

# Cognitive Assessment

## Overview of Instruments

Assessing cognitive functioning in students identified with or suspected of having autism (AU) can yield valuable data that inform instruction through identification of a pattern of strengths and weaknesses, thus giving insight into learning styles and preferences. This, in turn, can help a multidisciplinary team develop comprehensive instructional programs.

The following is a list of measures spanning all age ranges and levels of cognitive functioning. Nonverbal measures are included as they may be appropriate for students demonstrating limited language ability or limited English proficiency. Measures used to assess various types of cognitive processing and executive functions have also been included, as results of such assessment can facilitate a cross-battery analysis of cognitive processes and positively impact instructional decision-making.

### **Behavior Rating Inventory of Executive Function (BRIEF)**

The Behavior Rating Inventory of Executive Function (BRIEF; Gioia, Isquith, Guy, & Kenworthy, 2000) is an individualized, norm-referenced measure of executive function behaviors designed for school-aged students from 5 to 18 years of age. The BRIEF is a questionnaire that is completed by parents or teachers (two different forms), who rate behaviors related to executive functions in eight scales (Inhibit, Shift, Emotional Control, Initiate, Working Memory, Plan/Organize, Organization of Materials, and Monitor).

Results of the scales are combined to generate two index scores, Behavioral Regulation/BRI (based on three scales) and Metacognition/MI (based on five scales), and an overall composite score, the Global Executive Composite/GEC. Standardization of the BRIEF included individuals with a variety of developmental or neurological conditions, allowing for use of the inventory with a broad range of students. A Self-Report Form is also available for use with students 13

through 18 years of age, the Behavior Rating Inventory of Executive Function-Self-Report Version (BRIEF–SR; Guy, Isquith, & Gioia, 2005).

### **Behavior Rating Inventory of Executive Function – Preschool Version (BRIEF-P)**

The Behavior Rating Inventory of Executive Function-Preschool Version (BRIEF-P; Gioia, Espy, & Isquith, 2003) is an individualized, norm-referenced measure of executive function behaviors for preschool-aged children from 2 years to 5 years-11 months of age. The BRIEF-P, a questionnaire designed to be completed by parents or teachers (single form), rates behaviors related to various executive functions observed in the home and in the preschool setting in five scales (Inhibit, Shift, Emotional Control, Working Memory, and Plan/Organize). Items are rated on a Likert scale (never, sometimes, often) comparing the significance of the child’s behaviors to those of other children of the same age over a specified period of time.

Results of the scales are combined to generate three index scores, Inhibitory Self-Control, Flexibility, and Emergent Metacognition (each based on two scales), and an overall composite score, the Global Executive Composite/GEC. Standardization of the BRIEF-P included individuals with a variety of developmental or neurological conditions and children considered at risk, allowing for use of the inventory with a broad range of students. Use of the BRIEF-P may facilitate early identification of children with potential problems in areas of self-regulation.

### **Comprehensive Test of Nonverbal Intelligence (CTONI)**

The Comprehensive Test of Nonverbal Intelligence (CTONI; Hammill, Pearson, & Wiederholt, 1997) measures the nonverbal reasoning abilities of individuals aged 6-0 to 18-11. No oral responses, reading, writing, or manipulation of objects are required. The CTONI is useful for testing individuals with difficulties in language or fine-motor skills, including those who are bilingual, non-English-speaking, or have motor or neurological disabilities. The test can be administered orally or through pantomime.

The six subtests of the CTONI require subjects to view a group of pictures or designs and to solve problems involving analogies, categorizations, and sequences. The viewer simply indicates an answer by pointing to the answer. A computer-administered version of the test is available, the CTONI-CA. This is an interactive multimedia test that can be taken entirely on a computer. The program gives all the instructions using a human voice; the examinee points the mouse and clicks on the answer.

### **Comprehensive Test of Phonological Process (CTOPP)**

The Comprehensive Test of Phonological Processes (CTOPP; Wagner, Torgesen, & Rashotte, 1999) is an individually administered, norm-referenced measure of phonological awareness, phonological memory, and rapid naming, all foundational skill areas that are critical in learning to read. One form of the CTOPP is administered to children aged 5 and 6 years, focusing on the skills generally needed in kindergarten and first grade. It consists of seven core subtests and one supplemental subtest. A second form for individuals, ages 7 through 24 years consists of six core subtests and eight supplemental subtests.

The purposes of the CTOPP include identifying students who are behind in developing phonological skills and determining which skills have not been acquired or adequately developed. The supplemental tests allow for assessing specific strengths and weaknesses related to phonological processes. Subtests include subtests to measure rapid naming, blending and segmenting words and non-words, sound matching, and memory for digits. All subtests and composites (Phonological Awareness, Phonological Memory, and Rapid Naming) are reported in scaled scores, standard scores, and percentiles.

### **Das Naglieri Cognitive Assessment System (CAS)**

The Das Naglieri Cognitive Assessment System (CAS; Naglieri & Das, 1997) is an individually administered measure of cognitive ability designed to assess Planning, Attention, and Simultaneous and Successive (PASS) processes in individuals 5 years to 24 years-11 months old. Planning tasks require the test taker to develop an approach to solving a task in an efficient and

effective manner. Attention tasks require the individual to selectively attend to one and ignore the other aspect of a two-dimensional stimulus. Simultaneous tasks require the individual to interrelate the component parts of a particular item to arrive at the correct answer. Finally, successive tasks require the individual to either reproduce a particular sequence of events or answer questions that require correct interpretation of the linearity of events.

There are 8 subtests in the Basic Battery and 12 subtests in the Standard Battery. The CAS may be used for diagnosis, eligibility, determination of discrepancies, reevaluation, and instructional planning.

