (MCVCI) and the Visual Working Memory Index (VWMI). These scores provide reliable and valid estimates of specific abilities that can be used in concert with the WISC-V index scores in a similar manner to the WISC-V Integrated subtests, which are used to understand WISC-V subtest performance. The index scores are useful in specific situations (e.g., conducting evaluations of children who may have expressive difficulties or challenges or obtaining a broader assessment of a particular area of concern, such as working memory problems).

This book expands on the selection of index scores to provide Essentials composite scores for situations in which appropriate measures of ability ideally would not involve motor skills (e.g., for a child with motor delays) or not rely on expressive responses (e.g., a child with language disorder with expressive impairment). These Essentials composite scores mirror the published WISC-V composite scores in some cases. For example, a Full Scale Score that does not require motor performance is included, as is a Full Scale Score that does not require expressive responses. Others among the Essentials composite scores were constructed as similar nonexpressive or nonmotor parallels of composite scores that were created by other authors (i.e., Flanagan & Alfonso, 2017; Kaufman, Raiford, & Coalson, 2016) and included in books to accommodate practical needs or interpretation using a Cattell-Horn-Carroll (CHC) framework.

The online resources for this book include an interpretive program that automatically calculates the Essentials composite scores not available within the published test and provides data relevant to comparisons of those index scores with WISC-V composite scores. These additional index scores were developed to enhance interpretation in special clinical situations (e.g., an expanded index score that is derived from more subtests on the cognitive domain, an index score that does not require expressive responses) and theoretical perspectives (e.g., CHC). The online resources that accompany this book include the *WISC-V Integrated Interpretive Assistant 1.0,* scoring software that calculates norms for the Essentials composite scores and walks the practitioner through the interpretive approach in Chapter 4, including numerous score comparisons not available in the published test that can more fully inform interpretation.

The WISC-V Integrated scores can be interpreted from a normative perspective. That is, a child's cognitive processes can be understood by comparing scores to those obtained by others of approximately the same age (i.e., comparison to a normative reference group). This comparison helps practitioner to understand how the child benefits from modifications or scaffolding in tasks relative to other children his or her age.

The WISC-V Integrated scores can also be interpreted from an intrapersonal perspective. A total raw score from a WISC-V subtest can be compared directly to a total raw score from a corresponding WISC-V Integrated adaptation subtest, because they have the same item content. This enables inferences about which cognitive processes affected performance on the WISC-V subtest and provides information about how a child might better succeed with accommodations or modifications for schoolwork.

The performance on WISC-V items of subtests with corresponding WISC-V Integrated adaptation subtests (e.g., Vocabulary and Vocabulary Multiple Choice, Arithmetic and Arithmetic Process Approach) can also be compared to learn more about the child's specific knowledge of content. For example, if the definition of *cat* is not expressed in response to an open-ended question, the child may be able to select the best meaning from among five response options, such as (a) An animal, (b) It eats cat food, (c) It runs, (d) It's furry, (e) It's small.

The goal of this book is to provide a go-to reference for novice examiners and proficient practitioners using the WISC-V Integrated. Administration, scoring, and interpretive information is clearly and succinctly covered in successive chapters, incorporating the familiar Rapid Reference, Caution, and Don't Forget boxes that are hallmark features of the Essentials series. The author, who was the lead WISC-V and WISC-V Integrated research director, also includes Behind the Scenes boxes that offer insights into the test development process. Test questions are included at the conclusion of each chapter to highlight critical content.

HISTORICAL PERSPECTIVES ON THE PROCESS APPROACH TO COGNITIVE ASSESSMENT

The process approach to cognitive assessment has its roots in ideas put forth by Heinz Werner (1937), who proposed that cognitive assessment that involves careful and systematic observation of problem-solving strategies yields information that is more rich and useful than correct-incorrect scoring. He suggested that cognitive task performance involves multiple, dynamic processes. Any of these processes may contribute individually or in combination with others to exert an influence on responses and performance. For example, a child may have difficulty

with Block Design because of low motor skills, but another child low performance on the same task may be related to impaired visual spatial processing. Although both may score similarly on Block Design, the poor performance traces back to two different origins.

Process approaches to assessment recognize that in completing any cognitive task, regardless of its complexity, a number of mental processes are involved. These processes can range from simple (e.g., sensing, perceiving, motor functioning) to more complex (e.g., reasoning, decision making) (Kaufman et al., 2016). A problem with any of these processes can result in difficulties completing the overall task. The process approach aims to understand the reasons for low scores through identifying the cognitive processes that operate jointly on performance, breaking them down to more-specific components in a stepwise fashion or altering the task in some manner and testing hypotheses with tasks that involve fewer or different cognitive processes. For example, the hypothesis that low motor skills resulted in a lower Block Design score could be more closely examined by presenting the completed design and multiple pictured sets of blocks in a stimulus book and asking the examinee to select the set of blocks that, when assembled, make the design.

There are many approaches that have focused on understanding the cognitive processes involved in performance on the Wechsler scales, beginning with an approach first used by David Wechsler. He stated that "individuals attaining identical scores on intelligence tests cannot always be classified in the same way" (Wechsler, 1944, p. 12). Always a clinician, his approach was somewhat psychoanalytic in nature. It described how poor performance could result from various issues with cognitive processes and that information at the task and item level could provide clues as to the nature of impairment. For example, Wechsler (1958) described a deep dive into interpretation of the Object Assembly subtest as follows:

> If low score is due to poor juxtaposition of parts or bizarreness of arrangement one may suspect a schizophrenic process. On the other hand, if poor performance is due to hesitation and uncertainty, particularly on the "Hand" and "Face" items, it is more likely the results of dynamic repression. In either case it reflects unchannelized anxiety. (p. 193)

Kaufman's (1979) *Intelligent Testing With the WISC-R* encouraged clinicians to adopt a process approach to interpretation of test results by analyzing the input and output modalities (e.g., verbal input, visual output) as a means of better understanding the underlying causes of a child's pattern of strengths and weaknesses. Kaufman (1994) and Kaufman and Lichtenberger (1999, 2000,

2002) refined the *Intelligent Testing* methods to advance their Shared-Abilities Analysis approach to interpretation of Wechsler intelligence scale performance by synthesizing Silver's information processing model (1993) and Osgood's (1957) communication channels model with factor-analytic evidence and intelligence models (e.g., Guilford, 1967; Horn, 1989). Silver's model emphasized information processing input, integration, storage, and output stages of information processing, whereas Osgood highlighted receptive, associative, and expressive channels of communication within auditory verbal and visual motor pathways (Floyd & Kranzler, 2012). The Shared Ability Analysis approach posits that any task can be classified according to five aspects of processing (communication channel, input, integration, storage, and output). As an example, WISC-V Similarities requires the child to express how two objects or concepts are alike or what they have in common. This task involves the auditory verbal channel, requires receptive input for the task requirement as well as the word itself, draws on integration and storage by requiring novel reasoning with previously acquired information, and involves verbal output. Level of emphasis on each aspect was noted for each of the tasks and accumulated across the multiple tasks to generate hypotheses. Ultimately, the approach was thought not to be specific enough and too loosely integrated with factor-analytic research to be clinically useful (Floyd & Kranzler, 2012).

Edith Kaplan and others at the Boston Veterans Administration Medical Center operationalized and refined Heinz Werner's original work and termed it the *Boston process approach*. They provided supporting evidence that using the Boston process approach improved diagnostic and clinical utility in neuropsychological assessment. They found that problem-solving varied across various neurological conditions even when similar scores were obtained (Kaplan, 1988).

Today, there are numerous process approach measures available. Rapid Reference 1.1 lists the most familiar measures and basic descriptive information.

The influence and clinical utility of the process approach is clear in psychological assessment. Psychologists use the process approach to investigate the reasons for low scores, to learn about an examinee's cognitive strengths and weaknesses, and to develop recommendations for learning accommodations. Studies suggest that the process approach is clinically useful in assessment of a wide variety of neuropsychological and neurodevelopmental problems, such as autism spectrum disorder, attention-deficit/hyperactivity disorder, traumatic brain injury, and specific learning disorders (Boxer, Jackson, & Kohlman, 2014; Halleland, Sorensen, Posserud, Haavik, & Lundervold, 2015; Hoffmann, Donders, & Thompson, 2000; Kramer, Knee, & Delis, 2000; Mayfield, Reyes, Mayfield, & Allen, 2014; McLean, Johnson, Zimak, Joseph, & Morrow, 2014).

