



## Exceptionally gifted children: Different minds

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### Abstract

There are few descriptions in the literature of the cognitive processes of exceptionally gifted children. This study, based on testing profiles, anecdotes collected from parents, and observations made during family and group therapy sessions with moderately and exceptionally gifted children delineates some of the characteristic modes of thinking that differentiate exceptionally gifted children from their more moderately gifted peers.

While there have been many studies that explore adult giftedness, few have examined the thinking processes of gifted children. Most theories of giftedness assume that adult measures of cognition are directly applicable to children. Sternberg and Davidson (1985) concluded that information processing of gifted children is similar to that of adults in capitalizing on patterns of information using environmental shaping techniques, having, exceptional problem-finding ability, and exceptional ability to conceive higher order relations.

Dark and Benbow (cited in Benbow, 1991) found that gifted adolescents in the SMPY program process information in a quantitatively, rather than qualitatively, different manner from older individuals. These students were described as precocious in their abilities.

Other authors stressed giftedness as developmental potential and focused on problems that arise for gifted children when cognitive development outstrips other aspects of development such as chronological, social, moral and emotional. The higher the intellectual capacity, the greater is the degree of asynchrony requiring special consideration of exceptional needs in parenting, schooling and counseling (Columbus Group, 1991). These authors make the case that gifted children's precocity is different from adult achievement due to developmental considerations absent for adults. For example, young exceptionally gifted children may have developed exceptional ability to think abstractly and to formulate hypotheses, but might still lack ability to organize material, present an argument and coordinate a written thesis. Morelock (1993) suggested that giftedness in children implies advanced ability to construct meaning, to think abstractly, and to respond emotionally to abstract concepts used to interpret experiential phenomena.

Most discussions of cognitive characteristics focus on the differences between gifted and average children. Metacognitive characteristics involve thinking about one's own ways of knowing remembering and understanding. They include metacognitive knowledge and awareness, metamemory, insight and regulation of cognition. Rogers (1986) and Cheng (1993) reviewed the literature and found gifted children to exhibit significantly more of these characteristics than nongifted children. Cheng (1993) stated that there is both theoretical and empirical evidence for superior metacognitive ability being an essential component of giftedness.

Hollingsworth's (1942) work with children above 180 IQ reported that the children develop exceptionally earlier than average in talking, reading, and imagination. Gross's (1993) investigation of exceptionally gifted children in Australia reported differences from average children similar to those found by Hollingsworth more than 50 years ago.

There is not much differentiation in the literature among the different levels of giftedness. Yet, the child with an IQ of 200 is as discrepant from the child of IQ 150 (3 SD) as the child of IQ 150 is from an average child. Because all gifted children are grouped together in studies of how gifted children differ from average, it is difficult to determine how level of giftedness influences cognitive development. Feldman (cited in Morelock & Feldman, 1991) using Terman's original data compared moderately and exceptionally gifted adults in degree of eminence attained. The only cognitive characteristic mentioned, however, is high abstract reasoning ability, the characteristic that has been associated with intellectual giftedness since Terman's day.

Silverman (in press) described a number of intellectual and personality characteristics in gifted children at least three standard deviations above the mean, that is, both the moderately and exceptionally gifted. These traits include intellectual curiosity, fascination with ideas and words, need for precision ability to perceive many sides of a question metaphorical thinking, ability to visualize models and systems, and early moral concern, among others.

That there is differentiation among levels of giftedness is suggested by anecdotal information. Gross (personal communication July 10, 1993) stated that the thinking processes of the exceptionally gifted are as different from those of even more moderately gifted children as "chalk and cheese." She mentioned differences in abstract reasoning ability at an early age and complexity of

thinking. Silverman (1993a) suggested that intellectual characteristics in intellectually gifted children tend to increase in strength in accordance with IQ.

In my own observations during the process of assessment and family and group psychotherapy with moderately and exceptionally gifted children differences in the cognition of gifted children become more discernable as intellectual capacity increases (Lovecky, 1992a, b). This article is an attempt to delineate some of the ways in which children above 170 IQ process information.

This study is based on observations, anecdotes from parents, therapy notes and testing profiles of 32 children ages 4 to 12 with IQ scores over 170 (22 boys, 10 girls). Of these, 18 were over IQ 180 with 6 over IQ 200. A comparison group of 39 moderately gifted children, ages 4 to 16, (28 boys, 11 girls) with IQ scores from 140 to 159 was used. All IQ scores were obtained on the Stanford- Binet Intelligence Scale Form LM.

