Practical advice on Using the Cognitive Abilities Test as part of an identification system

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Abstract

The Cognitive Abilities Test (CogAT) is widely used in the identification of academically talented students. The goal of this document is to provide a practical overview of how to make the best use of CogAT as part of an identification system. Major characteristics of CogAT are also summarized. Some of the topics that are covered include: understanding scores and score warnings; developing local norms; making test accommodations; estimating Form 6 scores when retesting with Form 5; out-of-level testing to increase reliability; using an excel spreadsheet to combine ability and achievement test scores to identify the most academically talented students in all ethnic groups; and additional resources.

Contents

Three Procedures for Identifying Academically talented Students

In this first section, I describe three procedures for using CogAT as one component of a system for identifying academically talented students from all ethnic and linguistic backgrounds. I put this information first so that those who are familiar with CogAT need not search the document for the major recommendations. However, I have also included brief summaries of much other information on the test that both novices and experienced users should find helpful. I encourage you to consult the papers on my website (http://faculty.education.uiowa.edu/dlohman/) and the test manuals (including the free Short Guide for Teachers available at www.cogat.com) for more information.

The first identification procedure shows how to determine a child's standing on any test score (or combination of scores) in three norm groups: the nation, the local population, and opportunity-to-learn subgroups within that population. The procedure requires that all students in a particular grade in the local population (i.e., school) take the screening test. It also requires that one know the basics of using a spread sheet application (such as Microsoft Excel).

The second procedure is simpler. It shows how to combine information from a nationally (or locally) normed ability test with teacher ratings of only those students who are nominated for the TAG program. It can be used to help make decisions about which students are most likely to profit from some form of acceleration and which might best be served by enrichment or additional instruction at grade level.

The third procedure combines elements of the first two procedures. It shows how best to combine scores on ability and achievement tests. Then these composite scores are compared with teacher ratings to inform decisions about acceleration or enrichment for those who are identified as academically talented.

These procedures were developed using the CogAT – Form 6 (Lohman & Hagan, 2001a), the Iowa Tests of Basic Skills (ITBS; Hoover, Dunbar, & Frisbie, 2001) and the Scales for Rating the Behavioral Characteristics of Superior Students (SRBCSS; Renzulli, White, Callahan, Hartman & Westberg, 2002). However, the basic principles can be applied to other ability and achievement tests, and other rating scales. Decisions about educational programming – especially whole grade acceleration – would require additional information, such as some measure of the student's interests, social skills, anxiety, and other characteristics that would be expected to influence the probability of successful learning in the different educational placement options under consideration (Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2003). These measures are not discussed here. Rather, I focus on a principled way to identify those children who are the best candidates for enrichment or acceleration.

Procedure 1. Multiple Norm Groups

Detailed directions for using this method are provided in *Identifying academically talented minority students* (NRC Research Monograph RM05216; Lohman, 2005) and in the sample data set that accompanies that monograph (see http://faculty.education.uiowa.edu/dlohman/). Here are the steps for using only one test score. Examples in the sample data set that is available on the website show how to combine scores on two variables (such as mathematics achievement and quantitative reasoning abilities). This is important because identification procedures that average ability and achievement scores for particular domains better identify not only those who

currently excel, but also those who are most likely to continue to excel (see Lohman & Korb, 2006).

Step 1 – Preparing the data. Get the required data into a spreadsheet. For each student, this would include the student's name or ID, an opportunity to learn index (such as ELL status), national percentile ranks (PRs) or other norm-referenced test scores. On CogAT, these would be Standard Age Scores (SAS) for each of the test batteries and the Quant-Nonverbal Composite (if it was requested from the publisher). If achievement test scores will also be analyzed (as described in Procedure 2), then be sure to input Scaled Scores for Reading Total and Math Total as well. For CogAT and ITBS, these scores can be output to an excel spreadsheet from Riverside's Interactive Results Manager (IRM).

Step 2 – Getting local ranks. Sort the data by percentile ranks (or SAS scores). This will provide local ranks.[1] Those with highest scores will be at the top of the list. Local score distributions generally provide a better way to determine which students are most likely to be mismatched with the instruction they are receiving than will national norms. Local norms also make it much easier to identify a relatively consistent number of students across years.

Step 3 – Looking within groups defined by opportunity to learn. Sort the data again by opportunity to learn (as the first sorting variable in Excel) and then PR or SAS (as the second sorting variable in Excel). For example, if two opportunity-to-learn groups are used (e.g., ELL versus native speakers), then the most talented ELL students will be those with the highest ranks within the first group and the most talented native-speaking students will be those with the highest ranks in the second group. What kind of enrichment or acceleration to suggest for each depends on the students' levels of achievement and on other factors (such as interest, motivation, and the availability of different educational programs).

Procedure 2. Using Ability Test Scores and Teacher Ratings

This example uses all three CogAT batteries and the three main scales from the Scales for Rating the Behavioral Characteristics of Superior Students (*SRBCSS* ; Renzulli et al., 2002). The three scales from the SRBCSS are: Learning Ability, Motivation, and Creativity.

Although the procedure can be used when test scores are available for all students in the local population, it is particularly helpful when only some students are rated by their teachers or are administered an ability test. Whenever only a portion of the population is tested, it is important to test a much broader segment of that population than just those students who score highly on an achievement test or who are nominated by their teachers. Testing only those who meet the desired criterion on an achievement test (e.g., 97th PR) will eliminate the majority students who score higher on the ability test than on the achievement test. Testing more children is much easier to do when using a group-administered test rather than an individually-administered test. A reasonable rule

[1] Note that ranks are not the same as the percentile ranks provided in norm tables. However, for most purposes, a simple rank order of the scores is all that is needed. Other scores (e.g. Standard Age Scores) provide additional information on the size of the score gaps between students with different ranks.

is to test every child who scores above average on one or more of the major batteries of the achievement test (typically Reading Total and Math Total for elementary students). If this is done, it is often more administratively convenient to administer the ability test to all children. Classroom teachers are most likely to go along with this procedure if the ability test does more than identify the most able students but also provides information that they can use to help all students learn.[2]

How best to combine scores from the three *CogAT* batteries when predicting academic success is well documented in the research literature. Importantly, the weights that should be applied to each test battery in making these predictions are the same for all ethnic groups that have been studied (Lohman, 2005). Competence in a broad range of verbal domains (e.g., reading comprehension and literary skills) is best predicted by the CogAT Verbal SAS score. On the other hand, success in mathematics and domains of study that demand quantitative thinking is best predicted by a combination of the CogAT Quantitative and Nonverbal Reasoning Batteries. Further, differences between ethnic groups are often about the same on the Quantitative and Nonverbal batteries (especially on the Multilevel Battery), and so any advantage that might accrue from reduced mean score differences on the Nonverbal Battery are not compromised by combining those scores with scores on the Quantitative Battery. However, adding quantitative reasoning to the mix substantially improves the ability of the test to identify the best students. Therefore, we recommend using the Verbal Battery SAS score and the Quantitative-Nonverbal (QN) *Composite* SAS score to guide admissions decisions.[3] Students should be considered for admission if they obtain either a high Verbal SAS or a high QN Composite SAS.