Rapid Reference 1.1

Process Approach Measures

Measure	Abbreviation	Publication Information	Age Range	Purpose
Boston Naming Test	BNT	Kaplan, Goodglass, and Weintraub (1983)	25–88	Determine if naming performance improves with cues
California Verbal Learning Test–Second Edition	CVLT-II	Delis, Kramer, Kaplan, and Ober (2000)	16–89	Auditory memory: • Frequency of different types of errors • Susceptibility to interference through introducing other material • Degree of improvement across trials
Wechsler Adult Intelligence Scale–Revised as a Neuropsychological Instrument	WAIS-R NI	Kaplan, Fein, Morris, and Delis (1991)	50–89	Modifications to administration and scoring procedures of the Wechsler Adult Intelligence Scale–Revised (Wechsler, 1981) to understand cognitive processes contributing to performance
California Verbal Learning Test–Children's Version	CVLT-C	Delis, Kramer, Kaplan, and Ober (1994)	6–16	Auditory memory: • Frequency of different types of errors • Susceptibility to interference through introducing other material • Degree of improvement across trials
Wechsler Intelligence Scale for Children–Third Edition as a Process Instrument	WISC-III PI	Kaplan, Fein, Kramer, Delis, and Morris (1999)	6–16	Modifications to administration and scoring procedures of the Wechsler Intelligence Scale for Children–Third Edition (Wechsler, 1991) to understand cognitive processes contributing to performance

Measure	Abbreviation	Publication Information	Age Range	Purpose
Wechsler Intelligence Scale for Children–Fourth Edition Integrated	WISC-IV Integrated	Wechsler et al. (2004)	6–16	Modifications to administration and scoring procedures of the Wechsler Intelligence Scale for Children–Fourth Edition (Wechsler, 2003) to understand cognitive processes contributing to performance
Kaplan-Baycrest Neurocognitive Assessment	n/a	Leach, Kaplan, Rewilak, Richards, and Proulx (2000)	20–89	Clarifying cognitive limitations, particularly for individuals with dementia-related disorders
Delis-Kaplan Executive Function System	D-KEFS	Delis, Kaplan, and Kramer (2001)	8–89	Assessment of lower- and higher-order executive functions with standard neuropsychological measures that have been modified to provide information about cognitive processes
Wechsler Intelligence Scale for Children–Fifth Edition Integrated	WISC-V Integrated	Wechsler and Kaplan (2015)	6–16	Modifications to administration and scoring procedures of the Wechsler Intelligence Scale for Children–Fifth Edition (Wechsler, 2014) to understand cognitive processes contributing to performance

DEVELOPMENT OF THE WISC-V INTEGRATED

WISC-V Integrated development is discussed in this section. Key revisions, subtest changes, and composite scores are highlighted.

Key Revisions

A variety of issues precipitated the WISC-V Integrated revision. Chapter 2 of the WISC-V Integrated Technical and Interpretive Manual (Wechsler &

Kaplan, 2015) discusses these issues in detail. Rapid Reference 1.2 lists the key revision features broadly and specifically.

Rapid Reference 1.2

Broad and Detailed Key Revisions

Broad Key Revision	Detailed Key Revisions
Updated theoretical foundations	• Incorporated and considered working memory models and research • Varied presentation modes and response formats • Reduced timed aspects of performance
Increased developmental appropriateness	• Improved the developmental appropriateness of instructions and item phrases • Improved the developmental appropriateness of scoring criteria
Increased user friendliness	• Enhanced item security • Improved user friendliness of materials and packaging • Minimized testing time • Improved user friendliness of administration and scoring • Reduced length of discontinue rules
Improved psychometric properties	• Updated the norming method • Increased evidence of reliability and validity • Reduced item bias
Enhanced clinical utility	• Improved quality of artwork and items • Improved experimental control on processing speed measures • Reduced the expressive language requirements necessary to obtain a composite score • Increased the number of special group studies • Provided statistical linkage to measures of achievement and built in a pattern of strengths and weaknesses analysis

Subtests

Practitioners who used the WISC-IV Integrated will find many of the same subtests are present but substantively revised (with a number of new items and in some cases new procedures). They also will notice some subtests have been dropped, new subtests have been added, the test structure is modified, there are composite scores for the first time, and the Record Form is reorganized substantially.

New Subtests

There are three new subtests:

- Figure Weights Process Approach, a quantitative Fluid Reasoning subtest adapted from the WISC-V Figure Weights subtest that enables closer examination of the impact of timed performance on Figure Weights performance
- Sentence Recall, an auditory Working Memory subtest designed to improve the construct coverage of auditory working memory in the context of complex span requirements
- Cancellation Abstract, a speeded visual search Processing Speed subtest that is a variation of the WISC-V Cancellation subtest, which reduces the reliance on categorical reasoning and semantic processing ability relative to the WISC-V version of the subtest

Information about the development of these new subtests that provides insight into the test development process appears in the Behind the Scenes boxes in Chapter 2 of this book.

Dropped Subtests

Five subtests were removed from the WISC-IV Integrated complement prior to WISC-V Integrated development. These subtests were removed for varying reasons.

- Block Design Process Approach was removed because the clinically useful procedures and scores from this subtest were incorporated into the WISC-V version of Block Design and can be obtained organically there.
- Elithorn Mazes was dropped because there are various other measures of executive functioning ability in other related measures (e.g., NEPSY–Second Edition [Korkman, Kirk, & Kemp, 2007]).
- Visual Digit Span was removed because a measure of visual working memory, Picture Span, now appears on the WISC-V.

- Letter Span and Letter-Number Sequencing Process Approach had very similar demands to two existing WISC-V subtests—Digit Span and Letter-Number Sequencing—and so were removed.

Retained Subtests

Eleven WISC-IV Integrated subtests were retained. Rapid Reference 1.3 lists the retained subtests and examples of changes made to those subtests. The revisions are more specifically detailed in Chapters 2 and 3 of this book.

Rapid Reference 1.3

Retained Subtests and Changes

Subtest	Changes
Similarities Multiple Choice	• New and revised items, response options, and scoring criteria • Updated with more child-appropriate and contemporary questions • Reduced total items and shorter discontinue rule
Vocabulary Multiple Choice	• New and revised items, response options, and scoring criteria • Updated art for picture items • Reduced total items and shorter discontinue rule
Picture Vocabulary Multiple Choice	• New and revised items, response options, and scoring criteria • Updated art with similar "footprint" (profile size) for all response options • Reduced total items and shorter discontinue rule
Information Multiple Choice	• New and revised items, response options, and scoring criteria • Updated with more child-appropriate and contemporary questions • Reduced total items and shorter discontinue rule
Comprehension Multiple Choice	• New and revised items, response options, and scoring criteria • Updated with more child-appropriate and contemporary questions • Reduced total items and shorter discontinue rule • Eliminated use of the word *advantages* in items

Subtest	Changes
Block Design Multiple Choice	• New and revised items and response options • Updated art with improved perspective • New items to extend the ceiling • Reduced total items and shorter discontinue rule
Arithmetic Process Approach	• New and revised items • Eliminated references to currency and English units of measurement • Reduced total items and shorter discontinue rule
Written Arithmetic	• New and revised items • Revised format of items in response booklet (each placed in a box) • Discontinue rule created • Removed subtest time limit and enacted general 30-second rule
Spatial Span	• All new trials • Increased trials to improve gradient and ceiling • Board manipulative redesigned with letters instead of numbers on examiner's side to use as cues to ease user friendliness of item presentation and scoring • Overall subtest score created
Coding Recall	• Added Form A for ages 6–7 • New and revised shapes and symbols • Included new pairing condition for each form (Shape-Symbol Pairing and Digit-Symbol Pairing)
Coding Copy	• Added Form A for ages 6–7 • New symbols • Added time bonus

Subtest Descriptions and Expert References on Constructs Measured and Abilities Engaged

Rapid Reference 1.4 provides a description of all subtests, reproduced by permission from the test publisher. New subtests are indicated with an asterisk. Rapid Reference 1.5 provides information on the constructs and abilities thought to be involved with each subtest.

