CogAT (Cognitive Abilities Test) Results Explained – And How to Build On Areas of Strength

"A **Cognitive Abilities Test** is something that is unlike other tests. It is a learning abilities evaluation that says little about what students actually already know and more about what they are capable of figuring out. Each of us uses different skills to solve a problem, in fact, no two individuals will usually approach a problem from the same perspective. Although there are natural tendencies, each person is different. The CogAT test is a way to determine which skills your child is using to reason through a problem and to come to a conclusion.

The cognitive testing that is done measures your child's ability according to three different areas, quantitative, verbal and non-verbal skills. When a person is confronted with a problem, s/he has the ability to use any of these reasoning skills to solve it. For example, if your child encounters a problem that is quantitative in nature, and s/he has a highly functioning quantitative skill set, s/he will do better than someone who is functioning higher in verbal reasoning. Therefore, the test really is just a measure of how well a person is able to solve general problems that require either one, two, or all of the reasoning skills that should be at their disposal." (*Riverside Publishing, Houghton Mifflin*.)

Verbal subtest: measures verbal aptitude, word knowledge and concepts, facility with language, verbal reasoning, and analogies. Students with high verbal scores usually do well in reading and language activities. Since most classroom instruction and assignments are language-based, these students typically perform very well in the classroom on a daily basis. To support their advanced linguistic abilities, they may need to be provided with enrichment activities including advanced vocabulary, real-world writing, and a wide range of supplemental reading. Students with low verbal scores may struggle with reading, writing, and other language-based activities. They may need supplemental instruction in vocabulary as well as in basic literacy skills.

Quantitative subtest: measures mathematical reasoning and problem solving, numerical sequences and patterns, manipulation of mathematical concepts. Students with high quantitative scores usually do well with complex mathematical or numerical activities and concepts. Enrichment tasks should go beyond calculations and include mathematical thinking, explorations of advanced concepts, and real world problem solving (probability, codes, etc.). Students with low quantitative scores may need supplemental instruction in basic math skills to achieve success.

Non-verbal subtest: measures reasoning and problem solving with patterns and relationships, pictorial analogies, and categories. This subtest is also helpful for obtaining an accurate assessment of the cognitive abilities of a student who may have limited proficiency in English or who has had limited opportunities to acquire verbal or quantitative knowledge. Students with high non-verbal scores often do well with logic, models, creative thinking, constructions or building, technology, or other non-language based activities. Because the problem solving skills on the non-verbal subtest have little direct correlation to most reading, writing, and math instruction, students with high non-verbal scores who have strong aptitudes in this area may not be easily recognized in the classroom. It is important to help these students continue to develop their verbal and quantitative skills, but also to find ways for them to apply their excellent non-verbal skills. Use a variety of graphic organizers and other pictorial ways for students to demonstrate learning (including thinking maps, diagrams, drawings, models, multimedia projects, etc.). Provide opportunities for creative problem solving, finding logical patterns and relationships, and use of high-level questions and critical thinking activities. Students with low non-verbal scores may just not have strengths in this area, OR may have had no previous exposure to pictorial problem solving and analogies, OR may be "out-thinking" themselves ("well, it could be this, but if you look at it that way, it could be this, or even this…"), OR have vision issues, OR may just not understand the tasks.

Composite score: A total or overall score. *A composite score is neither the sum nor the average of the subtest scores, but is computed separately*. Students with high composite scores often seem to be the traditional "gifted" students, with excellent skills in most areas. Students with high scores in one or two subtests may also be gifted, and may need differentiated instruction in their areas of strength. Low composite scores may indicate that the student will need more structure, time, and practice for learning effectively.

