

Early Childhood Measurement and Evaluation Tool Review

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Cognitive Assessment System (CAS)

Measurement Areas:

The Cognitive Assessment System (CAS) is designed to test cognitive abilities. This test can be used for ages 5 years 0 months to 17 years 11 months. The scale provides a Full Scale (FS) score and scores for 4 cognitive processing scales:

1. Planning
2. Attention
3. Simultaneous
4. Successive

Purpose:

The CAS is a norm-referenced assessment tool that can be used for a variety of purposes:

- To inform a practitioners on relative levels of processing (strengths and weaknesses) within the individual
- Cognitive abilities relative to peers
- Prediction of achievement
- Assisting in the diagnoses and classification (learning disabilities, attention deficit disorder, cognitive disabilities, giftedness, traumatic brain injury, serious emotional disturbance)
- Special education eligibility decisions
- Consideration of particular treatment, instructional or remedial programs.
- research on abilities

Length and Structure:

The CAS is designed to be administered on an individual basis with children and adolescents. The Basic Battery (8 subtests) takes approximately 40 minutes and the Standard Battery (composed of 13 subtests but only 12 are used in a given assessment) takes approximately 60 minutes to administer.

The CAS is organized in three levels. The Full Scale is an overall measure of cognitive functioning. This score is based on the composite of the four scales: Planning, Attention, Simultaneous, and Successive. The scales are then made up of 3 subtests each (Standard Battery).

The CAS is based on the PASS theory of intelligence (Das, Kirby & Jarman, 1975, 1979). The basis of this theory is that four mental activities (Planning, Attention, Simultaneous and Successive) are essential for cognitive functioning. Planning is said to be a cognitive process by which the individual determines, chooses, applies and then evaluates solutions to problems or goals. Attention refers the ability to selectively focus cognitive activity over time. Simultaneous processing is that an individual incorporates the elements of stimuli into a conceptual whole. Successive processing is the cognitive ability whereby the individual processes the stimuli in a serial order.

Raw scores can be converted to subtest scaled scores, standard scores for each composite score, and Full Scale score. In addition percentile ranks and confidence intervals are provided for the scores.

Materials:

The CAS is classified as a “Level C” qualification targeted to institutions with personnel possessing masters and doctorates of psychology or education, and/or licensure in a relevant area of assessment with provincial or national organizations.

The CAS Standard kit is sold by the publisher for USD \$835.00 and includes: stimulus book, administration and scoring manual, interpretive handbook, record forms, response books for 5-7, response books for 8-17, figure memory response book, scoring templates and a red pencil. Kit is USD \$865.00 if a carrying case is desired. Scoring software (CAS Rapid Score) is available for USD \$958.00.

Accessibility:

The CAS is available in the English language (using USA norms).

Administration, Scoring, and Interpretation:

The interpretive manual suggests that only those individuals with formal graduate-level or professional training in psychological assessment should interpret test results using the procedures described in the manual. There are 3 basic steps to interpretation of CAS scores “(1) Describe the Full Scale and PASS scale standard scores. (2) Compare the four PASS scale standard scores for meaningful discrepancies (3) Compare subtest scores within each scale for meaningful discrepancies.” (Naglieri & Das, 1997, p. 93) In addition two optional procedures are noted “(a) compare the Full Scale and PASS Scale standard scores with age-based achievement standard scores, (b) compare subtest scores within each scale for meaningful discrepancies” (Naglieri & Das, 1997, p. 93). The interpretive manual contains a section on basic score interpretation, including suggestions on how to present the results in a report.

Subscales:

The CAS contains of 4 scales called the PASS Scales: Planning, Attention, Simultaneous, and Successive. Each scale contains 3 subtests (Standard Battery). The four PASS Scales are weighted equally to form the Full Scale (FS) score.

Documentation:

The CAS Administration and Scoring Manual provides specific procedures for administration and scoring. The Interpretive handbook has chapters with comprehensive information on interpretation, test standardization, validity and reliability.

Norming Sample:

The CAS was standardized using an American sample of 2200 children (50% Female, 50% Male) ages 5 to 17 years. The sample was closely matched the U.S. population (based on 1990 US Census bureau) on the basis of sex, race/ethnicity, geographic region, classroom placement (i.e. regular classroom or special placement), educational classification (i.e. learning disability, mental retardation, etc), and parental educational. Persons classified as 'American Indian, Asian, Pacific Islander or other' were included in the standardization sample in the category of "other". The entire "other" sample makes up 9.6% of the standardization sample.