### **Detroit Tests of Learning Aptitude – Fourth Edition (DTLA-4)**

The Detroit Tests of Learning Aptitude-Fourth Edition (DTLA-4; Hammill, 1998) is an individually administered measure of mental ability for individuals 6 to 17 years of age. It includes 10 subtests that may be combined to form 16 composites measuring both general intelligence and discrete ability areas. This test not only measures basic abilities but also shows the effects of language, attention, and motor abilities on test performance.

The DTLA-4 yields an Overall Composite comprised of standard scores of all 10 subtests in the battery. This composite is probably the best estimate of general intelligence. The Optimal Level Composite includes the four highest standard scores on the subtests and is the best estimate of a person's overall "potential." The Domain Composites are contrasting composites provided for three domains: language, attention, and manual dexterity. DTLA-4 includes the following: Verbal Composite, Nonverbal Composite, Attention-Enhanced Composite, Attention-Reduced Composite, Motor-Enhanced Composite, and Motor-Reduced Composite.

### **Differential Ability Scales – Second Edition (DAS-II)**

The Differential Ability Scales-Second Edition (DAS-II; Elliott, 2007) is an individually administered norm-referenced battery of cognitive subtests for children and adolescents ages 2-6 through 17-11. Although most cognitive measures are truly language-free, the DAS-II controls for language loading by providing a special Nonverbal Index, and can be used easily

with very young children and English Language Learners. It consists of two overlapping batteries, the Early Years Battery and the School-Age Battery. Several subtests within each battery can be used out of level for individuals working above or below typical levels by age.

The DAS-II yields (a) a composite score focused on reasoning and conceptual abilities, the General Conceptual Ability (GCA) score; (b) lower-level composite scores called cluster scores; and (c) diverse, specific-ability measures, including the core subtests, which comprise the GCA and diagnostic subtests. Verbal Ability measures the child's acquired verbal concepts and knowledge. Nonverbal Ability represents complex, nonverbal, inductive reasoning requiring mental processing. Spatial Ability measures complex visual processing. Diagnostic Clusters include Working Memory, Processing Speed, and School Readiness. The DAS-II yields *t*-scores for subtests and standard scores and percentiles for cluster and index scores and the GCA.

### **Kaufman Assessment Battery for Children – Second Edition (KABC-II)**

The Kaufman Assessment Battery for Children-Second Edition (KABC-II; Kaufman & Kaufman, 2004) is an individually administered measure of the cognitive processing abilities of children and adolescents aged 3 through 18. The KABC-II is a theory-based clinical instrument that contributes to culturally fair assessment. The KABC-II offers two global summaries: the Fluid-Crystallized Index (FCI), which includes all five scales, and the Mental Processing Index (MPI), which includes the first four scales but not the Knowledge/Crystallized Ability Scale. The test manual states: "Measures of Gc (general cognition) should be excluded from any score that purports to measure a person's intelligence or overall cognitive ability whenever the measure of Gc is not likely to reflect that person's level of ability."

The KABC-II offers a Nonverbal Scale (NVI), which yields a nonverbal index to assess the processing and cognitive abilities of children with whom a nonverbal measure of cognitive ability is appropriate. The Sequential Processing/Short-Term Memory Scale is designed to measure the ability to solve problems by remembering and using an ordered series of images or ideas. The Simultaneous/Visual Processing Scale measures the ability to solve spatial, analogical, or organizational problems that require the processing of many stimuli at one time. The Learning Ability/Long-Term Storage and Retrieval Scale

measures the ability to successfully complete different types of learning tasks. Immediate recall and delayed recall tasks are included in this scale. The Planning/Fluid Reasoning Scale measures the ability to solve nonverbal problems that are different from the kinds taught in school. Verbally mediated reasoning must be used to solve the problems. The Knowledge/Crystallized Ability Scale measures knowledge of words and facts using both verbal and pictorial stimuli and requiring either a verbal or pointing response.

### **Leiter International Performance Scale – Revised (LEITER-R)**

The Leiter International Performance Scale-Revised (Leiter-R; Roid & Miller, 1998) is a standardized, individually administered, nonverbal test designed to assess cognitive functions in children and adolescents ages 2-0 to 20-11 years. The Leiter-R includes two groupings of subtests: the Visualization and Reasoning Battery with 10 subtests of nonverbal intellectual ability related to visualization, reasoning, and spatial ability; and the Attention and Memory Battery with 10 subtests of nonverbal attention and memory function.

The Fluid Reasoning composite is comprised of subtests that show evidence of providing a unique fluid measure of seriation, reasoning, and pattern generation. The Full IQ score represents a measure of general nonverbal intelligence. The IQ is the sum of the subtests that compose the IQ estimate, and the subtests represented vary depending on the age of the student. The IQ score includes diverse aspects of cognition and is comprised of highly correlated subtests to obtain a single measure of intellectual ability.

### **NEPSY – Second Edition (NEPSY-II)**

The NEPSY-II (Korkman, Kirk, & Kemp, 2007) is a comprehensive instrument designed to assess neuropsychological development in preschool and school-age children from 3 years to 16 years, 11 months. It has a strong theoretical foundation that emphasizes the interrelatedness of brain operations. The full assessment evaluates six domains, including Executive Function and Attention, Language, Memory and Learning, Sensorimotor, Visuospatial Processing, and Social Perception. The Social Perception domain has been added to the original NEPSY. It includes

Affect Recognition and Theory of Mind, which would be beneficial particularly for children with possible AU. Performance is reported in standard (scaled) scores, process scores, and percentiles. Behavioral observations are presented as cumulative percentages or base rates.