Rapid Reference 1.4

Subtest Abbreviations and Descriptions

Subtest	Abbreviation	Description
Similarities Multiple Choice	SIMC	SIMC is a multiple-choice adaptation of the WISC-V Similarities subtest. Each item and its response options are presented visually and read aloud. The child selects the response option that best represents how the common objects or concepts are similar.
Vocabulary Multiple Choice	VCMC	VCMC is a multiple-choice adaptation of the WISC-V Vocabulary subtest. For picture items, the child views pictures and selects the best response from options read aloud. For verbal items, each item and its response options are presented visually and read aloud. The child selects the response option that best represents the definition of the word.
Picture Vocabulary Multiple Choice	PVMC	PVMC is a pictorial multiple-choice adaptation of the WISC-V Vocabulary subtest. The child views four pictures and selects the picture that best depicts the definition of the word that is read aloud.
Information Multiple Choice	INMC	INMC is a multiple-choice adaptation of the WISC-V Information subtest. Each item and its response options are presented visually and read aloud. The child selects the response option that best represents an understanding of the general knowledge topic.
Comprehension Multiple Choice	COMC	COMC is a multiple-choice adaptation of the WISC-V Comprehension subtest. Each item and its response options are presented visually and read aloud. The child selects the response option that best represents an understanding of the general principle or social situation.
Block Design Multiple Choice	BDMC	BDMC is a multiple-choice variation of the WISC-V Block Design subtest. The child views a picture of a constructed block design and selects the pictured block set that produces a matching composition, within a specified time limit.

Subtest	Abbreviation	Description
Figure Weights Process Approach*	FWP	FWP is an adaptation of the WISC-V Figure Weights subtest in which the child is given additional time to respond. Within an extended time limit, the child is readministered Figure Weights items previously scored 0 points.
Arithmetic Process Approach	ARP	ARP is an adaptation of the WISC-V Arithmetic subtest in which Items 6–34 are presented in multiple modalities for the child to solve within a specified time limit. For Part A, Arithmetic items on which the child scored 0 points are presented visually and simultaneously read aloud. For Part B, the child is provided pencil and paper and is readministered the items scored 0 points in Part A.
Written Arithmetic	WA	WA is an adaptation of the WISC-V Arithmetic subtest. The child is presented with the mathematical computations for Arithmetic items and uses a pencil to complete them.
Spatial Span	SSP	SSP is composed of two tasks: Forward and Backward. For Spatial Span Forward, the child reproduces a sequence of tapped blocks. For Spatial Span Backward, the child reproduces a sequence of tapped blocks, in reverse order.
Sentence Recall*	SR	SR items are composed of two tasks: a question task and a recall task. For the question task, the child responds either "yes" or "no" to one or more simple questions. For the recall task, the child recalls the last word of each question in the order presented.
Coding Recall	CDR	CDR provides more information about performance on the WISC-V Coding subtest. Working within a specified time limit and without a key, the child attempts to remember the corresponding pairs from Coding in three formats: cued recall, free recall, and pairing.

(*continued*)

Subtest	Abbreviation	Description
Coding Copy	CDC	CDC provides more information about performance on the WISC-V Coding subtest. The child copies symbols within a specified time limit.
Cancellation Abstract*	CAA	CAA is a variation of the WISC-V Cancellation subtest. Working within a specified time limit, the child scans two arrangements of shapes (one random, one structured) and marks target shapes.

*New subtest

Source: Table 1.1 of the WISC-V Integrated Administration and Scoring Manual. Used with permission. Wechsler Intelligence Scale for Children, Fifth Edition Integrated (WISC-V Integrated). Copyright © 2015 NCS Pearson, Inc. Reproduced with permission. All rights reserved. "Wechsler Intelligence Scale for Children" and "WISC" are trademarks, in the US and/or other countries, of Pearson Education, Inc. or its affiliates(s).

Rapid Reference 1.5

Subtest Constructs and Abilities

Subtest	Constructs and Abilities
Similarities Multiple Choice	• Designed to measure: verbal reasoning and concept formation • Decreased demands relative to WISC-V Similarities: verbal expression and memory retrieval • Possibly increased demands relative to WISC-V Similarities: receptive language skills, reading skills, decision-making skills, and working memory • Related to: crystallized ability, associative and categorical thinking, Gf-I (induction), concept recognition and generation • May also involve: auditory perception

Subtest	Constructs and Abilities
Vocabulary Multiple Choice	• Designed to measure: word knowledge, verbal concept formation, semantic memory • Decreased demands relative to WISC-V Vocabulary: verbal expression and memory retrieval • Possibly increased demands relative to WISC-V Vocabulary: receptive language skills, reading skills, decision-making skills, and working memory • Related to: crystallized ability, Gc-VL (lexical knowledge), fund of knowledge, learning, verbal expression, long-term semantic memory, vocabulary development • May also involve: auditory perception, auditory comprehension, abstract thinking, receptive vocabulary
Picture Vocabulary Multiple Choice	• Designed to measure: word knowledge, verbal concept formation, receptive vocabulary • Decreased demands relative to WISC-V Vocabulary: verbal expression, memory retrieval, receptive language • Possibly increased demands relative to WISC-V Vocabulary: visual perception, decision-making skills, working memory • Related to: crystallized ability, Gc-VL (lexical knowledge), fund of knowledge, learning, long-term memory, visual comprehension, visual-verbal association formation • May also involve: visual perception, auditory comprehension
Information Multiple Choice	• Designed to measure: acquisition, retention, and retrieval of general facts and knowledge • Decreased demands relative to WISC-V Information: verbal expression and memory retrieval • Possibly increased demands relative to WISC-V Information: receptive language skills, reading skills, decision-making skills, and working memory • Related to: crystallized ability, Gc-K0 (general information), and retention and retrieval of learned information, Glr • May also involve: auditory perception, verbal expression
Comprehension Multiple Choice	• Designed to measure: verbal reasoning, verbal conceptualization, verbal comprehension, verbal expression, practical knowledge, judgment

(*continued*)

Subtest	Constructs and Abilities
Comprehension Multiple Choice (*continued*)	• Decreased demands relative to WISC-V Comprehension: verbal expression and memory retrieval • Possibly increased demands relative to WISC-V Comprehension: receptive language skills, reading skills, decision-making skills, and working memory • Related to: crystallized ability (Gc), understanding of societal standards and conventional behavior, social judgment, Glr, common sense • May also involve: auditory perception
Block Design Multiple Choice	• Designed to measure: visual spatial processing, analysis and synthesis of abstract visual stimuli, mental imaging • Decreased demands relative to WISC-V Block Design: relaying response to motor channels, motor skills • Possibly increased demands relative to WISC-V Block Design: decision-making skills, working memory • Related to: Gv-SR (spatial relations), Gv-Vz (visualization), Gv-CS (closure speed), mental rotation, nonverbal reasoning, visual perception, simultaneous processing, problem-solving, cognitive flexibility, planning
Figure Weights Process Approach	• Designed to measure: quantitative fluid reasoning and intelligence, inductive reasoning • Decreased demands relative to WISC-V Figure Weights: speeded performance • Related to: Gf-I, Gf-RQ, simultaneous and successive processing, problem-solving, cognitive flexibility • May also involve: working memory, math problem-solving, math computation
Arithmetic Process Approach	• Designed to measure: quantitative, fluid, and logical reasoning, mental manipulation • Decreased demands relative to WISC-V Arithmetic: attention, auditory working memory, short-term memory, auditory discrimination, auditory comprehension • Possibly increased demands relative to WISC-V Arithmetic: reading, graphomotor • Related to: Gf-RQ, sequential processing, working memory, quantitative knowledge, applied computation, logical reasoning • May also involve: auditory discrimination

