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AUTHOR	Smith, Douglas K.
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ABSTRACT

This article describes the Kaufman Adolescent and Adult Intelligence Test (KAIT), emphasizing its theoretical base and the distinction between crystallized and fluid intelligence. It presents a synopsis of standardization data as well as reliability and validity data. Several uses of the KAIT are described with two case studies presented to illustrate its usefulness. The KAIT has strong psychometric properties and is well suited for use in both school and clinical settings. It contains more subtests measuring fluid intelligence than any other cognitive battery. All subtests require the use of formal problem solving skills. The KAIT has a strong theoretical base and offers an additional option for the evaluation of individuals ages 12 to 85. (Contains 12 references.) (JDM)

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By
Douglas K. Smith

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Chapter Eighteen

Use of the Kaufman Adolescent and Adult Intelligence Test (KAIT) in the New Millennium

Douglas K. Smith

Abstract

The KAIT is described, with an emphasis on its theoretical base and the distinction between crystallized and fluid intelligence. A synopsis of standardization data as well as reliability and validity data are presented. Most importantly, several uses of the KAIT are described, with two case studies presented to illustrate the usefulness of the test. The KAIT has strong psychometric properties and is well suited for use in both school and clinical settings. The emphasis of the test on the distinction between fluid and crystallized intelligence is a strength, and it contains more subtests measuring fluid intelligence than any other cognitive battery. In addition, all subtests require the use of formal problem-solving skills. The KAIT has a strong theoretical base and offers an additional option for the evaluation of individuals ages 12 to 85 years.

The KAIT, developed by Alan S. and Nadeen L. Kaufman in 1993, is an individually administered test of intelligence for individuals 11 to 85+ years of age. It is a test of general intelligence "composed of separate Crystallized and Fluid Scales. The Crystallized Scale measures acquired concepts and depends on schooling and acculturation for success, while the Fluid Scale measures the ability to solve new problems" (Kaufman & Kaufman, 1993, p. 1). The theoretical base of the test is the result of an integration of Horn and Cattell's theory of fluid and crystallized intelligence; the Luria Golden definition of planning ability; and Piaget's stage of formal operations.

Crystallized and Fluid Intelligence

Crystallized intelligence emphasizes verbal concepts and is heavily influenced by formal school learning. On other intelligence

tests, this construct is referred to as verbal intelligence, verbal comprehension, or verbal reasoning. Fluid intelligence emphasizes the ability to solve novel problems. Although this construct is less frequently measured on intelligence tests, examples include Matrix Reasoning on the Wechsler Adult Intelligence Scale third edition (WAIS–III), the Nonverbal Reasoning Cluster on the Differential Ability Scales (DAS), and the Fluid Reasoning Factor on the Woodcock-Johnson–III (WJ–III). In the case of the DAS and WJ–III, there are two subtests composing the cluster and factor, respectively.

Research on factor theories of intelligence, most notably studies by Carroll (1993), Horn (1991, 1994), and McGrew (1997), indicate that in addition to a general factor on intelligence, or *g*, there are additional factors that are key components of *g*. Although there is a lack of agreement on the number of these factors or their names, there is consensus that three factors (crystallized intelligence, fluid intelligence, and visual/spatial intelligence) are the most highly related to *g*. Two of these factors, crystallized intelligence and visual/spatial intelligence, have been the primary emphases of intelligence and cognitive ability tests such as the Wechsler scales and the Stanford-Binet. Recently, however, fluid intelligence has received increased attention with the release of the DAS, the KAIT, the WAIS–III with its new Matrix Reasoning subtest, and the WJ–III. Although all four tests measure fluid intelligence, the KAIT provides the most extensive measure, with four subtests as compared to two subtests in the DAS, one subtest in the WAIS–III, and two subtests in the WJ–III.