Research with the *SRBCSS* shows that each of its three main scales provides unique information. Therefore, the decision rule we suggest is that teacher ratings be considered high if any one of the three ratings is high.[4]

How to combine different kinds of information is a critical issue when identifying gifted children. Arraying this information in a matrix makes the information simultaneously available, but does not offer a principled way to combine it. Some programs prefer to follow traditional identification practices in which children are identified primarily (or solely) on the basis of ability and/or achievement test scores that are unusually high, using either national or local norm groups. Others have argued that programs should also serve children whose test scores are somewhat lower (e.g., the top 20% in the local

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[2] As far was we know, CogAT (Form 6) is the only ability test that provides this sort of information. Score reports contain a profile index that summarizes the level and pattern of scores across the three batteries for every student. This profile is linked to specific suggestions on how to adapt instruction to improve the likelihood that the student will learn. A free interpretive guide that provides more general advice on adapting instruction to individual differences is also available on the web at www.cogat.com.

[3] This composite score can be obtained from the publisher when requesting score reports or computed by averaging the USS scores for the Quantitative Battery and the Nonverbal Battery and then looking up the corresponding SAS and PR scores. Note that simply averaging SAS or PR scores on the separate batteries will not give the proper composite score.

[4] Because ratings are strongly correlated, accepting all students with an “above average” rating on any one of the three rating scales will identify considerably more than half of the students. This is undesirable only if schools cannot find ways to provide enrichment or other instruction for these students. Further, if possible, ratings on every student should be obtained from more than one teacher and then averaged.

group) but whom teachers believe exhibit unusual creativity, commitment to learn, or accomplishments in particular domains (Renzulli, 2005). The identification system we propose balances these perspectives.

		Teacher Rating on Learning Ability, Motivation, or Creativity	
		Below average teacher ratings	Above average teacher ratings
***CogAT* Verbal or Quantitative-Nonverbal Reasoning**	>97th PR	II	I
	>80th PR	IV	III

The identification scheme is shown in the figure above. The vertical dimension distinguishes children who exhibit superior reasoning abilities from those who exhibit above average reasoning abilities. We have set the cut scores as scoring at or above the 97th national percentile rank or at or above the 80th national percentile rank on either verbal reasoning or quantitative-nonverbal reasoning. These criteria are commonly used in gifted programs. However, other cut scores could be used in order to identify a particular percentage of the applicant pool. This is a relatively easy way to bring local norms into the picture. For example, one could set the criteria as the 97th and 80th local percentile ranks to identify students whose abilities are well above those of their classmates. In some schools, these students would have much higher national percentile ranks whereas in other schools they would have much lower national percentile ranks. Similarly, the horizontal dimension distinguishes between children who, when compared to other children nominated for the program, obtain above average teacher ratings and students who obtain average or below average teacher ratings. Note that, for ratings, the average is computed only on the subset of the student population who are nominated for inclusion in the program. Combining these two criteria gives four categories of assessment results.

Children in Category I exhibit superior reasoning abilities on *CogAT* and are rated as highly capable, motivated, or creative by their teachers. Children in Category II also exhibit superior reasoning abilities but, when compared to other children who were nominated, are not rated as highly by their teachers on any one of the three major scales of the SRBCSS. Programs that follow a traditional identification scheme (e.g., self-contained classrooms or schools) would accept children in Category I. Most would also accept children in Category II, given the difficulty of defending rejections on the basis of low teacher ratings. However, the progress of children in Category II should be monitored more closely. Children in Category III exhibit somewhat lower but strong reasoning abilities (80th to 96th PR) on *CogAT*, and are rated as highly capable, motivated, or creative by their teachers. These children would be included in school-wide enrichment programs that aim to serve a broader range of children. Schools that serve mainly poor and low-achieving students would find that many of their best students

would fall in this category, especially when using national rather than local test norms. Combining test scores and ratings in this way would enable these schools to identify the students most likely to benefit from curriculum compacting or enrichment programs, including instruction at a higher level than that received by most other students in the school. Finally, children in category IV exhibit good but not exceptional reasoning abilities (between 80th and 96th PR), and are not rated as unusually capable, motivated, or creative by their teachers. Although good students, these children would not be provided with special programming on the basis of either their *CogAT* scores or teacher ratings. However, if rank within opportunity-to-learn group is high, then some form of special assistance could be provided.

Procedure 3. Using ability scores, achievement scores, and teacher ratings.

Although either of the procedures we have described can be used to improve the identification process, the preferred procedure is to use achievement in addition to ability test scores. This is because the best prediction of subsequent success in school is given not by CogAT scores alone, or achievement test scores alone, but by the combination of CogAT scores and current achievement in the domain. Further, the best way to combine these scores is to average them.[5] An easy way to average scores is to get the data for both ability and achievement test scores into the spreadsheet, put them on the same score scale, and then average them.[6] Then either procedure 1 or 2 can be followed using these averaged scores. Directions for doing this are given in the sample data set on the web. The steps for this procedure are summarized in the box below

Using Ability, Achievement, and Teacher Ratings

1. Gather both achievement test and ability test scores for all children. If possible, test all children in the grade, not just those children teachers nominate.

2. Average ability and achievement test scores by domain, distinguishing verbal-linguistic and mathematical-symbolic domains.
   Verbal: average z scores for Reading Total and Verbal Reasoning
   Math: average z scores for Math Total and Quant-Nonverbal Composite

3. Set the upper (e.g., 97th PR) and lower (e.g. 80th PR) cut points for the ability-achievement composites (this is easily done in Excel. See Footnote 6)

4. Identify those students who score at or above the 97th PR, or between the 80th and 97th PR on either the Verbal Composite or the Math/Nonverbal Composite

[5] Requiring a high score on both the ability test (e.g., CogAT Verbal SAS) AND the achievement test (e.g., ITBS Reading Total) gives less satisfactory results. The "AND" rule misses many of the best students. For an explanation, see Lohman and Korb (2006).

[6] The procedure for doing this are given in the sample data set on the web. Averaging test scores that are not on the same scale gives greater weight to the test with the greater variability. Percentile ranks (PR) should generally not be averaged. The PR of the average scale score is generally not the same as the average of two or more PR scores.

5. Obtain teacher ratings for Academic Ability, Creativity, and Motivation only for those children who are nominated for the program If possible, gather ratings on each child from more than one teacher and then average the ratings of the two teachers for each of the scales on which all students are rated.