### **Stanford-Binet Intelligence Scales – Fifth Edition (SBS)**

The Stanford-Binet-Fifth Edition (SB5; Roid, 2003) provides comprehensive coverage of five factors of cognitive ability: Fluid Reasoning, Quantitative Reasoning, Visual-Spatial Reasoning, Working Memory, and Knowledge. The SB5 scoring provides a Full Scale IQ score, a Nonverbal IQ score, and a Verbal IQ score, which are reported in standard scores and percentiles and can be used to assess individuals from 2 years of age through 85 years.

The SB5 Nonverbal IQ (NVIQ) is based on the nonverbal subtests of the five-factor index scales. It measures skills in solving abstract, picture-oriented problems; recalling facts and figures; solving quantitative problems shown in picture form; assembling designs; and recalling tapping sequences. The NVIQ measures the general ability to reason, solve problems, visualize, and recall information presented in pictorial, figural, and symbolic form, as opposed to information presented in the form of words and sentences.

The SB5 Verbal IQ (VIQ) provides a composite of all the cognitive skills required to solve the items in the five verbal subtests. The VIQ measures general ability to reason, solve problems, visualize, and recall important information presented in words and sentences (printed and spoken). In addition, it reflects the examinee's ability to explain verbal response clearly, present rationale for response choices, create stories, and explain spatial directions. General verbal ability, measured by VIQ, is one of the most powerful predictors of academic success in classrooms, because of the heavy reliance on language, reading, and writing.

Fluid Reasoning is the ability to solve verbal and nonverbal problems using inductive or deductive reasoning. Quantitative Reasoning is an individual's facility with numbers and numerical problem solving, whether word problems or picture relationships. Activities in the SB5 emphasize applied problem solving more than specific mathematical knowledge acquired

through school learning. Visual-Spatial Processing measures an individual's ability to see patterns and relationships. Working Memory is a class of memory processes in which diverse information stored in short-term memory is inspected, sorted, or transformed. Knowledge is a person's accumulated fund of general information acquired at home, school, or work. Also called crystallized ability, it involves learned material such as vocabulary that has been acquired and stored in long-term memory. Verbal knowledge subtests fall under the narrow abilities of Lexical Knowledge and General Knowledge.

### **Universal Nonverbal Intelligence Test (UNIT)**

The Universal Nonverbal Intelligence Test (UNIT; Bracken & McCallum, 1998) is a set of individually administered tasks that measure the general intelligence and cognitive abilities of children and adolescents from ages 5 through 17 years who may be disadvantaged by traditional verbal and language-loaded measures. As such, the UNIT provides a comprehensive assessment of general intelligence.

The UNIT offers three administration options: abbreviated battery (2 subtests), standard battery (4 subtests), and extended battery (6 subtests). The Nonverbal Intelligence Quotient (NIQ) is, in most instances, the best index for measuring the ability to solve problems, or to reason, not requiring words. The Nonverbal Quotient (NIQ) measures three cognitive abilities (analogical reasoning, categorical classifying, and sequential reasoning), all assessed in two contexts (pictorial objects and geometric designs). The Memory Quotient is an index of attending, organizing, encoding, storing, and recalling information and experiences. The Reasoning Quotient provides a measurement of thinking skills, including the ability to use information to solve problems. The Symbolic Quotient measures symbolic processing or mediation. Symbolic mediation represents the verbal component of a nonverbal task. The Nonsymbolic Quotient measures abilities of perception, recognition, sequencing, organization, and integration. These skills encompass all aspects of cognition including reasoning and memory. Subtest scores are reported in standard scores and percentiles.

## **Wechsler Abbreviated Scale of Intelligence (WASI)**

The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) is an individually administered, brief intelligence scale consisting of either two or four subtests designed to be used with individuals age 6 to 89. Subtests (from the WISC-IV and WAIS-III) are Vocabulary, Block Design, Similarities, and Matrix Reasoning. Subtest raw scores are converted to *t*-scores (mean of 50 and a standard deviation of 10). If two subtests are given, a Full Scale IQ (reported as a standard score) can be derived. If four subtests are given, a Verbal IQ, Performance IQ, and Full Scale IQ can be derived. The manual states that, “The WASI is appropriate for screening, estimating IQ when a full evaluation is not possible, reevaluations when time is limited, research estimates of IQ, and other situations when a more comprehensive evaluation is not needed or not possible.”

## **Wechsler Adult Intelligence Scale – Third Edition (WAIS III)**

The Wechsler Adult Intelligence Scale-Third Revision (WAIS-III; Wechsler, 1997) is an individually administered, standardized test designed to measure general intelligence, or the overall ability of the individual “to act purposefully, to think rationally and to deal effectively with his environment” (Wechsler, 1999, p. 3). The WAIS-III covers an age range from 16 to 89 years. It contains 14 subtests, each yielding scaled scores with a mean of 10 and a standard deviation of 3. From these subtest scores, the WAIS-III provides three separate intelligence quotients (IQs): a Verbal Scale IQ, a Performance Scale IQ, and a Full Scale IQ. Alternately, it may be scored using the Full Scale IQ and the four Index Scores model used with the WISC-IV (Verbal Comprehension Index, Perceptual Organization Index, Working Memory Index, and Processing Speed Index).