Why is fluid intelligence important? The simple answer is that it relates highly to overall intelligence as measured by *g*. Second, it involves a number of important processes related to cognitive skills, including the abilities to reason, solve problems, and form concepts. As Kaufman and Kaufman (1993, p. 11) indicate, "Fluid intelligence (Gf), sometimes called broad reasoning, is the ability to solve new problems, specifically the type that are not made easier by extended education or intensive acculturation." Third, by de-emphasizing acculturation and formal educational experiences, fluid intelligence may be a more appropriate or purer measure of cognitive ability for some individuals.

Structure of the KAIT

The KAIT produces a Composite Intelligence Scale score, a Crystallized IQ score, and a Fluid IQ score, with a mean of 100 and standard deviations of 15. The core battery, administered in one hour, consists of three crystallized subtests (Definitions, Auditory Comprehension, and Double Meanings) and three fluid subtests (Rebus

Learning, Logical Steps, and Mystery Codes). The expanded battery, requiring an additional 30 minutes, consists of the core battery plus two measures of delayed memory (Rebus Delayed Recall and Auditory Delayed Recall) and two alternate subtests, Memory for Block Designs (Fluid) and Famous Faces (Crystallized). The third part of the KAIT is the Mental Status Exam, an optional subtest used when there are concerns as to whether the examinee has the necessary skills to complete the KAIT. The KAIT subtests are described in Table 18.1.

KAIT subtests are organized by the fluid-crystallized distinction and require planning ability and abstract thought. Subtests are primarily either fluid or crystallized, relate to real-life situations, and measure functional skills. Crystallized subtests are presented both verbally and visually with the exception of Auditory Comprehension, which is presented verbally. Fluid subtests are presented visually with verbal directions. The Famous Faces subtest utilizes both a visual and verbal presentation format. The response modality for the KAIT is primarily verbal. The only exceptions are Mystery Codes, in which responses are circled, and Memory for Block Designs, in which the examinee manipulates wooden blocks. Unlike the Wechsler Intelligence Scale for Children (WISC–III) and the WAIS–III, visual-motor coordination and how quickly problems are solved are not emphasized.

Standardization

The KAIT was standardized on 2,000 adolescents and adults from the ages of 11 years to 85+ years, stratified within each age group by gender, geographic region, socioeconomic status (defined by the examinee's or parent's educational level), and race or ethnic group, according to 1988 census data.

Reliability and Validity

Extensive reliability and validity data are presented in the KAIT manual (Kaufman & Kaufman, 1993) and summarized here. Spit-half reliability coefficients for the six core subtests range from .78 to .95, with a mean subtest reliability coefficient of .90 (range of .87 to .93). Average reliabilities for the two alternate subtests are .79 for Memory for Block Designs (range of .76 to .85) and .92 for Famous Faces (range from .83 to .97). Reliability coefficients average .95 for the Crystallized Scale, with a range from .91 to .97; and .95 for the Fluid Scale, with a range from .93 to .96. The average reliability coefficient for the Composite Intelligence score is .97, with a range from .95 to .98. Test-retest reliabilities range from .87 (Fluid) to .94 (Crystallized and Composite).

Table 18.1. Subtests of the KAIT

Subtest	Description
Crystallized Subtests	
Definitions	Examinees figure out a word by studying the word shown with some of its letters missing and hearing or reading a clue about its meaning.
Auditory Comprehension	Examinees listen to a recording of a news story and then answer factual and inferential questions about the story.
Double Meanings	Examinees study two sets of word clues, then think of a word with two meanings that relates closely to both sets of clues.
Famous Faces	Examinees name people of current or historical fame, based on their photographs and a verbal clue about them.
Fluid Subtests	
Rebus Learning	Examinees learn the word or concept associated with a particular rebus (drawing), then "read" phrases and sentences composed of these rebuses.
Logical Steps	Examinees attend to logical premises presented both visually and orally, then respond to a question by making use of the logical premises.
Mystery Codes	Examinees study the identifying codes associated with a set of pictorial stimuli, then figure out the code for a novel pictorial stimulus.
Memory for Block Designs	Examinees study a printed design that is exposed briefly, then copy the design from memory using six yellow and black wooden blocks and a tray.
Delayed Recall Subtests	
Rebus Delayed Recall	Examinees "read" phrases and sentences composed of rebuses they learned about 45 minutes earlier during the Rebus Learning subtest.
Auditory Delayed Recall	Examinees answer literal and inferential questions about new stories they heard approximately 45 minutes earlier during the Auditory Comprehension subtest.