6. Determine for each scale whether the student's rating is above or below the mean (or median)

7. Identify those students who have an above average rating on any one of the three rating scales

8. Identify students who fall in each of the four categories defined by the crossing of the two ability categories (80-96th PR and 97- 99th PR) and teacher ratings (below average, above average).

Overview of the Cognitive Abilities Test

Form 6 of the *Cognitive Abilities Test™ (CogAT®)* appraises the level and pattern of cognitive development of students from kindergarten through grade 12. The test measures both general and specific reasoning abilities. The general reasoning abilities reflect the overall efficiency of cognitive processes and strategies that enable individuals to learn new tasks and solve problems, especially in the absence of direct instruction. These abilities are assessed in three domains: verbal, quantitative, and nonverbal. Each is represented by two or three different reasoning tasks. Having *multiple measures* in each domain greatly increases the dependability of the score profile that is reported for each student.

The *Cognitive Abilities Test* measures developed abilities, not innate abilities. The development of these abilities begins at birth and continues through early adulthood. It is influenced by both in-school and out-of-school experiences. Because these abilities are closely related to an individual's success in school in virtually all subjects, test results may be used in planning effective instructional programs. In combination with other relevant information about a student, scores can be used to adapt instruction in ways that enhance the student's chances of success in learning.

Structure of the Test

Each battery of *CogAT* uses a variety of test tasks; for example, the tasks on the Verbal Battery of Levels A–H include verbal classification, sentence completion, and verbal analogies. These tasks are good measures of abstract reasoning skills and are developmentally appropriate for the age and grade levels of the students being tested. Although the same kinds of abstract reasoning skills are tested from kindergarten through grade 12, developmental differences between students in the primary grades and those in grades 3 through 12 require that different types of test tasks be used. In addition, the procedures for administering *CogAT* are different in kindergarten through early grade 3 from those used in grades 3 through 12. To accommodate these developmental differences, *CogAT* has two separate series of tests: a Primary Battery containing Levels K, 1, and 2 and a Multilevel Battery containing Levels A through H.

Levels K through 2 can be used from the beginning of kindergarten through grade 2, although Level 2 can be used in grade 3 for students who are slow in cognitive development. Levels A through H are administered to students from grades 3 through 12. Level A can also be used in grade 2 to appraise students who have a faster rate of cognitive development than their age peers. The overlapping of Level 2 of the Primary Battery and Level A of the Multilevel Battery in grades 2 and 3 and the multilevel format of Levels A through H allow school personnel to adjust the difficulty level of *CogAT* to a student's rate of cognitive development. This permits the most reliable assessment of the student's cognitive skills to be obtained in any school grade. The complete series provides a continuous scale for appraising cognitive growth and development from the beginning of kindergarten through grade 12.

Using the Test Results

The three primary uses of *CogAT* scores are (1) to guide efforts to adapt instruction to the needs and abilities of students, (2) to provide an alternative measure of cognitive development, and (3) to identify students whose predicted levels of achievement are markedly discrepant from their observed levels of achievement. A brief discussion of each use follows.

The first and most important use of *CogAT* scores is to help teachers adapt instructional goals, methods, and materials to the individual needs of students. Advice on how to do this is provided in the *Short Guide for Teachers* (available at www.cogat.com).

The second use of *CogAT* is to provide a measure of each student's level of cognitive development that captures important information not represented in school grades or in other measures of school achievement. For example, *o*nly about half of the students who score in the top 3 percent on the *Iowa Tests of Basic Skills*® also score in the top 3 percent on *CogAT.* This means that *CogAT* will identify many students as academically gifted who would not be identified on the basis of academic achievement alone. Conversely, *CogAT* scores show that most low-achieving students are able to reason at higher levels than their academic performance suggests. In fact, the lower the students' scores on an achievement test, the greater the probability that their *CogAT* scores will be at significantly higher levels. See the section "Encouraging Information for Many Low-Achieving Students" in Part 5 of the *CogAT Form 6 Interpretive Guide for Teachers and Counselors* for more information.

The third use of *CogAT* scores is to identify students whose levels of academic achievement are substantially lower or higher than expected given their *CogAT* scores. Students whose achievement is markedly below expectations should be checked for other problems such as learning disabilities, poor vision or hearing, the need for more assistance in completing school lessons, or the need for a different instructional program. On the other hand, students whose academic performance is better than would be expected from their *CogAT* scores should also be examined. These students have learned well the specific skills taught in school but are less successful in solving unfamiliar problems. Such students might profit from tasks that emphasize transfer and innovation. For more information, see the section "Interpreting Discrepancies between Ability and Achievement" in Part 5 of the *Interpretive Guide for Teachers and Counselors* and the section "Using *CogAT* to Identify Students with Unexpectedly High or Low Levels of Achievement" in Part 2 of the *Interpretive Guide for School Administrators.*

Types of Norms

Two types of norms, age norms and grade norms, are provided for all levels of *CogAT.* Age norms permit educators to compare one student's performance on the test to that of other students in the same age group. Grade norms permit one student's performance to be compared to that of other students in the same grade group.

Age Norms. The age norms for *CogAT* extend from 4 years and 11 months to 18 or more years. When the Riverside Scoring Service® scores *CogAT*, students are grouped by age in one-month intervals from 4 years and 11 months through 18+ years. When tests are hand scored using the *CogAT Form 6 Norms Booklet,* three-month intervals are used.

Grade Norms. The grade norms provided for *CogAT* cover the range from kindergarten through grade 12 for three test periods in the school year—fall, midyear, and spring. Although the majority of students in a particular grade fall within a narrow age range, some individuals are much younger or older than the typical student. For example, at the beginning of first grade, the majority of students are likely to range in age from 6 years and 2 months to 7 years; however, there are students in some first-grade classes who are 5 years and 9 months old and some who are 8 years old. When a student's age is typical for the group, the student's age and grade scores will be identical or nearly so. However, if individuals are very young for the grade, their age scores will be higher than their grade scores. If individuals are much older than the typical student in the grade, their grade scores will be higher than their age scores. For individuals who are younger or older than the typical student in a grade, grade norms, rather than age norms, are more appropriate to use when trying to understand the student's academic performance.

Local Norms. In many school systems, the characteristics of the student population differ markedly from those of a national sample of school-age children. When national norms are used in these districts, the scores of students on both achievement and ability tests are likely to be skewed toward the high or low extremes of the score distribution. Local norms provide another perspective by comparing the performance of each student to others in the local norm group. This perspective can be critical when making decisions about a child's need for special educational programming within the school. Such decisions should be made on the discrepancies between the cognitive and academic development and the development of other children in the child's class (see Lohman, 2005; Renzulli, 2005).