## **Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV)**

The Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV; Wechsler, 2003) provides a measure of general intellectual functioning (Full Scale Intelligence Quotient [FSIQ]) and four index scores. It can be used to assess individuals between the ages of 6 and 16 years, 11

months. Its framework is based on theory and supported by clinical research and factor-analytic results. The four index scores are the Verbal Comprehension Index (VCI), the Perceptual Reasoning Index (PRI), the Working Memory Index (WMI), and the Processing Speed Index (PSI). The WISC-IV consists of 10 core subtests and five supplemental subtests. The VCI is composed of subtests measuring verbal abilities utilizing reasoning, comprehension, and conceptualization. The PRI is composed of subtests measuring perceptual reasoning and organization. The WMI is composed of subtests measuring attention, concentration, and working memory. The PSI is composed of subtests measuring the speed of mental and graphomotor processing.

Take note that the Wechsler Individual Achievement Test, Second Edition (WIAT-II) was co-normed with the WISC-IV.

### **Wechsler Intelligence Scale for Children – Fourth Edition Integrated (WISC-IV Integrated)**

The Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV Integrated; Kaplan, Fein, Kramer, Delis, & Morris, 2004) enhances the WISC-IV by adding 16 process subtests, as well as qualitative and quantitative observations and error scores. The addition of more measures of cognitive processes allows for a broader definition of intelligence for individuals aged 6 years through 16-11. All or selected process subtests may be used when a low scaled score is obtained on a corresponding subtest or when a child displays inconsistent or atypical performance. Results may be used to investigate low scores and identify strengths and weaknesses in the corresponding areas.

To supplement the Verbal domain (VCI on WISC-IV), subtests include (a) Similarities Multiple Choice, (b) Vocabulary Multiple Choice, (c) Picture Vocabulary Multiple Choice, (d) Comprehension Multiple Choice, and (e) Information Multiple Choice. To supplement the Performance domain (PRI on WISC IV), subtests include (a) Block Design Multiple Choice, (b) Block Design Process Approach, and (c) Elithorn Mazes. The six process subtests that enhance the Working Memory domain (WMI on WISC IV) include (a) Visual Digit Span, (b) Spatial Span,

(c) Letter Span, (d) Letter-Number Sequencing Process Approach, and (e) Elithorn Mazes. Finally, process subtests used to enhance the Processing Speed (PSI on WISC-IV) include Coding Recall and Coding Copy.

### **Wechsler Nonverbal Scale of Ability (WNV)**

The Wechsler Nonverbal Scale of Ability (WNV; Wechsler & Naglieri, 2006) is an individually administered test of nonverbal intelligence for individuals, ages 4 through 21 years. When language poses a barrier to typical administration, or if traditional intellectual assessment results are questionable due to language-related difficulties, the WNV is appropriate.

The WNV uses subtests to determine a full-scale measure of cognitive ability. The subtests yield a raw score that is converted to a *t*-score, allowing a student's performance to be compared to that of his peers. *T-scores* have a mean of 50 and a standard deviation of 10. The *t*-scores of the subtests are totaled and converted to a full-scale score that is a standard score, with a mean of 100 and a standard deviation of 15. The subtests consist of (a) Matrices, (b) Coding, (c) Spatial Span (a visual memory measure corresponding to the auditory task in Digit Span), (d) Spatial Span Forward, (e) Spatial Span Backwards, (f) Picture Arrangement, (g) Object Assembly, and (h) Recognition.

### **Wechsler Preschool and Primary Scale of Intelligence – Third Edition (WPPSI-III)**

The Wechsler Preschool and Primary Scale of Intelligence-Third Edition (WPPSI-III; Wechsler, 2002) is an individually administered, standardized instrument for assessing the intelligence of children aged 2-6 through 7-3. It includes short, game-like tasks that engage young children. The WPPSI-III provides a Full Scale IQ (FSIQ), Verbal IQ (VIQ), and Performance IQ (PIQ) for ages 2-6 through 3-11 using four subtests. For ages 4-0 through 7-3, seven subtests are used to yield a FSIQ, VIQ, and PIQ. Optional subtests may be given to obtain a General Language Composite for younger children or a Processing Speed Quotient for older children.

## **Wide Range Assessment of Memory and Learning – Second Edition**

The Wide Range Assessment of Memory and Learning-Second Edition (WRAML-2; Sheslow & Adams, 2004) is an individually administered measure of memory functions that may have a significant impact on learning and school-related problems. The WRAML-2 may be used with individuals from age 5 through 90. It provides a General Memory Index, three additional index scores (Verbal Memory, Visual Memory, and Attention and Concentration), and three supplemental index scores (Working Memory, Delayed Memory, and Recognition). Each index score is derived from performance on from two to four subtests, and all are reported in standard scores and percentile ranks. Standard scores have a mean of 100 and a standard deviation of 15.

## **Woodcock-Johnson Tests of Cognitive Abilities – Third Edition/Normative Update (WJ-III COG/NU)**

The Woodcock-Johnson III Tests of Cognitive Abilities (WJ-III COG/NU; Woodcock, McGrew, & Mather, 2005) is a comprehensive set of individually administered co-normed tests for measuring cognitive ability. The tests may be used from ages 2 through adult. The battery assesses general intellectual ability as well as specific cognitive abilities. Twenty individual tests and 20 Cluster scores provide broad estimates of cognitive abilities.

The Verbal Ability Cluster Score is a measure of language development that includes the comprehension of individual words and the comprehension of relationships among words. The Thinking Ability Cluster Score represents a sampling of the thinking processes that may be invoked when information in short-term memory cannot be processed automatically. The scale includes samples of long-term retrieval, visual-spatial thinking, auditory processing, and fluid reasoning. The Cognitive Efficiency Cluster is derived from a sampling of two factors of automatic cognitive processing, processing speed, and short-term memory.