Note: Adapted from Kaufman and Kaufman (1993).

Concurrent validity studies comparing performance on the KAIT with performance on the WISC-R, WAIS-R, and Stanford-Binet fourth edition produced correlations ranging from .57 to .88. Both exploratory and confirmatory factor analyses were performed on KAIT standardization data and are supportive of the factor structure of the test. Since the publication of the KAIT, there have been a number of studies examining its validity (Kaufman & Horn, 1996; Kaufman, Kaufman, & McLean, 1995; Kaufman, McLean, & Kaufman, 1995; Kaufman, McLean, Kaufman, & Kaufman, 1994). These studies have been generally supportive of its validity.

Uses of the KAIT

The purpose of this section is to describe some of the uses of the KAIT within the educational setting. It is especially useful in the assessment of memory problems, fluid reasoning, gifted and talented evaluations, and special education re-evaluations.

Memory Problems

An important feature of the KAIT is the ability to measure both immediate and delayed memory using the Auditory Comprehension and Rebus Learning subtests for immediate memory and Auditory Delayed Recall and Rebus Delayed Recall for delayed memory. The Auditory Comprehension subtests focus on auditory memory, whereas the Rebus Learning subtests focus on visual memory. Norms are provided for determining whether the delayed and immediate versions differ significantly from each other. In interpreting results, I also compare the scores between the two subtests at each level of memory (immediate/delayed) to determine whether there are consistencies or inconsistencies. For some individuals, auditory memory may be significantly better developed for immediate memory (Auditory Comprehension > Rebus Learning) and less well developed for delayed or more long-term memory (Auditory Delayed Recall < Rebus Delayed Recall). It seems reasonable to conclude that most individuals show a basic consistency between the two conditions, and my clinical experience suggests this is the case, although empirical data are lacking.

What is the value of this information? First, it tells us how the individual most effectively takes in information for later retrieval (immediate short-term memory or long-term memory). Is the individual more likely to remember material presented verbally or visually, or does it matter? Secondly, in an academic context it enables us to present information in the most efficient manner for the particular student. The memory data may also be useful in cases where there are changes in the efficiency of either immediate or delayed memory or both over

repeated evaluations. Such changes could be the result of aging, neurological difficulties, or accidents to name a few possible causes.

Fluid Reasoning

Of the published tests that measure fluid reasoning or fluid intelligence, the KAIT provides the most extensive measure, with four subtests (see Table 18.2). Therefore, the instrument, especially the fluid subtests, is an important supplement to other cognitive batteries. In fact, it may be the instrument of choice for this reason, with subtests from other batteries being used as supplements. The fluid scale has strong psychometric properties, including an adequate floor and ceiling for ages 11 years, 0 months to 59 years, 11 months. For ages 60 years and older, the floor is less robust with minimum scores based on raw scores of 0 ranging from 53 to 70. See Table 18.3 for the effective range of standard scores across the age range for the Crystallized, Fluid, and Composite scales.