Types of Scores

The starting point for the construction of all norms is the number of correct answers that students mark on their answer document or test booklet. The number of correct answers given by a student is called the raw score. A raw score can be converted into a Universal Scale Score. The first step in developing norms for *CogAT* was to construct a Universal Scale Score.

Universal Scale Score (USS). The *Universal Scale Score* is a normalized standard score that is used as the entry for all of the age and grade norms tables for *CogAT.* The USS provides a continuous growth scale of cognitive development from

kindergarten through grade 12. The *CogAT Form 6 Norms Booklet* provides tables for converting the raw score on each battery to a Universal Scale Score. The USS is then used for entry to tables in the *Norms Booklet* that give the following scores for each battery: (1) a Standard Age Score, (2) percentile ranks by age and by grade, and (3) stanines by age and by grade. Note that it is the USS score – not the number correct – that is the critical score.

Items range from easiest to most difficult. The different levels of CogAT contain samples of items that increase in difficulty. As one moves from level to level, the easiest items are dropped and an equal number of harder items are added. Therefore, the same raw score will correspond with a higher USS score as one moves from lower to higher levels of the test. Moving up one, two, or even three levels can give a more dependable score for children who answer correctly nearly all items on a given level of the test. Missing or correctly guessing the answer to a question will have much less impact on the child's USS score when the level of the test appropriately matches the ability of the child (see discussion of Out-of-Level Testing, below).

Standard Age Score (SAS). The *Standard Age Score* scale is a normalized standard score scale for each battery and the Composite. The SAS has a mean of 100 and a standard deviation of 16. It permits educators to compare the rate and level of cognitive development of an individual to other students in the same age group. The SAS scale provides fine discriminations among high- and low-scoring students.

SAS scores are NOT IQ scores. Even though scores on CogAT correlate highly with those obtained from individually administered ability tests, CogAT does not purport to be a measure of "intelligence." It measures reasoning abilities, not the much broader range of abilities that are sampled by good intelligence tests. Furthermore, norms are based on those students who attend school and are able to take a group-administered test. Intelligence tests, on the other hand, go to great lengths to obtain representative samples of the entire population.

Percentile Rank (PR). A *percentile rank* indicates the percentage of students in the same age or grade group whose scores fall below the score obtained by a particular student. For example, if a fifth-grade student obtained a grade PR of 90 on the Quantitative Battery, it means that 90 percent of the fifth-grade students in the standardization sample received scores lower than the score obtained by this particular student. Percentile scores expand the score scale near the mean and compress it near the tails of the distribution. For example, all SAS scores above 134 fall in the 99th PR. For *CogAT,* percentile ranks are provided for both age and grade groups.

Stanine (S). The stanine scale is a normalized standard score scale consisting of nine broad levels designated by the numbers one through nine. Stanines are provided for both age and grade groups. Stanines, which are similar to percentile ranks, are relatively easy to use because they are all one-digit numbers. For example, a stanine of 9 means that the students who scored in the top 4 percent of the sample The major advantage of stanines is that the broad groupings discourage overinterpretation of small, insignificant differences among test scores.

Understanding Score Profiles

Since *CogAT's* inception, the authors have encouraged teachers to focus on the student's scores on the three *CogAT* batteries rather than on the student's Composite score. (In fact, the early editions of CogAT did not even report a Composite score.) The scores on the three batteries make up a student's score profile.

A profile must capture two things: (1) it must tell which scores that are significantly higher or lower than other scores and (2) it must report the overall level of performance (i.e., the height of the profile). The scores that are significantly higher or lower are referred to as the *pattern* of the scores, and the overall height of the profile is the *level* of the scores. The same pattern—say a higher score on the Verbal Battery than on the other two batteries—has different implications for instruction if the student's middle age stanine (the level of the profile) is 2 than if the student's middle age stanine is 8.

But how can we know if the verbal score is significantly higher than the quantitative score? All test scores have some error of measurement, so the difference should be larger than the error in either score. For most test-takers, these errors are about the same size and can be directly estimated from the reliability coefficient. However, Form 6 of *CogAT* goes one step further and estimates the error of measurement anew for each student. This means that a low score will *not* be interpreted as a relative deficit just because the student misunderstood one of the subtests or otherwise exhibited confusion in the answers marked.

Using the individual error scores, confidence intervals are drawn around each of the three battery scores. These confidence bands appear on the *List of Student Scores* and on the *Profile Narrative Report.* Based on this information, the score profiles are classified as **A, B, C,** or **E** profiles.

"A" Profiles. In an **A** profile, the student's verbal, quantitative, and nonverbal scores are roughly at the s**A**me level. There is only one other piece of information provided by the test, and that is the overall height, or level, of the profile. This is what we would expect if reasoning ability were a single dimension. It is the pattern assumed whenever a student's ability is summarized in a single score. About one-third of students obtain this profile.

"B" Profiles. A **B** profile means that one of the scores is a**B**ove or **B**elow the other two scores. The student shows a relative strength (when one score is above the other two) or a relative weakness (when one score is below the other two). For example, **B (V+)** means that the scores show a **B** profile with a strength in verbal reasoning; **B (N–)** means a relative weakness on the Nonverbal Battery. Overall, approximately 40% of students obtain a **B** profile. Thus, **B** profiles are more common than **A** profiles.

"C" Profiles. This profile is called **C** for **C**ontrast. The student shows a relative strength *and* a relative weakness. This pattern is much less common. About 14% of students have a **C** profile. A student who shows a relative strength on the Verbal Battery and a relative weakness on the Quantitative Battery would have a **C (V+ Q–)** profile.

"E" Profiles. The **B** or **C** profile for some students is much more extreme than for others. The authors call any profile in which there is a difference of 24 or more points (on the SAS scale) between two scores an **E,** or **E**xtreme, profile. Approximately 14% of students show an **E** profile. These profiles are helpful in identifying twice-exceptional students.