### **Cognitive Differences**

Both quantitative and qualitative differences in processing information were observed between the children who scored above IQ 170 and moderately gifted peers. These differences are examined in the following categorical descriptions.

#### **The Simple is Complex**

Exceptionally gifted children often have difficulty dealing with material other gifted children find easy. The exceptionally gifted see so many possible answers that they are not sure how to respond because no one answer seems to be better than another. For example, Zachery, age 7, with an IQ over 200, was unable to answer the question. "What does a doctor do?" The moderately gifted children answered with any of several acceptable responses and did not find this a difficult question. Zachery, however, answered that there were so many different kinds of doctors, and they all did different things. Even when encouraged, he was unable to pick one kind of doctor and name something that doctor did. Zachery obviously knew the material but was unable to focus on a simple level. His response suggests a higher level of analysis and integration than the question required.

Hollingworth (1942) presented another aspect of the problem. Child D, by age 8, named an amazing 300 shades of color with precise names and assigned them numerical values. He also created words and concepts to describe emotional states such as parts of the body where "queer feelings" originated. Finally, he originated more accurate scientific names for the entire array of bird species. For this boy the concepts of color and birds obviously were much more complex than for the ordinary 8-year-old. Asking D to get a red pencil or to draw a picture of a bird would probably bring a puzzled response where other children simply would carry out the task. Unless one knew D's complex response to colors and birds, one would wonder why he was not complying.

#### **A Need for Precision**

Often coupled with the idea of the simple being complex is the need for extreme precision. Kline and Meckstroth (1985) suggested that a need for precision characterizes the thinking, of exceptionally gifted children. Silverman (in press) noted that these children appear to have logical imperatives related to their complex thought patterns so they expect the world to make sense. The necessity for the world to be logical results in a need to argue extensively, correct errors, and strive for precision of thought. Eric, age 9, strove for such perfection. With an IQ in the 190's, he derived an original mathematical formula. When his math teacher told him that this was a theorem about how numbers worked, Eric corrected him saying that it was only a hypothesis, as they hadn't yet tested it with all possible combinations of numbers. To Eric, only when he could prove its exact applicability could it be a theorem.

In this study, most of the moderately gifted children required less precision in making a response; they operated from an underlying assumption of good enough because alternate meanings didn't occur to them. To the exceptionally gifted child, alternate meanings are myriad and there is no way of knowing precisely which one is what the questioner means. If one were to ask such a child a question that seems quite simple such as, "Are you having a nice time?" the child would likely answer "What do you mean by a nice time?" "That depends" is a frequent qualifier (Hollingworth. 1927).

#### **The Complex is Simple**

The exceptionally gifted child grasps abstract material by finding the underlying pattern. Once that pattern is understood, the child knows the concept behind the material and further practice is unnecessary. In fact, the whole is comprehended so quickly

and thoroughly, the child cannot break it down into component parts to show the steps used to build the concept. This process causes problems with many teachers. Dahlberg (1992) described Matthew, age 9, who mastered material so quickly that there never seemed anything to learn. Even in music, finding pieces difficult enough to challenge him and hold his interest was a problem.

Silverman (1993b) suggested that this type of cognitive complexity enables highly and exceptionally gifted children (3 SD+) to perceive many layers of meaning in each situation. This allows some to quickly perceive underlying innuendoes, metaphors and symbols. Lydia (Lovecky; 1992b), for example, age 11, with an IQ over 200, had difficulty completing school tasks. Her participation in class discussions showed a high level of capability in literary analysis, use of symbolism and interpretation of metaphoric meaning. However, Lydia finished her analyses in her mind long, before the rest of the class. When the written analysis was due, Lydia could not write it. Her interests were now on different topics. She had studied how other authors used the same types of metaphors, and she had read other books by the author studied in class, exploring how he used particular metaphoric themes in his works. To go back and write on what the teacher thought was significant about the book the class was still studying was impossible. How does one unsee insights after all?

The moderately gifted children, on the other hand, advanced rapidly in mathematics, science and foreign languages, subjects in which pattern formation was more an integral part of learning the material. These gifted children were precocious in their advanced level of knowledge, and their ability to assimilate and integrate presented underlying patterns. They rarely discovered and applied complex language patterns to material as Lydia did.