Table 18.2. Fluid Subtests on Various Cognitive Batteries

Cognitive Battery	Fluid Subtests
Differential Ability Scales	Matrices Sequential and Quantitative Reasoning
Kaufman Adolescent and Adult Intelligence Test	Rebus Learning Logical Steps Mystery Codes Memory for Block Designs (optional)
Wechsler Adult Intelligence Scale–III	Matrix Reasoning
Woodcock-Johnson–III	Concept Formation Analysis-Synthesis

Gifted and Talented Evaluations

The KAIT is especially well suited for use with students who may gifted and talented. The ceiling of the test for the three scales (Crystallized, Fluid, Composite) is excellent, as shown in Table 18.3. Second, it is the only cognitive abilities test specifically designed to measure higher-level cognitive processes in the adolescent and adult age ranges. Other instruments are extensions of school-age tests (e.g., Stanford-Binet fourth edition and DAS). Even the WAIS–III is a modification and revision of the WISC–III and the original Wechsler

Table 18.3. Effective Range of Standard Scores

Age	Crystallized IQ	Fluid IQ	Composite Intelligence Scale
11-0 – 11-3	62–160	40–157	48–160
11-4 – 11-7	62–160	40–157	48–160
11-8 – 11-11	59–160	40–157	46–160
12-0 – 12-3	59–160	40–157	46–160
12-4 – 12-7	56–160	40–157	42–160
12-8 – 12-11	53–160	40–157	40–160
13-0 – 13-3	53–160	40–154	40–160
13-4 – 13-7	53–160	40–154	40–160
13-8 – 13-11	53–160	40–151	40–160
14-0 – 14-3	53–160	40–151	40–160
14-4 – 14-7	53–160	40–151	40–160
14-8 – 14-11	53–160	40–151	40–160
15-0 – 15-3	53–160	40–151	40–160
15-4 – 15-7	49–160	40–151	40–160
15-8 – 15-11	49–160	40–151	40–160
16-0 – 16-3	49–160	40–151	40–160
16-4 – 16-7	49–160	40–151	40–160
16-8 – 16-11	45–160	40–151	40–160
17-0 – 17-5	45–160	40–151	40–160
17-6 – 17-11	45–160	40–146	40–160
18-0 – 18-5	41–160	40–146	40–160
18-6 – 18-11	41–160	40–146	40–160
19-0 – 19-11	41–160	40–146	40–160
20-0 – 20-11	41–160	40–146	40–160
21-0 – 22-11	40–160	40–146	40–160
23-0 – 24-11	40–160	40–146	40–160
25-0 – 29-11	40–160	40–146	40–160
30-0 – 34-11	41–160	40–146	40–160
35-0 – 44-11	45–160	40–151	40–160
45-0 – 54-11	53–160	40–151	42–160
55-0 – 59-11	53–160	40–157	44–160
60-0 – 64-11	56–160	53–157	52–160
65-0 – 69-11	62–160	53–157	55–160
70-0 – 74-11	64–160	53–157	57–160
75-0 – 79-11	64–160	60–157	60–160
80-0 – 84-11	69–160	65–157	65–160
85-0+	71–160	70–157	69–160

Note: Based on minimum raw scores (0 on all subtests) and maximum raw scores at each age level.

Bellevue Scale, which originated from David Wechsler's clinical perspectives and experiences at Bellevue Hospital in New York. Third, all of the subtests on the KAIT involve problem-solving skills utilizing what Piaget has described as formal operations. For example, Definitions is a vocabulary test, but the examinee must integrate a visual cue (the configuration of the word) with the word's definition or characteristics in order to produce the correct response. This is a far more complex task than simply defining words that are presented.

The fluid scale may also be useful in identifying gifted and talented individuals who are missed by programs that emphasize crystallized intelligence and academic achievement. Traditional measures of cognitive ability have emphasized verbal intelligence rather than fluid intelligence. Thus, individuals skilled in nonverbal problem solving or solving novel problems are often not identified as gifted and talented, even though their skills in this aspect of cognitive ability may be quite well developed.

Special Education Re-evaluations

The IDEA '97 amendments provide increased flexibility in special education re-evaluations. For example, the disability does not need to be rediagnosed. Emphasis is placed on obtaining information that will be useful in educational programming and transition planning. Thus, examiners are relieved of the task of readministering that same cognitive ability evaluation year after year.