Level of Scores. Suggestions for teaching depend on both the pattern and the level of the student's scores. The letters **A, B, C,** and **E** say something about the *pattern.* An estimate of the *level* is captured in the number that precedes the letter. This number is the student's middle age stanine. For example, if the student has age stanines of 6, 3, and 8 on the Verbal, Quantitative, and Nonverbal batteries respectively, the student's middle age stanine would be 6. A score profile of **6B (V+)** means that the student's middle age stanine was 6. This is the best estimate of the student's typical level of reasoning ability outside of the verbal domain. It is the baseline against which the verbal strength is measured. Stanines may be grouped as follows:

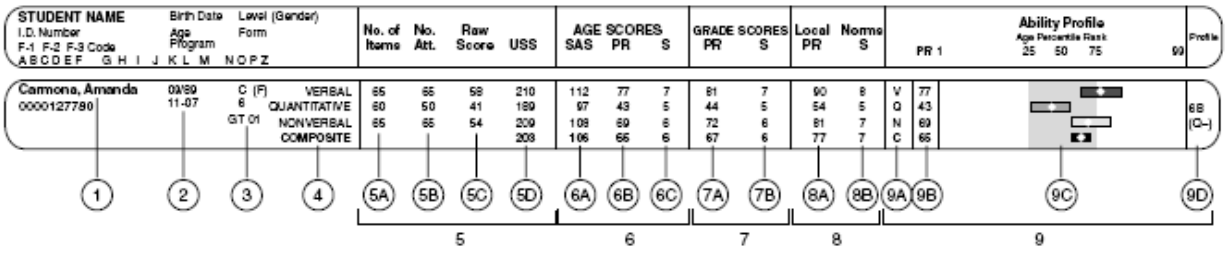
Stanine 9	Very high
Stanines 7–8	Above average
Stanines 4–6	Average
Stanines 2–3	Below Average
Stanine 1	Very low

In general, the profile number (middle age stanine) carries the most information for **A** profiles, less for **B** profiles (now we must also consider the strength or weakness), still less for **C** profiles, and the *least* information for **E** profiles.

Score Warnings for *CogAT* Form 6

A sample entry from the List of Student Scores report is shown below. The circled numbers are keyed to the paragraphs in the Interpretive Guide for Teachers and Counselors. You should pay particular attention to several items.

Sample entry from a List of Student Scores



First, compare columns 5A (Number of Items in the battery) with 5B (Number of Items the student attempted). Students should not be omitting many items on the Verbal and Nonverbal Batteries. This could signal an unusually slow but accurate response style. If extreme, this will trigger a warning (see "Many items omitted"). Omitting many items is rarely a problem on the Verbal Battery, but can impact scores on the Quantitative Battery. In large measure this seems to reflect an emphasis on reflective thinking in the teaching in the teaching of mathematics in some schools. If this seems to be a problem in your school (i.e., Quantitative scores are lower than expected), then consider telling

students to work quickly (or at least not to work slowly) on these tests. An easier solution is simply to use local norms.

Over 50 years of experience in administering both group and individual ability tests has convinced the test authors that many people misinterpret scores on ability tests. One solution to this problem is to try to re-educate test users about what ability tests do and do not measure (see, e.g., Lohman, 2006). Another solution is to warn users about potential problems that might compromise interpretation of scores. These score warnings are a major feature of CogAT. Look for them in the score reports and, unless the warning can be dismissed (a child was deliberately tested out of level), decisions about the child should not be made using such scores. Note particularly the warning "‡ **Extremely variable responses."** This is always a red flag. It says that, for this child, scores within that battery were inconsistent. When this happens, the error bands around the child's score for that battery (see the sample entry above) will be unusually wide. Even if there is no score warning but the error bands seem unusually wide, look more closely at the child's test booklet or answer sheet.

CogAT (Form 6) Score Warnings

**Too few items attempted.** Too few items were attempted to permit an estimation of a score on this battery and the complete Composite.

o **Excluded from group averages by school request.** The student's scores are excluded from class, school, and district averages at the school's request.

<< Age is out-of-range; age-based scores are not reported. Either the student's age is outside the valid range to calculate age scores (4 years 11 months to 21 years 7 months) or the date of birth was not indicated.

~ **Estimated level.** Either the test level was left blank or it was double-gridded and had to be estimated. In certain circumstances, this may indicate that the level was forced in order to correct for misgridded information.

§ **Level unusual for coded grade.** The test level is unusual for the grade indicated. Double-check the accuracy of the grade and level information for the student. This may also indicate that the student was purposely tested off-level.

• **Targeted score.** The number of correct answers marked is at or below a chance level; that is, the raw score could have been obtained by randomly marking answers to the test items.

‡ **Extremely variable responses.** Responses to items or subtests were inconsistent. For example, the student may have missed many easy items but correctly answered many of the more difficult items. Or, the student scored much lower on one of the subtests than on the other subtest(s) within the same battery. The error of measurement for the score on this battery is, therefore, unusually large.

^ Many items omitted. The student omitted many items, apparently due to a very slow, but accurate, response style.

a Age unusual for coded level. The student's age is unusual for the level of *CogAT* taken. Double-check the accuracy of the age and level information for the student. This may also indicate that the student was purposely tested off-level.

Tips on Test Administration

In this section I offer some suggestions for administering CogAT that are often overlooked. However, this is not a substitute for the Directions for Administration that accompany the test.

Read the directions

- I'm astonished by the number of people who are surprised to learn that they should not use the overall composite score from identifying academically talented children. Beginning with the fourth edition of CogAT Every edition of CogAT (published in 1984), the test manual has included a section on recommendations for using CogAT to identify gifted students. All explicitly state: Do not use the overall composite score! Only about one third of the students at all score levels shown an even or "A" score profile. Many academically talented students show significantly (even markedly) uneven score profiles. These students will have lower overall composite scores than students who show an even score profile.
- Practice reading the directions for each test before you attempt to administer it.

Prepare the students for the test

- For kindergarten children, practice the rules of the game: no calling out answers, no copying, no moving about the room, etc. Encourage children to see the activity as a special game, not a "test." If children are anxious, it is usually because their parents (and sometimes teachers) have made them so. For such children, it is even more important to make taking the test a fun activity. Contrary to horror stories in the news media, research shows that children actually enjoy the activity.
- If at all possible, go over the directions for the test—especially those with unfamiliar item formats such as matrices—a day or two before the test. Make up additional practice items to ensure that ALL children understand what they are supposed to do. NEVER start the test unless you are sure that the children understand what they are supposed to do.
- Never make decisions—either to admit a child to a special class or to deny admission—on the basis of a single test score. Many children who obtain high scores on one test occasion will get much lower scores on another administration of the same test. Neither the highest nor the lowest score provides the best estimation the child's ability. Unless one score is clearly invalid, the best estimate is given by the average score across multiple administrations of parallel tests.

Provide appropriate Accommodations.

Accommodations are modifications to standard test administration procedures that are designed to remove impediments to performance that are unrelated to the construct being measured by the test but which can influence performance on it. The CogAT manuals provide guidance on this topic. The discussion here is limited to *extra time* and *read-aloud* accommodations. Further, since neither of these accommodations is needed on the Primary Battery, these comments apply only to the Multilevel Battery.

The most common accommodation in group testing is to allow additional time. In general, allowing more time has little effect when the time limits for the test are sufficiently generous that at least 90 percent of the students have time to attempt every item. This is the case on the CogAT Verbal Battery. Our studies show that allowing an extra 2 minutes per battery has little impact on CogAT Verbal scores. However, time can be a factor for all students when the number of items on the test exceeds the number that most students attempt. This is often the case on the Quantitative Battery. Fewer students attempted all of the items on the Quantitative Battery on Form 6 of CogAT 6 than on Form 5, in spite of the fact that test length was the same and items were designed to be parallel. Changes in the way mathematics is taught seem to be the primary cause. This means, however, that allowing some students extra time will not only compensate for a learning disability. Additional time would probably increase their scores even if they did not have the disability. Therefore, if allowing extra time raises the child's scores on the Quantitative and, to a lesser extent, Nonverbal batteries to the level where the child qualifies for special services, it would be wise to seek additional corroborating evidence. (We will soon be issuing a report on the study on this accommodation, so contact me if interested.)