Subtest	Constructs and Abilities
Written Arithmetic	• Designed to measure: numerical reasoning ability, acquired knowledge of mathematical calculations, math computation • Decreased demands relative to WISC-V Arithmetic: attention, mental efficiency, verbal aspects of cognitive arithmetic, math problem-solving • Possibly increased demands relative to WISC-V Arithmetic: reading, graphomotor • Related to: Gf-RQ, sequential processing, working memory, quantitative knowledge, applied computation, logical reasoning, calculation skills, counting skills, math facts retrieval • May also involve: working memory, knowledge of mathematical symbols and syntax, order of operations knowledge
Spatial Span	• Designed to measure: visual spatial working memory • Related to: Gsm-MW (working memory capacity), Gsm-MS (memory span), Gv-MV (visual memory), attention and attentional capacity, simultaneous and successive processing, planning and metacognition, visual immediate memory spatial locations, response inhibition • May also involve: motor integration and programming, motor and self-regulation, cognitive flexibility, mental alertness, primacy effects, recency effects
Sentence Recall	• Designed to measure: auditory working memory with cognitive processing, working memory capacity • Related to: storage during cognitive processing, reactivation of attention
Coding Recall	• Designed to measure: incidental learning, associative memory • Decreased demands relative to WISC-V Coding: graphomotor speed, timed performance • Possibly increased demands relative to WISC-V Coding: associative memory • Related to: short-term visual recall and recognition memory and learning ability • May also involve: visual-motor skills, procedural learning

(*continued*)

Subtest	Constructs and Abilities
Coding Copy	• Designed to measure: speed, fluency, and efficiency of processing; performance fluency, graphomotor speed, perceptual speed, visual-motor integration • Decreased demands relative to WISC-V Coding: incidental learning, associative memory • Possibly increased demands relative to WISC-V Coding: graphomotor speed • Related to: selective and sustained attention, visual scanning and tracking, response inhibition • May also involve: visual-motor skills
Cancellation Abstract	• Designed to measure: processing speed; speed, fluency, and efficiency of processing; performance fluency • Decreased demands relative to WISC-V Cancellation: categorical knowledge, visual immediate memory • Possibly increased demands relative to WISC-V Coding: response inhibition • Related to: Gs-P (perceptual speed), speed and efficiency, simultaneous processing, planning and metacognition, selective and sustained attention, visual scanning and tracking, visual immediate memory, response inhibition • May also involve: visual-motor skills

Sources: Cardoso, Branco, Cotrena, and Fonseca (2015); Carroll (1993); Demakis, Sawyer, Fritz, and Sweet (2001); Flanagan and Alfonso (2017); Flanagan, Alfonso, and Ortiz (2012); Flanagan, Alfonso, Ortiz, and Dynda (2010); Gagnon and Belleville (2011); Goldstein and Green (1995); Groeger, Field, and Hammond (1999); Groth-Marnat (2009); Joy, Fein, Kaplan, and Freedman (1999); Joy, Kaplan, and Fein (2003); Kreiner and Ryan (2001); Lezak, Howieson, Bigler, and Tranel (2012); Lichtenberger and Kaufman (2013); Mainela-Arnold, Misra, Miller, Poll, and Park (2012); McCloskey (2009); McCloskey and Maerlender (2005); Milberg, Hebben, and Kaplan (1986); Miller (2010, 2013); Miller and Jones (2016); Sattler (2008); Sattler, Dumont, and Coalson (2016); Schneider and McGrew (2012); Schroeder (2014); Service and Maury (2015); Smyth and Scholey (1992).

Subtest Score Types

The test includes 18 scaled scores and a host of raw scores that are converted to base rates. These are discussed in detail in Chapter 3. The raw scores may indicate maximum performance on a span or recall task, the number of errors

of a certain type committed on a given task, or the number of times a specific behavior is observed during a subtest. These scores are discussed in further detail in Chapter 3.

Composite Scores

There are two composite scores in the published test. They are listed, with their abbreviations (used in some tables in this book and throughout the published manuals), in Rapid Reference 1.6.

Rapid Reference 1.6

Published Composite Score Abbreviations

Composite Score	Abbreviation
Multiple Choice Verbal Comprehension Index	MCVCI
Visual Working Memory Index	VWMI

TEST STRUCTURE

The WISC-V Integrated has 14 subtests. Eight subtests (i.e., Similarities Multiple Choice, Vocabulary Multiple Choice, Picture Vocabulary Multiple Choice, Information Multiple Choice, Comprehension Multiple Choice, Figure Weights Process Approach, Arithmetic Process Approach, and Written Arithmetic) are adaptations of WISC-V subtests. An adaptation subtest includes the same item content as the corresponding WISC-V subtest, but the presentation mode, response method, and/or item administration procedure has been modified. Two subtests (Block Design Multiple Choice and Cancellation Abstract) are variations of the WISC-V subtests. A variation subtest is a task that is closely related to a WISC-V subtest in a clinically useful manner. It has item content that does not correspond to that on a WISC-V subtest, and the presentation mode, response method, and/or administration procedure has been modified. Two subtests (Coding Recall and Coding Copy) are designed to clarify WISC-V Coding performance. Two subtests (Spatial Span and Sentence Recall) are included solely to improve the breadth of working memory construct coverage.

Each composite score is derived from two subtests. No substitution is permitted when deriving these scores. The Visual Working Memory Index requires

a subtest scaled score from the WISC-V, Picture Span, to be summed with the Spatial Span scaled score.

Figure 1.1 depicts the test framework. The cognitive domains corresponding to the subtests appear in the first column in black font. Because several of the WISC-V Integrated subtests are adaptations or variations, some of the WISC-V subtests appear in gray font in the second column. The third column lists the WISC-V Integrated subtests, in most cases next to the corresponding WISC-V

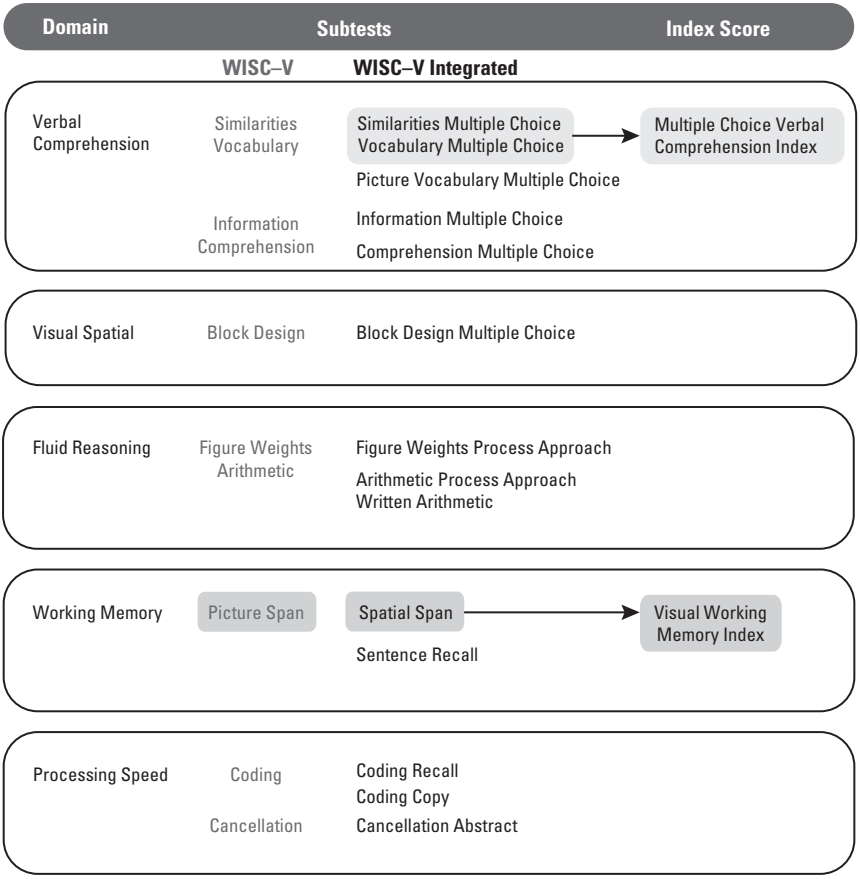

Figure 1.1 Test Structure

Source: Wechsler Intelligence Scale for Children, Fifth Edition Integrated (WISC-V Integrated). Copyright © 2015 NCS Pearson, Inc. Reproduced with permission. All rights reserved. "Wechsler Intelligence Scale for Children" and "WISC" are trademarks, in the US and/or other countries, of Pearson Education, Inc. or its affiliates(s).

subtest for which it is an adaptation or variation. The subtests used to derive the two index scores appear in gray fill, and an arrow designates the index score to which they contribute.