By far the most frequently administered test of cognitive abilities in both school and clinical settings is the WISC–III/WAIS–III (Oakland & Hu, 1992; Stinnett, Havey, & Oehler-Stinnett, 1994; Watkins, Campbell, Nieberding, & Hallmark, 1996). All too often re-evaluations have simply consisted of readministering the same test without adding any new information. In my experience as a school psychologist and a trainer of school psychologists, it is typical to see the WISC–III, and at older ages the WAIS–III, administered to special education students three, four, or even five times. Each time the scores and profiles are similar and little new information is added.

With the new IDEA '97 amendments, the examiner can supplement the evaluation with additional information. The KAIT provides the opportunity to provide information on fluid reasoning and both immediate and delayed memory, for example. Although empirical data are currently lacking, clinical experiences indicate that in some instances students diagnosed as having cognitive or learning disabilities have shown relative strengths in fluid reasoning upon re-evaluation with the KAIT. For example, Donald, age 16 years, 3 months, was originally diagnosed as having a cognitive disability in the second grade. At age 15 he was re-evaluated with the WISC–III and the KAIT.

His WISC–III scores were consistent with previous scores and included a Verbal IQ of 69, a Performance IQ of 59, and a Full Scale IQ of 61. These scores indicated that Donald was functioning at a level well below his peers. On the KAIT, however, he obtained the following scores: Crystallized IQ of 83, Fluid IQ of 77, and Composite IQ of 79. These scores are still below average, but they do suggest a somewhat higher potential than previously indicated. In contrast to his performance on the WISC–III, in which only Digit Span was in the average range, Donald had scores in the average range on three KAIT subtests (Double Meanings, Famous Faces, and Logical Steps). These scores suggest that his problem-solving skills, although below average, show more potential than previously indicated. In addition, the KAIT results suggest that transition activities for Donald should focus on developing vocational skills that would allow him to secure employment and become self-sufficient.

Another case is Jeremy. He is also 16 years of age (16 years, 11 months) and has been receiving services for a learning disability for the past nine years. At his latest re-evaluation he was administered the WISC–III and the KAIT. On the WISC–III he received a Verbal IQ of 89, a Performance IQ of 97, and a Full Scale IQ of 97, whereas on the KAIT his scores were 94 for Crystallized IQ, 122 for Fluid IQ, and 108 for Composite IQ. Once again the measures of verbal ability (crystallized ability) are similar, but a strength both relative and in relation to peers emerges in fluid reasoning. More important, Jeremy displayed large discrepancies between his scores in the measures of auditory memory and visual memory. His mean auditory memory score was 10.5 (Auditory Comprehension = 6, Auditory Comprehension Delayed = 5) and the mean visual memory score was 14.5 (Rebus Learning = 14, Rebus Learning Delayed = 15). These results suggest that he excels in solving novel nonverbal problems and that he is most likely to remember and retrieve information that presented visually rather than orally.

Although these two cases do not constitute empirical data, they do show the utility of the KAIT on a case-by-case basis. With now flexibility in re-evaluation procedures, it is feasible to collect additional information that may prove useful in programming and transition planning.

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About the Author

Douglas K. Smith is currently director of programs in school psychology at the University at Albany–State University of New York. He obtained his Ph.D., Ed.S., and M.Ed. degrees in school psychology from Georgia State University. Current research interests include psychoeducational assessment issues in general and developing individual testing accommodations for students with disabilities in particular. Dr. Smith is author of *Essentials of Individual Achievement Assessment* (2001) and co-editor of the forthcoming *Assessing People With Disabilities in Educational, Employment, and Counseling Settings,* as well as numerous journal and chapter articles. Dr. Smith was named the Outstanding Faculty Member of 1987 in the College of Education at the University of Wisconsin–River Falls.

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