CogAT is not a test of student's reading abilities. Therefore, there is no prohibition against reading (i.e., decoding but not explaining) items to students. If one knows in advance that this will be necessary because of a reading disability, it would be best to test the child individually or with other children who need this accommodation for the Verbal Battery.

Retesting with Form 5

Test users who administer Form 6 of CogAT® sometimes need to retest students after only a short interval. Administering the same form of a test after a short delay confounds general practice effects with memory for specific items. A better procedure is to administer an alternate form of the test. The three tables in the Appendix can be used to estimate Universal Scale Scores (USS) on CogAT Form 6 for students who have previously taken Form 6 and are then retested with Form 5. The tables cannot be used to estimate Form 6 USS scores for students who have only taken Form 5.

The tables were developed from data collected in a special Equating Study in which 6,628 students were administered both Form 5 and Form 6 of *CogAT.* Order of administration was counterbalanced. The average of the two administration conditions was used to compare the changes in norms for Standard Age Scores between 1992, when Form 5 norms were developed, and 2000, when Form 6 norms were developed (see "Part 6: Equivalence of Forms" in the *CogAT Form 6 Research Handbook*). Tables reported here are based only on those students who took Form 6 first and then Form 5.

Order of administration matters, so the tables should only be used to estimate Form 6 USS scores from a Form 5 retest for students who have previously taken Form 6.[7]

There are three tables, one for each *CogAT* battery. For example, assume the student was first administered Level A of Form 6 and then later retested with Level A of Form 5.[8] The student obtained retest raw scores of 57, 58, and 60 on the Verbal, Quantitative, and Nonverbal batteries, respectively. These correspond to Form 6 USS scores of 199, 211, and 207. USS scores can then be converted to SAS and/or PR scores using the appropriate age and/or grade tables in the *CogAT Form 6 Norms Booklet.*

Thinking in terms of Developmental Scales

One of the most important – but least appreciated features of CogAT is the fact that all levels of each of the each test battery (Verbal, Quantitative, Nonverbal) are mapped on to a single developmental scale. This means that the raw score that a child obtains on any level of the test is converted to this developmental scale score (called a USS score for "Universal Scale Score").

The USS scores that a child obtains shows how well the child performed on the test in a way that is *independent of the norm group*. In other words, a child who obtains a USS score of 180 on the Verbal Battery performed better on the test than a child who obtained a USS score of 160. These children could be in the same grade or in different grades; the same age or different ages. There are as many different PR's for a given USS score as there are norm groups. For example, children who are the best performers in kindergarten perform better on the test than children who are much older.

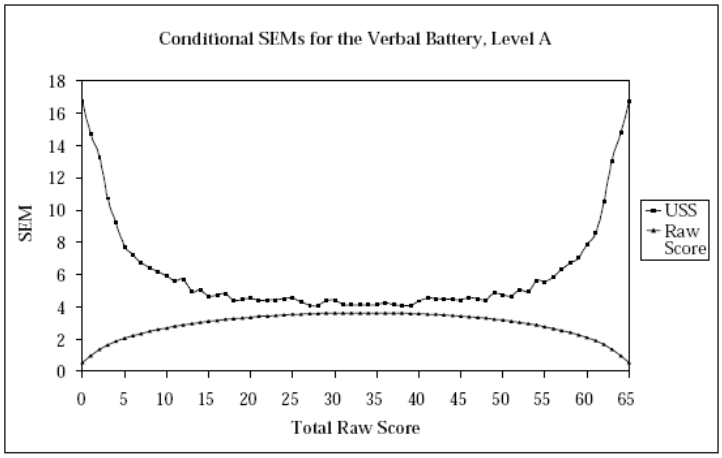
For example, consider the child who obtains a Verbal USS score of 188 in the fall of kindergarten. This puts the child at the 98 PR when compared to other kindergarteners. But it also places her at the 96th PR when compared to those entering first grade or the 90th PR when compared to those entering the second grade. K-1 growth is least on the Verbal Battery (10 USS points) and greatest on the Quantitative and Nonverbal Batteries (about 17-19 USS points). This means that, for Non-ELL children, estimates of their ability (compared to age or grade mates) that based on the Verbal scale are less likely to change than scores for the other scales (i.e., larger average growth means greater variability in growth across ages/grades).

[7] A fundamental assumption of test equating is that the equating transformations be symmetric. This means that the function that maps Form 5 scores onto the Form 6 scale must be the inverse of the function that maps Form 6 scores onto the Form 5 scale. This is not the case here. The tables apply only to the case in which Form 6 is administered prior to Form 5. Put differently, these are not equating tables but the product of a nonlinear linking function.

[8] Note that there is no requirement that the student be administered the same level of both tests. Indeed, students who score near the ceiling on a particular level of Form 6 should be retested with a higher level of Form 5. This will allow them to obtain a higher USS score. However, moving from the Primary Edition (Levels K-2) on one form to the Multilevel Edition (Levels A-H) on the other form is likely to show somewhat larger score changes than administering another level within the same edition. This is because the Primary Edition is shorter and measures somewhat different abilities than the Multilevel Edition.

Out of Level Testing

Many Schools administer the same level of CogAT to all students within a class. For this reason, each test level is constructed to be appropriate for the vast majority of students. If items were made sufficiently difficult to challenge the most able students, many less able students would find the test unnecessarily difficult and frustrating. Each level of the test provides excellent measurement for students at the first to the 90th percentiles (midyear grade norms). Errors of measurement for Standard Age Scores, however, increase substantially after that point. This is shown in the figure below. The figure shows that errors of measurement in USS scores increase substantially as the raw score on the battery approaches the minimum or maximum possible (0 and 65, respectively). Note that this increase in error of measurement is NOT unique to CogAT. It occurs on every fixed-length test. However, most tests do not report this information. This is unfortunate because it is critical when identifying gifted students.



The table below shows that if Level A is administered to every student, errors of measurement remain reasonably small for all students who score below the 90th percentile. Thereafter, errors increase substantially. Testing these high-scoring students with Level B helps some, although errors are still quite large for students at or above the 98th percentile. For these students, Level C is more appropriate. Thus, the level of the test that is most appropriate depends on the ability level of the student. Keep in mind, however, that errors on the PR scale will be much smaller than errors on the USS or SAS scales are more finely differentiated at high scores, relative to PR scores.