NEW ESSENTIALS COMPOSITE SCORES

There are a number of Essentials composite scores provided in this book and the accompanying interpretive program. The Essentials composite scores were developed based on specific theoretical approaches and practical considerations. The norms for these index scores are available in the *WISC-V Integrated Interpretive Assistant 1.0* that is included with the online resources for this book. Rapid Reference 1.7 provides a summary of the subtest composition of the new Essentials composite scores. Supporting technical evidence for these additional index scores is provided in Chapter 4 of this book.

Rapid Reference 1.7

Subtest Composition of Essentials Composite Scores

Essentials Composite Score	Acronym	Contributing Subtests
Expanded Visual Spatial Index	EVSI	• Block Design* • Visual Puzzles* • Block Design Multiple Choice
Expanded Working Memory Index	EWMI	• Digit Span* • Picture Span* • Letter-Number Sequencing* • Spatial Span • Sentence Recall
Expanded Processing Speed Index	EPSI	• Coding* • Symbol Search* • Cancellation* • Coding Copy • Cancellation Abstract

(*continued*)

Essentials Composite Score	Acronym	Contributing Subtests
Expanded Auditory Working Memory Index	EAWMI	• Digit Span* • Letter-Number Sequencing* • Sentence Recall
Nonexpressive Expanded Crystallized Index	NEECI	• Similarities Multiple Choice • Vocabulary Multiple Choice • Information Multiple Choice • Comprehension Multiple Choice
Nonexpressive General Verbal Information	NEGc-K0	• Information Multiple Choice • Comprehension Multiple Choice • Picture Concepts*
Nonexpressive Induction	NEGf-I	• Similarities Multiple Choice • Matrix Reasoning* • Picture Concepts*
Nonexpressive Fluid-Crystallized	NEGf-Gc	• Vocabulary Multiple Choice • Information Multiple Choice • Matrix Reasoning* • Figure Weights*
Nonexpressive Full Scale Score	NEFSS	• Similarities Multiple Choice • Vocabulary Multiple Choice • Matrix Reasoning* • Figure Weights* • Block Design* • Picture Span* • Coding*
Nonmotor Visual Spatial Index	NMVSI	• Block Design Multiple Choice • Visual Puzzles*
Nonmotor Nonverbal Index	NMNVI	• Block Design Multiple Choice • Visual Puzzles* • Matrix Reasoning* • Figure Weights* • Picture Span*

Essentials Composite Score	Acronym	Contributing Subtests
Nonmotor General Ability Index	NMGAI	• Similarities* • Vocabulary* • Block Design Multiple Choice • Matrix Reasoning* • Figure Weights*
Nonmotor Full Scale Score	NMFSS	• Similarities* • Vocabulary* • Block Design Multiple Choice • Matrix Reasoning* • Figure Weights* • Digit Span* • Naming Speed Quantity* (converted to scaled score)

*= WISC-V subtest.

VALIDITY

The evidence of WISC-V Integrated validity is discussed in this section.

Intercorrelation Studies

The WISC-V Integrated was developed to examine the cognitive processes and behaviors that are associated with WISC-V performance. Therefore, structural validity studies evaluated the correlations with the WISC-V and also the intercorrelations of the WISC-V Integrated scores.

The average correlations of the WISC-V Integrated subtest scores, grouped by domain, and selected WISC-V index scores appear in Table 1.1.

The data in Table 1.1 show that when the WISC-V Integrated subtest scores are grouped by cognitive domain, the average correlations are highest with the corresponding index scores from the same cognitive domain. For example, the average correlation of the WISC-V Integrated Verbal Comprehension subtests (i.e., SIMC, VCMC, PVMC, INMC, COMC) are more highly correlated with the Verbal Comprehension Index than with any of the other index scores. These results demonstrate that the WISC-V Integrated subtests are measuring cognitive

Table 1.1 Average Correlations of WISC-V Integrated Subtest Score Groups and Selected WISC-V Index Scores

	WISC-V Integrated Subtest Score Group			
WISC-V Index Score	Verbal Comprehension	Fluid Reasoning	Working Memory	Processing Speed
Verbal Comprehension Index	**.58**	.58	.39	.25
Visual Spatial Index	.41	.54	.42	.27
Fluid Reasoning Index	.44	**.60**	.39	.22
Working Memory Index	.41	.54	**.49**	.30
Processing Speed Index	.28	.37	.34	**.40**
Quantitative Reasoning Index		**.75**		
Auditory Working Memory Index			**.49**	

Note: Bold denotes average correlation of the subtest score group with index scores from the same cognitive domain. Subtest score groups are Verbal Comprehension = SIMC, VCMC, PVMC, INMC, COMC; Fluid Reasoning = FWP, ARPa (Arithmetic Process Approach Part A), ARPb (Arithmetic Process Approach Part B), WA; Working Memory = SSP, SSPf (Spatial Span Forward), SSPb (Spatial Span Backward), SR; Processing Speed = CDC, CAA, CAAr (Cancellation Abstract Random), CAAs (Cancellation Abstract Structured). The WISC-V Integrated Visual Spatial subtest score group is not included because that domain has only one subtest score, BDMC.

processes that are relevant to WISC-V performance. Moreover, the relations of the WISC-V Integrated subtest scores are highly related with WISC-V performance beyond the WISC-V subtest level; the relations extend to the WISC-V index level.

It is also noteworthy that Table 5.1 in the Technical and Interpretive Manual indicates that the MCVCI correlates .69 with the WISC-V Verbal Comprehension Index, and the VWMI correlates .83 and .65 with the WISC-V Working Memory Index and Auditory Working Memory Index, respectively. These data suggest that the WISC-V Integrated index scores and the WISC-V index scores in the same cognitive domain are measuring similar constructs.

The average correlations of the WISC-V Integrated adaptation and variation subtest scores with their corresponding paired WISC-V subtests, grouped by domain, appear in Table 1.2.

The data in Table 1.2 show that the WISC-V Integrated adaptation and variation subtest scores are highly correlated with their corresponding subtest scores. For example, the average correlation of the WISC-V Integrated

Table 1.2 Average Correlations of Pairs of WISC-V Integrated Adaptation and Variation Subtests and Corresponding WISC-V Subtests, by Cognitive Domain

WISC-V Integrated Subtests	Average Correlation With Corresponding WISC-V Subtests
Verbal Comprehension	.59
Visual Spatial	.49
Fluid Reasoning	.77
Processing Speed	.53

Note: Pairs are Verbal Comprehension = SIMC–Similarities, VCMC–Vocabulary, PVMC–Vocabulary, INMC–Information, COMC–Comprehension; Visual Spatial: BDMC–BD; Fluid Reasoning = FWP–FW, ARPa (Arithmetic Process Approach Part A)–Arithmetic, ARPb (Arithmetic Process Approach Part B)–Arithmetic, WA–Arithmetic; Processing Speed = CDC–Coding, CAA–Cancellation, CAAr (Cancellation Abstract Random)–Cancellation Random, CAAs (Cancellation Abstract Structured)–Cancellation Structured. The Working Memory domain is not included because Spatial Span and Sentence Recall are not adaptation or variation subtests.

Verbal Comprehension adaptation subtests with their paired subtest from the WISC-V (i.e., SIMC–Similarities, VCMC–Vocabulary, PVMC–Vocabulary, INMC–Information, COMC–Comprehension) is .59. These results demonstrate that the WISC-V Integrated subtests are measuring cognitive processes that are relevant to performance on their corresponding paired WISC-V subtest.

The average correlations of the WISC-V Integrated score groups with the WISC-V score groups, by cognitive domain, appear in Table 1.3.

The data in Table 1.3 show that the WISC-V Integrated score groups are generally most correlated with the WISC-V score group of the same domain. For example, the average correlation of the WISC-V Integrated Processing Speed score group with the WISC-V Processing Speed score group is .42, and the average correlations of the WISC-V Integrated Processing Speed score group with all other WISC-V score groups is lower. These results demonstrate that the WISC-V Integrated subtests are measuring cognitive processes that are relevant to performance on the subtests from the corresponding WISC-V domain.