Strength in Verbal Reasoning

Learner Characteristics	These students typically obtain higher-than-expected achievement test scores in all areas except mathematical computation. The differences between observed and expected achievement are smallest at the primary level and largest at the secondary level. A strength in verbal reasoning has this broad effect on achievement because verbal reasoning abilities are important for success in virtually all school subjects.
Strength	Indicators of a strength in verbal reasoning include the following: • The students generally do best when they are encouraged to talk and write about what they are attempting to learn. • These students often have remarkably good memories for arbitrary sequences of sounds, letters, words, and events. Thus, they typically are above average in spelling; in their knowledge of syntax and grammar; in their ability to learn other languages; and in their ability to remember dialogue, prose, and poetry.
Building on Strength	Instructional opportunities to build on students' strength in verbal reasoning include the following: • Offer greater challenges in areas of the curriculum that involve reading, writing, and speaking. At the elementary level, this may mean providing special reading or writing assignments that are more demanding than the assignments given to other students. At the secondary level, if scores on the Verbal Battery are particularly high (stanine 8 or 9), it may mean placement in honors or advanced-placement classes. • Encourage these students to use their superior verbal reasoning skills to achieve at higher levels in other curricular areas, particularly in mathematics. For example, these students will often learn best if encouraged to restate mathematical expressions verbally and to explain them to others. • Avoid this pitfall in mathematics: Students with relatively strong verbal abilities often find it easier to memorize formulas than to build more abstract, often spatial mental models of the same conceptual systems. It is the latter that leads to long-term retention of mathematical concepts and, more importantly, to the ability to transfer mathematical knowledge to unfamiliar domains. Take steps to discourage these students from simply memorizing formulas. The use of computers with graphing capabilities can help in this respect. Most importantly, use learning materials and test problems that allow these students to use their excellent verbal reasoning skills instead of their rote memories when learning mathematics. • Especially at the primary and early elementary levels, encourage these students to practice mathematical facts orally rather than silently. Consider how one best learns common replies to questions posed in a foreign language and try using similar methods here. Expect that these students will need more practice for mastering mathematical skills than they need for mastering reading and language skills. • Encourage the habit of creating a mental model and coordinating it with a verbal description. These students sometimes have difficulty creating a visual mental model of the scenes depicted in a story. Read aloud to such students, pausing frequently to respond to their questions or to ask what they envision. Select texts with illustrations and ask students to make explicit connections between the text and the illustration. • For young students or for those who still have difficulties understanding stories, allow them to make a model of the situation described in the story and then to alter the model as changes occur in the text. Their goal is to learn how to create a visual mental model that allows them to keep track of the persons and events described in the text. If students are able to read and write about events that occur in locations that they know well, illustrations may not be needed.

Strength in Quantitative Reasoning

Learner Characteristics	Students in the primary grades who show a strength in quantitative reasoning tend to score somewhat higher than expected (on the basis of their verbal and nonverbal reasoning abilities) on both the mathematics and language portions of standardized achievement tests. By the elementary years, however, the advantage is confined to mathematics and persists through the high school years.
Relative Strength	Indicators of a relative strength in quantitative reasoning include the following: • Students are capable of abstract thinking. At lower ability levels, a quantitative strength may be apparent in the student's abilities with the computational aspects of mathematics rather than the conceptual aspects. • Students who display high levels of quantitative reasoning abilities typically excel in identifying patterns from their experiences and then reasoning by using their abstractions. • They often learn computer skills more readily than their peers, especially skills such as procedures for using text editors and spreadsheets. They do not typically excel at computer programming unless their quantitative reasoning abilities are quite high. • Students who excel at learning rule-based mathematical knowledge often show better- than-expected knowledge of grammar.
Building on Strength	Instructional opportunities to build on a strength in quantitative reasoning include the following: • Exploit and further develop this ability. If quantitative reasoning scores are very high, this may mean acceleration for some students; others benefit from enrichment activities such as math clubs or honors classes. Selecting appropriate strategies requires knowledge of a student's level of achievement in mathematics and of personal factors such as anxiety about working with older students. • Provide opportunities for these students to contribute at high levels to group projects. A strength—especially an extreme strength—in quantitative reasoning can be a source of great pride. Group projects provide an avenue for building better verbal and spatial reasoning abilities. • If students have strong grammar skills, praise this strength and ask the students to give feedback on each other's writing. This activity, in turn, can help these students acquire knowledge of higher-level writing skills (such as principles of style or organization). • Encourage development of their abilities through mathematical tasks, games, and puzzles that can be engaged in cooperatively rather than competitively.