Standard Errors of Measurement (SEM) for Selected Verbal Battery USS Scores for Levels 2, A, B, and C of *CogAT* Form 6

Fall Grade 3 Verbal NPR	Verbal USS	SEM by Test Level 2	A	B	C
98	216*	13.4	13.9	10.4	8.4
90	197	11.4	7.5	5.9	5.2
50	169	7.5	4.5	4.2	4.1
10	140	7.4	4.6	5.3	6.6
2	124*	7.7	6.0	7.5	10.5

*Average USS

Therefore, if more accurate and dependable SAS scores are needed, high-scoring students should be tested out of level. The table below identifies the appropriate test level based on midyear grade norms. If, on the other hand, age- or grade-based percentile ranks are the critical score, there is ordinarily much less need for out-of-level testing. For more detailed information, see the CogAT Form 6 *Research Handbook*.

Lowest Test Level Providing the Best Measurement of Standard Age Scores at Various Percentile Ranks (Midyear Grade Norms).

Midyear PR	Grade Level in School K	1	2	3	4	5	6	7	8	9	10	11	12
<90	K	1	2	A	B	C	D	E	F	F	G	G	H
90–95	1	2	A	B	C	D	E	F	G	G	G	G	H
96–98	2	A	B	C	D	E	F	F	G	G	H	H	H
99	2	B	C	D	E	F	G	G	H	H	H	H	H

In general, the recommendation for out-of-level testing (using midyear norms) may be summarized as follows. For students who score below the 90th percentile on-level testing is recommended. For more accurate Standard Age Scores for students who score between the 90th and 95th percentiles, add one level; for students who score between the 95th and 98th percentiles, add two levels; for students who score at the 99th percentile, add three levels. Estimates of these percentile ranks can be derived from a prior administration of CogAT or from the Composite score on a well-constructed achievement test such as the ITBS or ITED.

At levels A through H, it is easy to administer multiple levels of CogAT simultaneously; however, one can reduce the amount of out-of-level testing by following the general recommendation to test one level higher for above-average classes. Because CogAT is designed to be relatively easy for an average-ability class, moving up one level has virtually no effect on the measurement error in the scores of lower-scoring students taking the Multilevel Battery. However, lower-scoring students in the primary grades should be tested on level.

Where to Get More Information

CogAT Form 6 Short Guide for Teachers (free at www.cogat.com)

CogAT Form 6 Interpretive Guide for Teachers & Counselors

CogAT Form 6 Interpretive Guide for School Administrators

For general background on adapting instruction to individual differences:

Stanford Aptitude Seminar (2002) *Remaking the concept of Aptitude: Extending the legacy of Richard E. Snow.* Mawhaw, NJ: Erlbaum.

References

(see http://faculty.education.uiowa.edu/dlohman/ for copies of some of these papers)

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VERBAL Battery

Form 5 — Form 6 Verbal USS

Raw score	1	2	A	B	C	D	E	F	G	H
0	11	24	65	76	85	95	104	112	120	129
1	35	43	78	91	85	95	124	134	139	144
2	57	68	92	105	113	122	132	141	150	156
3	68	80	101	113	124	135	138	145	157	165
4	76	88	107	118	130	140	143	150	162	170
5	82	95	111	123	134	145	146	153	165	174
6	87	100	116	127	137	148	149	157	169	177
7	92	105	119	130	140	150	152	160	172	182
8	96	109	122	132	143	152	154	164	174	185
9	101	113	126	135	144	154	157	167	176	188
10	103	116	128	137	146	156	160	171	178	191
11	106	120	130	139	148	158	162	173	180	193
12	110	123	132	141	149	160	165	177	182	195
13	113	126	134	143	151	161	166	179	184	197
14	116	129	136	145	152	163	169	181	186	198
15	118	132	137	146	154	165	171	184	188	200
16	121	134	139	148	155	166	173	185	189	201
17	125	138	140	149	157	168	175	187	190	202
18	127	140	142	150	158	169	176	189	192	204
19	129	142	143	152	159	170	178	190	193	205
20	132	145	145	153	160	172	180	191	195	206
21	135	147	146	155	162	173	181	192	197	207
22	137	150	147	156	163	174	182	193	198	208
23	140	153	148	157	164	176	184	194	199	209
24	143	155	149	158	165	177	185	195	200	210
25	145	157	151	160	166	178	186	196	201	211
26	149	159	152	161	168	180	187	197	203	212
27	151	162	153	162	169	181	189	198	204	213
28	154	164	154	164	170	183	190	199	205	214
29	158	166	155	165	171	184	191	200	206	214
30	162	168	156	166	172	185	192	201	207	215
31	165	170	158	167	173	186	194	201	208	216
32	171	173	158	168	175	187	194	202	209	217
33	175	175	159	169	177	189	195	203	210	218
34	182	178	160	171	178	190	196	204	212	219

Form 5	Form 6 Verbal USS									
Raw score	1	2	A	B	C	D	E	F	G	H
35	189	180	161	172	179	191	197	204	213	220
36	201	182	162	173	181	192	198	205	214	221
37	223	185	164	174	182	193	199	206	215	222
38	223	189	165	175	183	195	200	207	216	222
39	223	192	166	176	185	196	201	208	217	223
40	223	195	168	178	187	197	203	209	218	225
41		198	169	179	188	198	203	210	219	226
42		202	171	181	189	200	204	211	220	226
43		206	172	182	191	201	205	211	221	227
44		213	174	184	192	202	206	212	222	228
45		219	175	186	194	203	208	214	224	229
46		226	176	187	196	205	209	215	225	231
47		232	178	189	197	206	210	216	226	232
48		239	180	190	199	207	212	217	227	233
49			182	192	201	209	213	218	228	235
50			184	194	202	210	214	219	229	236
51			185	196	204	212	215	220	231	238
52			187	197	206	213	217	222	232	239
53			190	199	207	215	219	224	233	241
54			192	201	209	217	220	225	235	243
55			194	203	211	218	222	227	236	245
56			197	205	213	220	224	229	238	248
57			199	208	215	222	226	231	240	250
58			202	211	218	224	229	234	242	253
59			206	213	221	227	232	236	244	256
60			209	216	224	231	235	238	247	260
61			213	219	227	236	239	243	251	265
62			218	223	231	241	244	247	254	269
63			227	228	238	252	249	252	261	278
64			236	235	247	268	260	260	277	291
65			244	254	261	270	276	275	290	300