## Summary of Cognitive Instruments

### Measures of Intelligence

Name of Tool/ Author (Year)	Age Range (in years)	Method of Administration/Format	Approximate Time to Administer	Subscales	Availability
Comprehensive Test of Nonverbal Intelligence (CTONI) Hammill, Pearson, & Wiederholt (1997)	6-91	Individually administered, norm-referenced measure of nonverbal reasoning; nonbiased measure for individuals with language, motor, other differences Yields standard scores, percentiles, age equivalents, composite scores	60 min.	Three Composites (Nonverbal IQ, Pictorial Nonverbal IQ, Geometric Nonverbal IQ), and 6 subtests (Pictorial & Geometric Analogies, Pictorial & Geometric Sequential Reasoning, Pictorial & Geometric Classification)	Pro-Ed <a href="http://www.proedinc.com/Customer/default.aspx">http://www.proedinc.com/Customer/default.aspx</a>
Comprehensive Test of Phonological Processes (CTOPP) Wagner, Torgesen, & Rashotte (1999)	5-25	Individually administered, norm-referenced measure of phonological awareness, phonological memory, and rapid naming (foundational reading skills); 2 forms (ages 5-6; ages 7-24) Yields standard scores, percentiles, age equivalents	30 min.	Phonological Awareness Quotient (PAQ); Phonological Memory Quotient (PMQ); Rapid Naming Quotient (RNQ)	Pro-Ed, Inc. <a href="http://www.proedinc.com/customer/productView.aspx?ID=1615&amp;SearchWord=CTOPP">http://www.proedinc.com/customer/productView.aspx?ID=1615&amp;SearchWord=CTOPP</a>
Das Naglieri Cognitive Assessment System (CAS) Naglieri & Das (1997)	5-25	Individually administered, norm-referenced measure of cognitive processes, based on PASS Theory (Planning, Attention, Simultaneous & Successive); 2 batteries (basic, standard) Yields scaled scores, standard scores, percentiles, age equivalents	45 min. – basic battery; 60 min. – standard battery	13 subtest scaled scores 4 processing scales – Planning (Matching Number, Planned Codes, Planned Connections); Attention (Expressive Attention, Visual Selective Attention, Receptive Attention); Simultaneous (Matrices, Simultaneous Verbal, Figure Memory); and Successive (Word Series, Sentence Repetition, Sentence Questions, Speech Rate) Composite score	Riverside Publishers <a href="http://www.riversidepublishing.com/products/cas/index.html">http://www.riversidepublishing.com/products/cas/index.html</a>

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Name of Tool/ Author (Year)	Age Range (in years)	Method of Administration/Format	Approximate Time to Administer	Subscales	Availability
Differential Ability Scales-Second Edition (DAS-II) Elliott (2007)	2.5-18	Individually administered, norm-referenced measure of cognitive abilities; aligned to the Cattell-Horn-Carroll (CHC) model; 20 subtests (core and diagnostic) in two overlapping batteries: Early Years (2-6 to 3-5 or 3-6 to 6-11) and School-Age (7-0 to 17-11) Yields <i>t</i> -scores and percentiles by age; <i>t</i> -scores convert to standard scores for the cluster and composite scores and for GCA	60-90 min.	2-6 to 3-5 yrs. – General Conceptual Ability (GCA) score, Verbal Ability and Nonverbal Ability Cluster Scores (considered Core Clusters); 3-6 to 17-11 – General Conceptual Ability (GCA) score; Verbal Ability, Nonverbal Reasoning Ability, and Spatial Ability Cluster Scores (Core Clusters); Special Nonverbal Composite; Diagnostic Cluster scores (5-0 to 17-11 years) – Working Memory and Processing Speed (5-0 to 8-11 years); School Readiness Cluster	Pearson Assessment & Information <a href="http://www.pearsonassessments.com/HAWEBCultures/en-us/Productdetail.htm?Pid=015-8338-820">http://www.pearsonassessments.com/HAWEBCultures/en-us/Productdetail.htm?Pid=015-8338-820</a>
Kaufman Assessment Battery for Children-Second Edition (KABC-II) Kaufman & Kaufman (2004)	3-18	Individually administered, norm-referenced measure of cognitive and processing ability; based on Luria’s processing model and the Cattell-Horn-Carroll (CHC) Model; 18 core and supplementary subtests; co-normed with the KTEA-II. Yields scaled scores and percentiles for subtests, standard scores and percentiles for index, and composite scores	30-75 min.	Luria Model – Sequential Index, Simultaneous Index, Planning Index, Learning Index, Knowledge Index, Mental Processing Index, Nonverbal Index CHC Model – Short Term Memory, Visual Processing, Long-term Storage and Retrieval, Fluid Reasoning, and Crystallized Ability, Fluid-Crystallized Index	Pearson Assessment & Information <a href="http://www.pearsonassessments.com/HAWEBCultures/en-us/Productdetail.htm?Pid=PAa21000">http://www.pearsonassessments.com/HAWEBCultures/en-us/Productdetail.htm?Pid=PAa21000</a>