Strength in Nonverbal Reasoning

Learner Characteristics	Students who show a relative strength on the Nonverbal Battery can be either very good at reasoning with spatial stimuli or particularly adept at solving novel problems that are unlike those encountered in school. Choosing between these explanations often requires information outside the test results (for example, knowledge of a student's learning style and extracurricular activities of choice and, for older students, their career interests). Students with particularly strong spatial abilities often experience difficulties in verbal fluency (as when writing under time pressure or speaking extemporaneously) or in remembering sequences of words or letters (as in spelling). On the other hand, these students often excel at drawing, sculpting, and other visual and mechanical arts. Another possibility is that this profile represents not so much a strength in spatial reasoning as a weakness in both verbal and quantitative reasoning abilities. These students need activities both in and out of school that will develop their verbal and quantitative reasoning abilities. For suggestions on improving these areas, see "Adapting Instruction to Shore Up Weaknesses," beginning on page 30. Paradoxically, students who have a relative strength on the Nonverbal Battery tend to obtain **lower** scores on some portions of standardized achievement tests than those of students with the same levels of verbal and quantitative abilities but an **N–** profile. Most achievement tests do not measure spatial reasoning. A strength in and preference for spatial reasoning runs counter to the predominantly linear and verbal modes of thinking required by conventional schooling. Although much effort is directed toward the development of students' verbal and, to a lesser extent, quantitative reasoning abilities, very little effort is made to develop their spatial reasoning abilities. Yet these abilities routinely play an important role in high-level learning and in creative contributions in mathematics, science, engineering, and the visual arts. Like verbal and quantitative reasoning abilities, spatial reasoning abilities respond to instruction. Students with a nonverbal strength often perform less well on tasks that require verbal fluency, such as speaking and writing. Indeed, extremely high levels of spatial ability are associated with a diverse array of specific verbal problems such as stuttering, difficulty learning phonics, poor spelling, and difficulty speaking foreign languages.
Relative Strength	The suggestions in this section are based on the interpretation that the Nonverbal profile represents a strength in spatial thinking. Indicators of a relative strength in nonverbal reasoning include the following: • Students tend to prefer visual mental models when solving problems. They respond well to texts that contain difficult graphics and prefer maps to verbal directions. • Learning is easiest for these students when they can readily connect each new concept or relationship with a mental or physical model (e.g., a schematic drawing) of the situation. At younger ages, these students learn most readily when the concepts described in textbooks and other media have previously been experienced concretely and can subsequently be applied concretely.

Building on Strength	Instructional opportunities to build on students' strength in nonverbal reasoning include the following: • For young students, provide reading texts that contain detailed illustrations, especially for unfamiliar content for which the students cannot form their own mental model. • In all areas of the curriculum, but especially in science and mathematics, use metaphors, analogies, and real-world examples to help students connect unfamiliar, abstract concepts to more familiar objects or experiences. Such relationships not only enable students to understand but also greatly facilitate retention and transfer. • When material is presented verbally at a rapid or inflexible rate, allow students to control the rate at which the information is presented (such as pausing and replaying a video presentation).

Building on Strength, cont.	• Encourage students to create drawings when solving problems in mathematics, concept maps when taking notes, or mental models of a scene when reading a text. For young students especially, ask, "What do you see?" and allow them to describe a mental picture. Ask older students to illustrate the scene. • Provide a hands-on approach to learning. Relate student interests to traditional, academic subjects and offer physical applications for problem solving. • When teaching writing, encourage these students to try descriptive rather than narrative prose. Provide examples of good descriptive prose. Have them first envision the scene they would like to describe before they attempt to describe it to someone else. • Encourage the development and application of these students' spatial reasoning and thinking abilities. These students are often quite skilled in the visual arts and can excel in trades such as carpentry, landscaping, interior decorating, product design, and computer graphics.

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