QUANTITATIVE Battery

Form 5	Form 6 Quantitative USS score									
Raw score	1	2	A	B	C	D	E	F	G	H
0	25	42	65	77	84	91	98	104	111	118
1	50	67	84	98	105	115	114	130	132	138
2	63	77	96	109	114	124	129	136	142	146
3	70	85	105	115	121	131	136	140	149	154
4	77	91	111	120	126	135	142	143	154	159
5	83	97	115	124	131	138	146	146	158	163
6	88	100	119	128	135	141	150	148	162	167
7	92	104	122	131	139	144	153	150	165	171
8	95	108	125	133	141	146	156	153	168	175
9	98	110	128	136	145	149	158	156	170	178
10	101	113	130	138	147	151	160	158	172	180
11	104	116	132	140	150	153	163	160	174	183
12	107	119	134	142	152	154	165	162	177	185
13	110	121	136	144	154	156	167	164	179	188
14	112	123	137	146	155	158	168	166	181	190
15	115	126	139	147	157	159	170	169	183	192
16	117	127	140	149	159	161	172	171	185	193
17	119	129	142	150	160	162	173	174	186	195
18	122	132	144	152	162	164	174	176	188	197
19	124	134	145	153	163	165	175	178	190	198
20	126	135	146	154	164	167	177	181	191	199
21	128	137	148	156	165	168	178	183	193	201
22	130	139	149	157	166	170	179	185	194	202
23	133	140	150	158	167	172	181	187	195	203
24	135	142	152	159	168	173	181	189	196	205
25	137	143	153	160	170	174	182	191	198	206
26	139	145	154	162	170	176	183	193	199	207
27	142	147	156	163	171	178	185	194	201	208
28	145	148	156	164	172	179	186	195	202	209
29	147	150	157	165	173	181	187	197	204	210
30	150	152	158	167	175	183	188	198	205	211
31	153	153	159	168	175	184	190	199	206	212
32	156	155	161	169	176	186	191	201	208	213
33	159	157	162	170	177	187	192	202	209	215
34	163	159	163	172	178	189	193	203	210	216
35	168	161	164	173	180	190	194	205	211	217
36	172	164	166	174	180	192	195	206	213	218
37	179	166	167	175	181	193	197	207	214	219
38	188	168	168	176	182	195	198	208	215	220

Form 5			Form 6 Quantitative USS							
Raw score	1	2	A	B	C	D	E	F	G	H
39	200	171	169	178	184	196	200	210	217	221
40	229	174	171	179	185	197	201	211	218	223
41		177	172	180	186	199	203	213	219	224
42		181	173	182	188	201	205	214	221	225
43		186	175	184	189	202	207	215	222	227
44		191	175	185	190	204	208	217	224	228
45		199	177	187	192	205	210	218	226	230
46		207	178	189	194	206	212	220	227	232
47		219	180	191	197	208	215	221	229	233
48		242	182	193	199	210	217	223	230	235
49			183	195	202	211	220	225	233	237
50			185	197	205	213	223	227	235	239
51			187	199	210	216	225	229	237	242
52			189	202	214	218	229	231	240	244
53			191	205	219	221	232	234	243	247
54			194	208	224	224	236	238	246	250
55			197	212	231	227	240	242	249	252
56			200	216	239	232	244	248	254	256
57			205	223	250	238	251	255	260	260
58			211	231	264	249	258	269	269	265
59			219	241	266	273	269	287	281	270
60			252	259	266	273	279	287	295	282

NONVERBAL Battery

Form 6 Nonverbal USS

Form 5

Raw Score	1	2	A	B	C	D	E	F	G	H
0	49	66	82	89	96	102	107	113	118	124
1	73	99	97	113	107	123	124	113	139	128
2	80	106	111	119	125	131	137	142	148	151
3	86	110	118	122	133	138	143	152	154	162
4	91	114	124	126	138	142	148	158	158	167
5	96	117	128	130	142	146	152	161	162	172
6	99	120	131	133	146	150	154	164	165	175
7	102	123	134	135	149	153	157	167	168	179
8	106	125	136	138	151	156	159	169	170	181
9	109	127	139	140	154	159	162	171	173	183
10	112	129	141	143	156	162	164	172	175	184
11	114	131	143	145	158	163	165	174	177	186
12	117	133	144	148	159	165	166	175	179	187
13	119	135	146	150	161	167	168	177	180	189
14	122	137	147	152	162	169	170	178	182	190
15	124	139	149	154	163	171	171	180	184	191
16	126	141	150	156	165	172	172	181	185	192
17	128	143	151	158	166	173	174	182	187	193
18	130	145	153	160	167	174	175	183	188	194
19	132	147	154	162	169	176	176	185	189	195
20	134	148	155	163	169	177	177	185	190	196
21	136	150	156	164	170	178	178	186	191	197
22	137	152	158	166	171	179	179	187	192	198
23	139	155	159	167	173	180	180	188	193	199
24	141	157	160	168	174	181	182	190	194	199
25	143	158	160	169	175	182	183	191	195	200
26	145	160	161	170	176	183	184	192	196	201
27	147	162	162	171	177	184	185	193	197	202
28	149	165	163	172	178	184	186	194	198	203
29	151	166	165	174	179	185	187	195	199	204
30	153	168	166	175	179	186	188	196	200	205
31	155	170	167	176	180	187	189	197	201	205
32	157	171	167	176	181	188	190	198	202	206
33	160	173	168	177	182	188	191	199	203	207
34	163	175	169	178	183	189	192	200	203	207
35	165	177	170	179	184	191	193	201	204	208
36	169	179	171	180	185	192	194	202	205	209
37	172	181	172	181	186	193	195	203	206	210
38	177	183	173	181	187	193	197	203	207	210
39	186	185	175	182	189	194	198	204	208	211
40	229	187	176	183	190	195	199	205	209	212

Form 5			Form 6 Nonverbal USS							
Raw Score	1	2	A	B	C	D	E	F	G	H
41		190	177	184	191	196	200	206	209	213
42		192	178	185	191	197	201	207	210	213
43		195	178	186	192	198	202	209	211	214
44		198	179	187	193	199	203	210	212	216
45		203	181	189	194	200	204	211	213	217
46		209	182	190	196	201	205	212	214	218
47		222	183	191	197	202	205	212	216	218
48		249	184	192	198	204	207	214	217	219
49			185	193	199	205	208	215	218	220
50			187	195	201	206	209	216	220	221
51			189	196	202	208	210	217	221	222
52			191	198	204	209	212	218	223	223
53			192	200	206	211	213	220	225	225
54			194	202	207	213	214	221	227	227
55			195	204	209	215	215	222	229	228
56			198	207	211	217	216	223	232	230
57			200	210	213	220	218	225	235	233
58			203	213	216	222	219	227	237	236
59			205	218	219	225	221	229	240	239
60			207	221	222	228	223	231	244	242
61			211	226	226	233	226	233	248	247
62			215	233	230	237	229	237	253	251
63			221	242	237	242	232	241	258	258
64			228	255	248	250	237	252	265	265
65			240	264	269	273	249	285	290	279