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Leiter International Performance Scale-Revised (Leiter-R) Roid & Miller (1998)	2-21	Individually administered, norm-referenced measure of nonverbal cognition 20 subtests in 4 domains, 10 subtests in Visualization and Reasoning battery and 10 subtests in Attention and Memory battery; Instructions are pantomimed; three response formats – ordering response cards, arrangement of manipulative shapes, or pointing to correct response on an easel Yields scaled scores, standard scores	90 min. (approx. 40 min. per battery)	Visualization and Reasoning – VR Composite, Fluid Reasoning, Brief IQ, Fundamental Visualization, Spatial Visualization, Full Scale IQ Attention and Memory – AM Composite, Memory Screen, Associative Memory, Memory Span, Attention, Memory Process, Recognition Memory	Western Psychological Services <a href="http://portal.wpspublish.com/portal/page?_pageid=53.114601&amp;_dad=portal&amp;_schema=PORTAL">http://portal.wpspublish.com/portal/page?_pageid=53.114601&amp;_dad=portal&amp;_schema=PORTAL</a>
Stanford-Binet Intelligence Scales-Fifth Edition (SB5) Roid (2003)	2-80+	Individually administered, norm-referenced assessment of cognitive abilities; administered by clinician; routing tests for Nonverbal Fluid Reasoning and Verbal Knowledge to determine appropriate difficulty level. Yields scaled scores for 10 cognitive factors (verbal and nonverbal) and standard scores and percentiles for composite scores in 5 cognitive factors	5-10 min. per subtest (4 subtests at each level, both verbal (levels 3-6) and nonverbal (levels 2-6))	Verbal, Nonverbal, and Full Scale IQs; Index scores for each of the 5 Nonverbal and Verbal cognitive factors: Fluid Reasoning, Knowledge, Quantitative Reasoning, Visual-Spatial Processing, and Working Memory	Riverside Publishing <a href="http://www.riversidepublishing.com/products/sb5/index.html">http://www.riversidepublishing.com/products/sb5/index.html</a>
Universal Nonverbal Intelligence Test (UNIT) Bracken & McCallum (1998)	5-17	Individually administered norm-referenced measure of nonverbal intelligence; 3 batteries: abbreviated, standard, or extended; administered nonverbally; yields scaled scores, standard scores, percentiles	10-45 min. (abbreviated, standard, extended batteries)	Symbolic, Nonsymbolic, Memory (Symbolic Memory, Spatial Memory and Object Memory subtests), Reasoning (Cube Design, Analogic Reasoning, and Mazes subtests), Full Scale IQ	Riverside Publishing <a href="http://www.riversidepublishing.com/products/unit/index.html">http://www.riversidepublishing.com/products/unit/index.html</a>

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Name of Tool/ Author (Year)	Age Range (in years)	Method of Administration/Format	Approximate Time to Administer	Subscales	Availability
Wechsler Abbreviated Scale of Intelligence (WASI) Wechsler (1999)	6-89	Individually administered, norm-referenced brief measure of intelligence; clinician-administered; two forms; provides estimates of verbal and performance abilities Yields subtest scaled scores, standard scores, and percentiles	15-30 min.	Verbal IQ (Vocabulary, Similarities), Performance IQ (Matrix Reasoning, Block Design), Full Scale IQ	Pearson Assessment & Information <a href="http://www.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=015-8981-502">http://www.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=015-8981-502</a>
Wechsler Adult Intelligence Scale- Third Edition (WAIS-III) Wechsler (1997) [WAIS-IV–2008 release]	16-89	Individually administered, norm-referenced intellectual measure; 14 subtests: 9 core + 2 supplemental (Picture Arrangement, Comprehension) Yields traditional scoring (VIQ, PIQ, FSIQ); core subtests + 2 subtests (Symbol Search, Letter- Number Sequencing) yields four index scales (VCI, POI, WMI, PSI); Optional – Object Assembly Scoring – subtest scaled scores, standard scores and percentiles	60-90 min.	Verbal (Vocabulary, Similarities, Arithmetic, Digit Span, Information, Comprehension, Letter- Number Sequencing, Total); Performance (Picture Completion, Digit Symbol-Coding, Block Design, Matrix Reasoning, Picture Arrangement, Symbol Search, Object Assembly, Mazes, Total); Verbal Comp. Index, Perceptual Organization Index, Working Memory Index, Processing Speed Index, Total	Pearson Assessment & Information <a href="http://www.pearsonassessments.com/haiweb/cultures/en-us/productdetail.htm?pid=015-8980-808">http://www.pearsonassessments.com/haiweb/cultures/en-us/productdetail.htm?pid=015-8980-808</a>

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Name of Tool/ Author (Year)	Age Range (in years)	Method of Administration/Format	Approximate Time to Administer	Subscales	Availability
Wechsler Intelligence Scale for Children- Fourth Edition (WISC-IV) Wechsler (2003)	6-17	Individually administered, norm-referenced measure of cognitive abilities; administered by clinician; 10 core subtests; 5 alternate/ supplemental subtests Yields scaled scores for subtests, standard scores and percentiles for four index scales, base rates	65-90 min.	Processing Indices: Verbal Comp. Index (Similarities, Vocabulary, Comprehension, Information, Word Reasoning, Total); Perceptual Reasoning Index (Block Design, Picture Concepts, Matrix Reasoning, Picture Completion, Total); Working Memory Index (Digit Span, Letter-Number Sequencing, Arithmetic, Total); Processing Speed Index (Coding, Symbol Search, Cancellation, Total); Full Scale IQ (includes 7 Process scores, based on variations of Digit Span, Block Design, and Cancellation not used in composite scores)	Pearson Assessment & Information <a href="http://www.pearsonassessments.com/HAWEB/Cultures/en-us/Productdetail.htm?Pid=015-8979-044">http://www.pearsonassessments.com/HAWEB/Cultures/en-us/Productdetail.htm?Pid=015-8979-044</a>
Wechsler Nonverbal Scales of Ability (WNV) Wechsler & Naglieri (2006)	4-22	Individually administered, norm-referenced measure of nonverbal cognitive abilities; for use with individuals with language differences or diversity Yields t-scores, percentiles	2 subtest battery – 15- 20 min.; 4 subtest battery – 45 min.	Subtest t- scores/percentiles – Matrices, Coding, Object Assembly, Recognition, Spatial Span, Picture Arrangement; Full Scale IQ	Pearson Assessment & Information <a href="http://www.pearsonassessments.com/HAWEB/Cultures/en-us/Productdetail.htm?Pid=015-8338-499">http://www.pearsonassessments.com/HAWEB/Cultures/en-us/Productdetail.htm?Pid=015-8338-499</a>