In two cases, the WISC-V score groups share a similar correlation with their corresponding WISC-V Integrated score groups and with another WISC-V

Table 1.3 Average Correlations of WISC-V Integrated and WISC-V Score Groups, by Cognitive Domain

	WISC-V Score Group				
WISC-V Integrated Score Group	Verbal Comprehension	Visual Spatial	Fluid Reasoning	Working Memory	Processing Speed
Verbal Comprehension	**.51**	.36	.39	.34	.19
Visual Spatial	.35	**.48**	.38	.27	.20
Fluid Reasoning	.52	.47	**.52**	.44	.23
Working Memory	.34	.37	.35	**.39**	.21
Processing Speed	.21	.24	.21	.25	**.42**

Note: Bold denotes average correlation of the WISC-V Integrated subtest score groups with the WISC-V subtest score groups from the same cognitive domain. WISC-V Integrated groups are Verbal Comprehension = SIMC, VCMC, PVMC, INMC, COMC; Visual Spatial = Block Design Multiple Choice; Fluid Reasoning = FWP, ARPa (Arithmetic Process Approach Part A), ARPb (Arithmetic Process Approach Part B), WA; Working Memory = SSP, SSPf (Spatial Span Forward), SSPb (Spatial Span Backward), SR; Processing Speed = CDC, CAA, CAAr (Cancellation Abstract Random), CAAs (Cancellation Abstract Structured). WISC-V groups are Verbal Comprehension = Similarities, Vocabulary, Information, Comprehension; Visual Spatial = Block Design, Block Design No Time Bonus, Visual Puzzles; Fluid Reasoning = Matrix Reasoning, Figure Weights, Picture Concepts, Arithmetic; Working Memory = Digit Span, Digit Span Forward, Digit Span Backward, Picture Span, Letter-Number Sequencing; Processing Speed = Coding, Symbol Search, Cancellation, Cancellation Random, Cancellation Structured.

Integrated score group. For example, the WISC-V Verbal Comprehension score group correlates about the same with the WISC-V Integrated Fluid Reasoning score group and with the WISC-V Verbal Comprehension score group. An examination of Table 5.1 in the Technical and Interpretive Manual indicates that this is because of the strong relationship of Figure Weights Process Approach and Arithmetic Process Approach with the WISC-V Verbal Comprehension subtests. This is most likely because of the shared high *g* loading of these tasks.

The correlation of the WISC-V Working Memory score group with the WISC-V Integrated Fluid Reasoning group is slightly higher than that with the WISC-V Integrated Working Memory score group. A closer look at Table 5.1 in the Technical and Interpretive Manual suggests this is because WISC-V Digit Span and Letter-Number Sequencing are highly correlated with the Arithmetic tasks, which share numerical stimuli, and each places demands on working memory.

Standardization and Psychometric Properties

The normative information is based on a national sample of 550 children. It was collected starting in April 2013 through October 2014. It was selected to match proportions from 2012 US Census data and is stratified according to age, sex, race-ethnicity, parent education level, and US geographic region. Eleven age groups were created, with 50 children in each age group.

Reliability

Internal consistency and test-retest stability studies were conducted and provide evidence of reliability. A summary of results appears in Rapid Reference 1.8.

Rapid Reference 1.8

Average Reliability Coefficients of WISC-V Integrated Scores

WISC-V Integrated Score	Internal Consistency	Test-Retest Stability
Similarities Multiple Choice	.79	.80
Vocabulary Multiple Choice	.84	.72
Picture Vocabulary Multiple Choice	.85	.80
Information Multiple Choice	.86	.84
Comprehension Multiple Choice	.77	.70
Block Design Multiple Choice	.83	.74
Figure Weights Process Approach	.93	.74
Arithmetic Process Approach Part A	.93	.85
Arithmetic Process Approach Part B	.93	.86
Written Arithmetic	.88	.85
Spatial Span	.89	.76
Spatial Span Forward	.80	.72
Spatial Span Backward	.81	.69
Sentence Recall	.89	.80
Coding Copy	.83	.82
Cancellation Abstract	.85	.84
Cancellation Abstract Random	.82	.83
Cancellation Abstract Structured	.81	.80
Multiple Choice Verbal Comprehension Index	.87	.72
Visual Working Memory Index	.90	.91

Source: Data are from the Technical and Interpretive Manual, Tables 4.1 and 4.5.

The average reliability coefficient for the Multiple Choice Verbal Comprehension Index is .87 and for the Visual Working Memory Index is .90. The reliability coefficients for the subtest-related scores range from .77 for Comprehension Multiple Choice to .93 for Figure Weights Process Approach and for Arithmetic Process Approach Parts A and B. The reliability coefficients within age groups are similar.

A subset of the normative sample ($N = 128$) provided retest reliability data. Results showed the average stability coefficients across all ages for the index scores were .72 for the Multiple Choice Verbal Comprehension Index and .91 for the Visual Working Memory Index. The highest overall average subtest-related stability coefficient was .86 for Arithmetic Process Approach Part B, and the lowest was .69 for Spatial Span Backward.

Loadings on the General Factor

General intelligence, or *g* (Spearman, 1927) can be derived by several methods. For the purposes of this book, *g* is calculated using the subtest factor loadings on the first unrotated factor in a principal components analysis. Factor loadings of .70 or greater are classified as good measures of *g*, loadings of .50–.69 are classified as fair, and loadings below .50 are classified as poor. Squaring the subtest *g* loading provides the proportion of variance attributable to *g*.

Lichtenberger and Kaufman (2004) noted that the meaning of *g* loadings and of the concept of general intelligence has been the subject of much discussion and debate. That debate continues to the present day (Kaufman, Reynolds, Liu, Kaufman, & McGrew, 2012; McFarland, 2012; Reynolds, 2013; te Nijenhuis, van Vianen, & van der Flier, 2007). It therefore is important, as Lichtenberger and Kaufman (2004) state, not to interpret a subtest with a good *g* loading as representing the child's general intellectual ability.

A subset of the subtest-related scaled scores' *g* loadings was examined. To avoid redundancy, not all scores were included. The *g* loading, strength of each score as a measure of *g*, and proportion of variance for each score attributed to *g* are provided in Rapid Reference 1.9. The subtests are listed in descending order with respect to *g* loading.

Most of the selected subtest-related scores are good or fair measures of *g*; only the Processing Speed subtests are poor. The strongest *g* loadings occur on the Verbal Comprehension and Fluid Reasoning domains. All Fluid Reasoning scores are good measures of *g*. These results are typical of the pattern observed in *g* loadings of the Wechsler intelligence scales.

Rapid Reference 1.9

Score *g* Loadings, Strength as Measures of *g*, and Proportions of Variance Attributed to *g*

Score	*g* Loading	Strength as Measure of *g*	Proportion of Variance Attributed to *g*
Arithmetic Process Approach Part A	.84	good	.71
Arithmetic Process Approach Part B	.83	good	.69
Information Multiple Choice	.76	good	.58
Vocabulary Multiple Choice	.73	good	.53
Written Arithmetic	.72	good	.52
Picture Vocabulary Multiple Choice	.71	good	.50
Figure Weights Process Approach	.71	good	.50
Similarities Multiple Choice	.63	fair	.40
Sentence Recall	.59	fair	.35
Spatial Span	.57	fair	.32
Comprehension Multiple Choice	.56	fair	.31
Block Design Multiple Choice	.54	fair	.29
Coding Copy	.40	poor	.16
Cancellation Abstract	.38	poor	.14

Note: All *g* loadings of .70 or above are considered good, .50–.69 are considered fair, and loadings below .50 are considered poor.

COMPREHENSIVE TEST REFERENCES

The WISC-V Integrated Administration and Scoring Manual and the WISC-V Integrated Technical and Interpretive Manual (Wechsler & Kaplan, 2015) currently provide the most detailed information about the WISC-V Integrated. These manuals review the scale's development, subtest descriptions, item- and subtest-level administration and scoring rules, standardization, and evidence of reliability and validity. Rapid Reference 1.10 provides basic information on the WISC-V Integrated and the test publisher, Pearson. *Essentials of WISC-IV Assessment* (Flanagan & Kaufman, 2009) provides some information about administration, scoring, and interpretation of the prior edition, the WISC-IV Integrated (Wechsler et al., 2004).