Reliability:

The CAS was standardized using an American sample of 2200 children (50% Female, 50% Male) ages 5 to 17 years. The sample was closely matched the U.S. population (based on 1990 US Census bureau) on the basis of sex, race/ethnicity, geographic region, classroom placement (i.e. regular classroom or special placement), educational classification (i.e. learning disability, mental retardation, etc), and parental educational. Persons classified as being American Indian, Asian, Pacific Islander or other were included in the standardization sample in the category of "other". The entire "other" sample makes up 9.6% of the standardization sample.

Validity:

An extensive discussion of validity is contained in the CAS technical manual. Validity will be discussed in terms of content validity, criterion-related validity, construct validity, and validity evidence.

Content Validity: Content-related validity evidence for the CAS was developed via task analysis and experimental examination so that the items would adhere to PASS theory. The interpretive offers explanations on how each subtest measures the component that comprise the PASS theory of cognitive abilities.

Criterion-Related Evidence of Validity: Criterion related validity is determined by demonstrating the scale is related to other scales that measure the same construct, societal outcome measures, and special group membership (i.e. gifted). Two types of evidence are used to demonstrate criterion-related validity: predictive and concurrent.

Predictive Validity: The importance of predictive validity is that it demonstrates how well an instrument can predict academic achievement as traditionally Intelligence is said to be fairly strongly related to achievement. The interpretive manual lists a study with a sample

of 1600 children age 5-17 were tested with the Woodcock-Johnson- Revised (WJ-R) and the CAS. Correlations between the CAS Full Scale standard scores and the WJ-R Skills cluster are .73 for the Standard Battery and .74 for the Basic Battery. PASS Scales correlated from .50 to .67 for the Standard Battery and from .44 to .64 for the Basic Battery with the WJ-R skills cluster.

In order to demonstrate the predictive capability of the CAS, the CAS and the Wechsler Intelligence Scale for Children-Third Edition (WISC-III) as well as the WJ-R were administered to groups of special populations and correlations of the two cognitive instruments to the achievement scores were compared. The correlations between the CAS and WISC-III Full Scale scores to the WJ-R skills cluster were as follows:

	WISC-III	CAS
Regular Education students	.58	.8
Children with Mental Retardation	.54	.54
Children with learning disabilities	.50	.52

Concurrent validity: Studies between the CAS and other measures of cognitive abilities demonstrate fairly high correlations. A study listed in the interpretive manual consisted of 33 students who were administered the Wechsler Preschool and Primary Scale of Intelligence-Revised (WPPSI-R) and the CAS. Correlations between the Full Scale IQ (FSIQ) for the measure were .60.

According to the interpretive manual, validity studies were conducted by administering The Wechsler Intelligence Scales for Children-Third Edition (WISC-III) and the CAS to regular education students, children with mental retardation and children with learning disabilities. The correlations between the two measures Full Scale IQ scores were .69 for regular education students, .71 for students with learning disabilities and .66 for students with mental retardation.

Special Populations: Another important facet of cognitive ability tests is the presence of distinctive score profiles for those in special populations (i.e. attention-deficit/ hyperactivity disorder, children with reading difficulties, mental retardation, traumatic brain injury, severe emotional disturbance, and giftedness). The Interpretive manual describes some possible profile patterns that the various groups may demonstrate on the CAS.

Construct Validity: The interpretive handbook also provides confirmatory factor analysis (CFA) and Exploratory Factor analyses (EFA) data to provide evidence for construct related validity. The results generally support the four factor model; however there is also some support for a three factor model (Das & Naglieri, 1997). Therefore, it could be debated that planning and attention factors are better considered a single factor (Meikamp, 2004).

Additional Validity Studies

Kranzler, Keith and Flanagan (2000), conducted an investigation of the factor structure of the CAS. The researchers tested 155 children with the CAS and then performed confirmatory factor analysis on the data. The results did not support the four factor PASS model. It was found that the Planning and Attention factors were so highly related ($r=.88$) that they could not be appropriately distinguished. The authors of this study suggested that because of the amount in which the Planning and Attention scales overlap, they should not be interpreted separately. However, forming a combined Attention/Planning scales and separate Successive and Simultaneous could be supported.

Publication Information:

This review is based on the Cognitive Assessment System published in 1997 by Riverside Publishing.

References:

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