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Name of Tool/ Author (Year)	Age Range (in years)	Method of Administration/Format	Approximate Time to Administer	Subscales	Availability
Wechsler Preschool and Primary Scales of Intelligence-Third Edition (WPPSI-III) Wechsler (2002)	2.5-7.25	Individually administered norm-referenced measure of intelligence, clinician-administered; 14 subtests in all, including lower-level subtests designated for children 2-6 through 3-11 years old Yields subtest scaled scores, standard scores, percentiles	30-60 min.	Verbal IQ (Receptive Vocabulary, Information, Picture Naming, Vocabulary, Word Reasoning, Comprehension, Similarities); Performance (Block Design, Object Assembly, Matrix Reasoning, Picture Concepts, Picture Completion); Processing Speed (Coding, Symbol Search); Global Language Composite	Pearson Assessment & Information <a href="http://www.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=015-8989-317">http://www.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=015-8989-317</a>
Woodcock-Johnson Tests of Cognitive Abilities-Third Edition/Normative Update (WJ-III COG/NU) Woodcock, McGrew, & Mather (2005)	2-90	Individually administered, norm-referenced measure of cognitive abilities; clinician-administered; 10 Standard + 10 extended subtests (e.g., information processing, planning, speed, memory, attention) based on C-H-C abilities Yields standard scores, percentiles; age/grade equivalents	60-90 min.	General Intellectual Ability, Verbal Ability, Thinking Ability, Cognitive Efficiency; Cognitive Long-Term Retrieval, Comp-Knowledge, Visual-Spatial Thinking, Auditory Processing, Fluid Reasoning, Proc. Speed, Short-Term Memory; Broad Attention, Phonemic Awareness, Working Memory, Cognitive Fluency, Executive Processes	Riverside Publishing <a href="http://www.riversidepublishing.com/products/wjiii/cognitive/index.html">http://www.riversidepublishing.com/products/wjiii/cognitive/index.html</a>

## Measures of Memory, Language and Executive Function

Name of Tool/ Author (Year)	Age Range (in years)	Method of Administration/Format	Approximate Time to Administer	Subscales	Availability
Behavior Rating Inventory of Executive Function (BRIEF) Gioia, Isquith, Guy, & Kenworthy (2000) (Also BRIEF–Self- Report; SR)	5-18	Individualized norm- referenced measure of executive function; Parent and Teacher rating forms Yields t-scores, percentiles, confidence intervals	10-15 min. per form; 20 min. to score	Behavioral Regulation Index (Inhibit, Shift, Emotional Control); Metacognitive Index (Initiate, Working Memory, Plan/Organize, Organization of Materials, Monitor)	Psychological Assessment Resources, Inc. <a href="http://www4.parinc.com/Products/Product.aspx?ProductID=BRIEF">http://www4.parinc.com/Products/Product.aspx?ProductID=BRIEF</a>
Behavior Rating Inventory of Executive Function- Preschool Version (BRIEF-P) Gioia, Espy, & Isquith (2003)	2.5-11	Individualized norm- referenced measure of executive function; single rating form for parents and teachers Yields t-scores, percentiles, confidence intervals	10-15 min.	Subscales (Inhibit, Shift, Emotional Control, Working Memory) form 3 broad index scores: Inhibitory Self-Control, Flexibility and Emergent Metacognition	Psychological Assessment Resources, Inc. <a href="http://www4.parinc.com/Products/Product.aspx?ProductID=BRIEF-P">http://www4.parinc.com/Products/Product.aspx?ProductID=BRIEF-P</a>
Detroit Tests of Learning Aptitude- Fourth Edition (DTLA-4) Hammill (1998)	6-17	Individually administered, norm-referenced measure of cognitive functions in language, attention and motor areas; designed to minimize the effects of bias; 10 subtests that form 16 composite scores Yields standard scores, percentiles	40 min. to 2 hrs.	Overall Composite Score (g), Optimal Level Composite (based on the 4 highest subtests); Domain composites: Verbal, Nonverbal, Attention-Enhanced, Attention-Reduced, Motor-Enhanced, Motor-Reduced. Theoretical Composites: Fluid Intelligence, Crystallized Intelligence, Associative Level, Cognitive Level, Simultaneous Processing, Synthesized Processing, Verbal Scale, Performance Scale	Pro-Ed, Inc. <a href="http://www.proedinc.com/customer/productView.aspx?ID=1435">http://www.proedinc.com/customer/productView.aspx?ID=1435</a>