Rapid Reference 1.10

- Title: *Wechsler Intelligence Scale for Children–Fifth Edition Integrated (WISC-V Integrated)*
- Authors: David Wechsler and Edith Kaplan
- Publication date: 2015
- Age range: 6:0–16:11
- What the test measures: cognitive processes and problem-solving skills associated with the WISC-V Verbal Comprehension, Visual Spatial, Fluid Reasoning, Working Memory, and Processing Speed subtests
- Administration time: Varies
- Qualification of examiners: C level
- Publisher: Pearson
  5601 Green Valley Drive
  Bloomington, MN 55437
  Customer Service: (800) 627–7271
  www.PsychCorp.com
- Product number: 0158008413
- WISC-V Integrated Kit: includes Administration and Scoring Manual, Technical and Interpretive Manual, Stimulus Books 1 and 2, 25 Record Forms, 25 Response Booklet #1, 25 Response Booklet #2, Spatial Span Board, Coding Recall Scoring Key, and Cancellation Abstract Scoring Template
- Price: $305 (in box)

TEST YOURSELF

1. **Who pioneered the Boston process approach to psychological assessment?**
   a. David Wechsler
   b. Alan S. Kaufman
   c. Edith Kaplan and colleagues
   d. Heinz Gruber
   e. Bill Jobs
2. **Which of the following subtests are used to compute the Multiple Choice Verbal Comprehension Index?**
   a. Information Multiple Choice and Similarities Multiple Choice
   b. Similarities Multiple Choice and Vocabulary Multiple Choice

c. Similarities Multiple Choice, Vocabulary Multiple Choice, Information Multiple Choice, and Comprehension Multiple Choice
d. Similarities Multiple Choice, Vocabulary Multiple Choice, and Information Multiple Choice

3. Which of the following subtests are used to compute the Visual Working Memory Index?

a. Arithmetic Process Approach and Spatial Span
b. Written Arithmetic and Spatial Span
c. Spatial Span and Sentence Recall
d. Spatial Span and Picture Span

4. Which is a retained subtest from the WISC-IV Integrated?

a. Sentence Recall
b. Cancellation Abstract
c. Picture Vocabulary Multiple Choice
d. Figure Weights Process Approach

5. Which subtest is *not* a measure of verbal comprehension?

a. Information Multiple Choice
b. Sentence Recall
c. Vocabulary Multiple Choice
d. Comprehension Multiple Choice

Answers (1) c (2) b (3) d (4) c (5) b

REFERENCES

Boxer, O., Jackson, K., & Kohlman, S. (2014). B-31 problem-solving weaknesses in children with nonverbal learning differences. *Archives of Clinical Neuropsychology*, *29*(6), 547.

Cardoso, C. O., Branco, L. D., Cotrena, C., & Fonseca, R. P. (2015). Correlational analysis of performance in executive function tasks after stroke. *Psychology & Neuroscience*, *8*(1), 56–65. doi:10.1037/h0101021

Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies*. Cambridge, UK: Cambridge University Press.

Delis, D. C., Kaplan, E., & Kramer, J. H. (2001). *Delis-Kaplan executive function system*. Bloomington, MN: Pearson.

Delis, D. C., Kramer, J. H., Kaplan, E., & Ober, B. A. (1994). *California verbal learning test—Children's version*. Bloomington, MN: Pearson.

Delis, D. C., Kramer, J. H., Kaplan, E., & Ober, B. (2000). *California verbal learning test* (2nd ed.). Bloomington, MN: Pearson.

Demakis, G. J., Sawyer, T. P., Fritz, D., & Sweet, J. J. (2001). Incidental recall on WAIS-R digit symbol discriminates Alzheimer's and Parkinson's diseases. *Journal of Clinical Psychology*, *57*(3), 387–394.

Flanagan, D. P., & Alfonso, V. C. (2017). *Essentials of WISC-V assessment*. Hoboken, NJ: John Wiley & Sons.

Flanagan, D. P., Alfonso, V. C., & Ortiz, S. O. (2012). The cross-battery assessment approach: An overview, historical perspective, and current directions. In D. P. Flanagan & P. L.

Harrison (Eds.), *Contemporary intellectual assessment: Theories, tests, and issues* (3rd ed., pp. 459–483). New York, NY: Guilford Press.

Flanagan, D. P., Alfonso, V. C., Ortiz, S. O., & Dynda, A. M. (2010). Integrating cognitive assessment in school neuropsychological evaluations. In D. C. Miller (Ed.), *Best practices in school neuropsychology: Guidelines for effective practice, assessment, and evidence-based intervention* (pp. 101–140). Hoboken, NJ: John Wiley & Sons.

Flanagan, D. P., & Kaufman, A. S. (2009). *Essentials of WISC-IV assessment* (2nd ed.). Hoboken, NJ: John Wiley & Sons.

Floyd, R. G., & Kranzler, J. H. (2012). Processing approaches to interpretation of information from cognitive ability tests. In D. P. Flanagan & P. L. Harrison (Eds.), *Contemporary intellectual assessment: Theories, tests, and issues* (3rd ed., pp. 497–525). New York, NY: Guilford Press.

Gagnon, L. G., & Belleville, S. (2011). Working memory in mild cognitive impairment and Alzheimer's disease: Contribution of forgetting and predictive value of complex span tasks. *Neuropsychology*, *25*(2), 226–236. doi:10.1037/a0020919

Goldstein, F. C., & Green, R. C. (1995). Assessment of problem-solving and executive functions. In R. L. Mapou & J. Spector (Eds.), *Clinical neuropsychological assessment: A cognitive approach* (pp. 49–81). New York, NY: Plenum.

Groeger, J. A., Field, D., & Hammond, S. M. (1999). Measuring memory span. *International Journal of Psychology*, *34*, 359–363.

Groth-Marnat, G. (2009). *Handbook of psychological assessment* (5th ed.). New York, NY: John Wiley & Sons.

Guilford, J. P. (1967). *The nature of human intelligence*. New York, NY: McGraw-Hill.

Halleland, H. E., Sorensen, L., Posserud, M.-B., Haavik, J., & Lundervold, A. J. (2015). Occupational status is compromised in adults with ADHD and psychometrically defined executive function deficits. *Journal of Attention Disorders*. Advance online publication. doi:10.1177/1087054714564622

Hoffmann, N., Donders, J., & Thompson, E. H. (2000). Novel learning abilities after traumatic head injury in children. *Archives of Clinical Neuropsychology*, *15*, 47–58.

Horn, J. L. (1989). Cognitive diversity: A framework for learning. In P. L. Ackerman, R. J. Sternberg, & R. Glaser (Eds.), *Learning and individual differences* (pp. 61–116). New York, NY: Freeman.

Joy, S., Fein, D., Kaplan, E., & Freedman, M. (1999). Information multiple choice among healthy older adults: Characteristics, correlates, and clinical implications. *The Clinical Neuropsychologist*, *13*, 48–53.

Joy, S., Kaplan, E., & Fein, D. (2003). Digit Symbol-Incidental learning in the WAIS–III: Construct validity and clinical significance. *The Clinical Neuropsychologist*, *17*, 182–194.

Kaplan, E. (1988). A process approach to neuropsychological assessment. In T. J. Boll & B. K. Bryant (Eds.), *Clinical neuropsychology and brain function: Research, measurement, and practice* (pp. 129–167). Washington, DC: American Psychological Association.

Kaplan, E., Fein, D., Kramer, J., Delis, D., & Morris, R. (1999). *Wechsler intelligence scale for children–Third edition as a process instrument*. Bloomington, MN: Pearson.

Kaplan, E., Fein, D., Morris, R., & Delis, D. C. (1991). *Wechsler adult intelligence scale–Revised as a neuropsychological instrument*. San Antonio, TX: The Psychological Corporation.

Kaplan, E., Goodglass, H., & Weintraub, S. (1983). *Boston naming test*. Philadelphia, PA: Lea & Febiger.

Kaufman, A. S. (1979). *Intelligent testing with the WISC-R*. New York, NY: John Wiley & Sons.

Kaufman, A. S. (1994). *Intelligent testing with the WISC-III*. New York, NY: John Wiley & Sons.

Kaufman, A. S., & Lichtenberger, E. O. (1999). *Essentials of WAIS-III assessment*. New York, NY: John Wiley & Sons.
Kaufman, A. S., & Lichtenberger, E. O. (2000). *Essentials of WISC-III and WPPSI-R assessment*. New York, NY: John Wiley & Sons.
Kaufman, A. S., & Lichtenberger, E. O. (2002). *Assessing adolescent and adult intelligence* (2nd ed.). Boston, MA: Allyn & Bacon.
Kaufman, A. S., Raiford, S. E., & Coalson, D. L. (2016). *Intelligent testing with the WISC-V*. Hoboken, NJ: John Wiley & Sons.
Kaufman, S. B., Reynolds, M. R., Liu, X., Kaufman, A. S., & McGrew, K. S. (2012). Are cognitive *g* and academic *g* one and the same *g*? An exploration on the Woodcock-Johnson and Kaufman tests. *Intelligence*, *40*, 123–138. doi:10.1016/j.intell.2012.01.009
Korkman, M., Kirk, U., & Kemp, S. (2007). *NEPSY-II*. Bloomington, MN: Pearson.
Kramer, J. H., Knee, K., & Delis, D. C. (2000). Verbal memory impairments in dyslexia. *Archives of Clinical Neuropsychology*, *15*, 83–93.
Kreiner, D. S., & Ryan, J. J. (2001). Memory and motor skill components of the WAIS-III Digit Symbol–Coding subtest. *The Clinical Neuropsychologist*, *15*, 109–113.
Leach, L., Kaplan, E., Rewilak, D., Richards, B., & Proulx, G. (2000). *Kaplan-Baycrest neurocognitive assessment*. San Antonio, TX: The Psychological Corporation.
Lezak, M. D., Howieson, D. B., Bigler, E. D., & Tranel, D. (2012). *Neuropsychological assessment* (5th ed.). New York, NY: Oxford University Press.
Lichtenberger, E. O., & Kaufman, A. S. (2004). *Essentials of WPPSI-III assessment*. Hoboken, NJ: John Wiley & Sons.
Lichtenberger, E. O., & Kaufman, A. S. (2013). *Essentials of WAIS-IV assessment* (2nd ed.). Hoboken, NJ: John Wiley & Sons.
Mainela-Arnold, E., Misra, M., Miller, C., Poll, G. H., & Park, J. S. (2012). Investigating sentence processing and language segmentation in explaining children's performance on a sentence-span task. *International Journal of Language & Communication Disorders*, *47*(2), 166–175. doi:10.1111/j.1460-6984.2011.00080.x
Mayfield, A., Reyes, A., Mayfield, J., & Allen, D. (2014). C-44 improvement in executive function following traumatic brain injury in children. *Archives of Clinical Neuropsychology*, *29*(6), 590.
McCloskey, G. (2009). The WISC-IV integrated. In D. P. Flanagan & A. S. Kaufman (Eds.), *Essentials of WISC®-IV assessment* (2nd ed., pp. 310–467). Hoboken, NJ: John Wiley & Sons.
McCloskey, G., & Maerlender, A. (2005). The WISC-IV integrated. In A. Prifitera, D. H. Saklofske, & L. G. Weiss (Eds.), *WISC-IV clinical use and interpretation: Scientist-practitioner perspectives* (pp. 101–149). Burlington, MA: Elsevier Academic Press.
McFarland, D. J. (2012). A single *g* factor is not necessary to simulate positive correlations between cognitive tests. *Journal of Clinical Experimental Neuropsychology*, *34*, 378–384.
McLean, R. L., Johnson, H. A., Zimak, E., Joseph, R. M., & Morrow, E. M. (2014). Executive function in probands with autism with average IQ and their unaffected first-degree relatives. *Journal of the American Academy of Child and Adolescent Psychiatry*, *53*(9), 1001–1009.
Milberg, W. P., Hebben, N., & Kaplan, E. (1986). The Boston Process Approach to neuropsychological assessment. In I. Grant & K. M. Adams (Eds.), *Neuropsychological assessment of neuropsychiatric disorders* (pp. 65–80). New York, NY: Oxford University Press.
Miller, D. C. (2010). *Best practices in school neuropsychology: Guidelines for effective practice, assessment, and evidence-based intervention*. Hoboken, NJ: John Wiley & Sons.
Miller, D. C. (2013). *Essentials of school neuropsychological assessment* (2nd ed.). Hoboken, NJ: John Wiley & Sons.

Miller, D., & Jones, A. M. (2016). Interpreting the WISC-V from Dan Miller's integrated school neuropsychological/Cattell-Horn-Carroll model. In A. S. Kaufman, S. E. Raiford, & D. L. Coalson (Eds.), *Intelligent testing with the WISC-V* (pp. 459–492). Hoboken, NJ: John Wiley & Sons.

Osgood, C. E. (1957). A behavioristic analysis of perception and language as cognitive phenomena. In J. S. Bruner, E. Brunswick, E. Festinger, K. F. Muenzinger, C. E. Osgood, & D. Rapaport (Eds.), *Contemporary approaches to cognition* (pp. 75–118). Cambridge, MA: Harvard University Press.

Reynolds, M. R. (2013). Interpreting the *g* loadings of intelligence test composite scores in light of Spearman's law of diminishing returns. *School Psychology Quarterly*, *28*(1), 63–76. doi:10.1037/spq0000013

Sattler, J. M. (2008). *Assessment of children: Cognitive foundations* (5th ed.). San Diego, CA: Author.

Sattler, J. M., Dumont, R., & Coalson, D. L. (2016). *Assessment of children: WISC-V and WPPSI-IV*. San Diego, CA: Author.

Schneider, W. J., & McGrew, K. S. (2012). The Cattell- Horn-Carroll model of intelligence. In D. P. Flanagan & P. L. Harrison (Eds.), *Contemporary intellectual assessment: Theories, tests, and issues* (3rd ed., pp. 99–144). New York, NY: Guilford Press.

Schroeder, P. J. (2014). The effects of age on processing and storage in working memory span tasks and reading comprehension. *Experimental Aging Research: An International Journal Devoted to the Scientific Study of the Aging Process*, *40*(3), 308–331.

Service, E., & Maury, S. (2015). Differential recall of derived and inflected word forms in working memory: Examining the role of morphological information in simple and complex working memory tasks. *Frontiers in Human Neuroscience*, *8*(Article 1064), 1–16. doi:10.3389/fnhum.2014.01064

Silver, L. B. (1993). Introduction and overview to the clinical concepts of learning disabilities. *Child and Adolescent Psychiatric Clinics of North America*, *2*, 181–192.

Smyth, M. M., & Scholey, K. A. (1992). Determining spatial span: The role of movement time and articulation rate. *Quarterly Journal of Experimental Psychology: Human Experimental Psychology*, *45A*, 479–501.

Spearman, C. E. (1927). *The abilities of man: Their nature and measurement*. London, UK: Macmillan.

te Nijenhuis, J., van Vianen, A.E.M., & van der Flier, H. (2007). Score gains on *g*-loaded tests: No *g*. *Intelligence*, *35*, 283–300.

Wechsler, D. (1944). *The measurement and appraisal of adult intelligence*. Baltimore, MD: Williams & Wilkins.

Wechsler, D. (1958). *The measurement and appraisal of adult intelligence* (4th ed.). Baltimore, MD: Williams & Wilkins.

Wechsler, D. (1981). *Wechsler adult intelligence scale* (revised ed.). New York, NY: The Psychological Corporation.

Wechsler, D. (1991). *Wechsler intelligence scale for children* (3rd ed.). San Antonio, TX: The Psychological Corporation.

Wechsler, D. (2003). *Wechsler intelligence scale for children* (4th ed.). Bloomington, MN: Pearson.

Wechsler, D. (2014). *Wechsler intelligence scale for children* (5th ed.). Bloomington, MN: Pearson.

Wechsler, D., & Kaplan, E. (2015). *Wechsler intelligence scale for children integrated* (5th ed.). Bloomington, MN: Pearson.

Wechsler, D., Kaplan, E., Fein, D., Kramer, J., Morris, R., Delis, D., & Maerlender, A. (2004). *Wechsler intelligence scale for children integrated* (4th ed.). Bloomington, MN: Pearson.

Werner, H. (1937). Process and achievement: A basic problem of education and developmental psychology. *Harvard Educational Review*, *7*, 353–368.