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Name of Tool/ Author (Year)	Age Range (in years)	Method of Administration/Format	Approximate Time to Administer	Subscales	Availability
NEPSY, Second Edition (NEPSY-II) Korkman, Kirk, & Kemp (2007)	3-17	Individually administered (by clinician), norm-referenced measure of neurological status; 32 subtests across 6 domains – can select general assessment (brief), diagnostic and selective assessment (in-depth), or comprehensive (all subtests) Yields subtest scores, standard scores, process scores, and behavioral observations (cumulative percentages, base rates)	45-90 min. – preschool; 60-120 min. – school ages, depending on subtests selected	Executive Function, Language (includes Phonological Processing and Speeded Naming); Memory and Learning, Sensorimotor Functioning; Social Perception (including Affect Recognition and Theory of Mind); Visuospatial Processing	<p>Pearson Assessment &amp; Information  <a href="http://www.pearsonassessments.com/HTMLWEB/Cultures/en-us/Productdetail.htm?Pid=NEPSY-II&amp;Mode=summary">http://www.pearsonassessments.com/HTMLWEB/Cultures/en-us/Productdetail.htm?Pid=NEPSY-II&amp;Mode=summary</a></p>
Wide Range Assessment of Memory and Learning-Second Edition (WRAML-2) Sheslow & Adams (2004)	5-90	Individually administered, norm-referenced measure of memory functions, including working memory, delayed recall, and recognition memory; clinician-administered; six core tests and 11 optional subtests. Yields scaled scores, index scores (standard scores)	60-90 min.	Scaled scores for subtests (Story Memory, Verbal Learning, Design Memory, Picture Memory, Finger Windows, Number/Letter, Verbal Working Memory, Symbolic Working Memory); Verbal Memory Index, Visual Memory Index, Attention-Concentration Index, General Memory Standard Score (optional Delayed Recall, General Recognition, Working Memory)	<p>Psychological Assessment Resources, Inc. (PAR)  <a href="http://www4.parinc.com/Products/Product.aspx?ProductID=WRAML2">http://www4.parinc.com/Products/Product.aspx?ProductID=WRAML2</a></p>

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Name of Tool/ Author (Year)	Age Range (in years)	Method of Administration/Format	Approximate Time to Administer	Subscales	Availability
Wechsler Intelligence Scale for Children- Fourth Edition Integrated (WISC-IV Integrated) Kaplan, Fein, Kramer, Delis, & Morris (2004)	6-17	Individually administered, norm-referenced measure of cognitive ability and problem-solving processes; administered by clinician; includes the 10 core and 5 supplemental subtests of the WISC-IV plus additional process subtests; identifies underlying deficits in processing areas through 16 additional subtests with alternate administration methods (e.g., visual administration, auditory, recognition, multiple choice, scores with no time bonus, process approach) Yields scaled scores and base rates to compare with standard administration formats	Varies by subtest; from 3 to 20 min. per process test in addition to the 60-90 min. for the standard WISC-IV subtests	Expands WISC-IV index scores (VCI, PRI, WMI, PSI) and FSIQ; Process Subtests include multiple-choice formats (Similarities, Vocabulary, Picture Vocabulary, Comprehension, Information, and Block Design), process approach format (Block Design, Letter-Number Sequencing, Arithmetic), Elithorn Mazes, alternates to Digit Span (Visual Digit Span, Spatial Span [Forward and Backward], and Letter Span [Rhyming and No Rhyming]), Written Arithmetic, Coding Copy, and scoring with No Time Bonuses (Block Design, Multiple Choice Block Design, Elithorn Mazes, Arithmetic)	<p style="text-align: center;">Pearson Assessment &amp; Information  <a href="http://www.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=015-8982-800&amp;Mode=summary">http://www.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=015-8982-800&amp;Mode=summary</a></p>

## Research on Cognitive Assessment Instruments

Currently, there is little research on the use of these instruments with individuals with autism. Newer versions of the assessments, such as KABC-II and SB-5, include more detailed measures of cognitive and executive functioning than the previous versions of these assessments. The only research published on the new version of the Wechsler scales confirms that the pattern of scatter demonstrated by individuals with higher functioning skills on previous versions remains the same (Mayes & Calhoun, 2008). These individuals tend to demonstrate greater rote skills and deficits in abstract concepts. Students with Asperger Syndrome have been found to demonstrate a pattern of higher verbal skills and lower performance skills, whereas students with classic autism demonstrate higher performance skills and lower verbal skills, as measured by the WISC-III (Meyer, 2001-2002).

## Misconceptions

Myth	Reality
Full-scale IQ is a good description of a student's cognitive ability.	Students with autism typically demonstrate a profile of scatter on comprehensive cognitive measures, performing better on tasks involving rote skills than on tasks involving problem solving, conceptual thinking, and social knowledge (Mayes & Calhoun, 2008; Meyer, 2001-2002).
If a student has an average IQ, an adaptive behavior measure is unnecessary.	Although a student has an average IQ and is even doing well academically, that does not mean that an adaptive measure is not needed. Research indicates many students with autism have deficits in communication, daily living skills, and socialization (Lee & Park, 2007; Myles et al., 2007). Klin and Volkmar (2000) stated that adaptive behavior is a critical area of planning for students with AS to facilitate transition from the school environment to work and community environments.
If a student demonstrates a well-below-average IQ, the student does not have any cognitive skills.	A flat profile of skills may indicate difficulty accessing what the student knows. Formal cognitive assessments may not yield valuable information for assessing current level of functioning and needs for programming. In addition, students with autism may not be able to generalize skills from the classroom setting to the testing environment, or the manner in which the information is being assessed may prohibit the child from demonstrating mastery of skills. For example, if the student has learned to perform a task in one way with a certain prompt and the assessment asks for it in a different way, the student may not be able to demonstrate knowledge of the skill.
Formal IQ is more valid than informal data from classroom.	Informal classroom data provide information about how the student functions on a daily basis. Analyzing formal and informal data to determine patterns of skills and learning is a key component of assessment (Hagiwara, 2001-2002). Informal data from the classroom may be more valuable than information gathered in a contrived one-on-one setting when determining programming for a student with autism.
If a student has a high IQ or demonstrates high achievement, she should be successful in the general education classroom.	Because students with autism have difficulty with language, communication, and social skills, they may continue to struggle in the general education classroom in activities that involve these skills.

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