### **Ability to Reason Abstractly at an Early Age**

Exceptionally gifted children can reason abstractly and do so at an earlier age than moderately gifted children. What's more, the level of abstraction is higher. For example, child A (Hollingworth, 1942) at age 3 saw the logical flaw in Eugene Field's poem about the gingham dog and calico cat who ate each other up. He saw that if one mouth ate the other, there would be no mouth left to eat the first mouth, and thus, eating each other up was impossible.

In this study, the moderately gifted children were quite good at formulating categories. They discerned and summarized similarities and differences among classes of objects, and generalized from specifics to larger classes. On the other hand, the exceptionally gifted children both categorized data and saw logical connections among different types of data. They developed matrices of several categories and placed specific information within them. For example, Christopher, age 11, with an IQ over 200, was portrayed as "trying to put every piece of information or every problem which he had to solve into some sort of category" (Gross, 1993, p. 15). He was described as working "in parallel," able to solve one mental problem while working on another.

The exceptionally gifted children also grasped the main point of an idea and were often analytical thinkers. In general, by age 9, the exceptionally gifted children were able to explain difficult proverbs on the Binet LM. Those who scored over IQ 200 could explain these proverbs by age 7; by age 9, they were able to solve problems using analogies and to explain the reasoning behind their thinking. Eric, age 9, given the analogy "baby: elephant = adult: ?" reasoned the answer had to be woolly mammoth because size was the determining factor in the comparison and the woolly mammoth was the biggest elephant.

Children with the highest IQ scores were able to think metaphorically from an early age. For example, humor was one area in which these children used metaphors and analogies. Eric, age 9, when told by his mother that today they had to "eat and run" replied, "You mean like carnivorous pantyhose?" Louis (1993, p. 8) described Ryan, age 27 months, who at his first view of the ocean made a pun: "The ocean is waving at me." Other exceptionally gifted children are adept at paradoxical thinking. Lydia, at age 11, described herself being an "optimistic pessimist."

### **Early Grasp of the Essential Element of an Issue**

It is unusual for young children to be able to grasp the essential part of a complex idea and then to apply that understanding to further develop complexity of reasoning on a question. Feldman (1986) described a child, who from age 2 to 4, learned 11 different languages to find out whether there had been a parent language. The ability to conceptualize at this level would be exceptional for any gifted child, but at such an early age is phenomenal. Indeed, the ability to find a problem to solve requires ability to conceive that there might be an underlying principle, an ability most gifted children do not achieve until adolescence.

More typical of moderately gifted elementary-age children is a depth of understanding about the implications of events not found in age peers. Moderately gifted children grasped cause and effect, saw influences that might affect outcome, and made connections between separate events. Before middle school age, however, they did not usually set problems for themselves, and were unable to formulate hypotheses.



Exceptionally gifted children, on the other hand, from an early age formulated problems. Eddie, age 4 1/2, with an IQ in the 180's, heard about the MS Readathon. He decided to raise a specific sum of money by soliciting pledges for each book read. He calculated how many books he would have to read to achieve his goal and realized that if he read easier, shorter books, he could read faster and complete more books.

Many exceptionally gifted children showed insight into social and moral issues. Hollingworth (1942) suggested that religious questioning, the search for what morality is, and the ability to discuss abstractly a philosophy of life and death only occur when a child reaches a mental age of 12. Gross (1993) found the children in her study attained this by age 7 1/2. Austin, age 8, with an IQ in the 180's, showed advanced understanding of astrophysics. His mental investigation of the purposes of black holes was paralleled by questions about religion. One of his investigations explored how the cosmology of different religions might use black holes in explanations of what God is (Lovecky, 1992a).

### **High Capacity for Empathy**

Empathy, the capacity for projective identification with another, is usually used to mean that one projects oneself into another's persona and determines what the other is feeling. Empathy may also mean any ability to project oneself into something. Visual artists project themselves onto canvas when they paint. Scientists describe the identification they feel with their subject matter (Lovecky, 1993). For example, Barbara McClintock (Keller, 1983) described her ability to be so close to her plants as she studied corn genetics, that she became one with them; by knowing each plant she was able to understand the relationship between what she saw in the field and what she would eventually see under the microscope. The ability to imagine oneself as part of one's creative product is described in the literature of adult creativity (Root-Bernstein, 1987). Some of the exceptionally gifted children in this study were also able to project themselves into the process of problem solving.

Rachel, age 10, with an IQ in the 170's, was proficient with origami; she was able to follow directions to make any form, and also originated forms. When asked how she thought of the designs, she explained that first she had a feeling inside herself which translated into a visual/kinesthetic form which was a part of herself. She understood how to make the form because she was the form. James, age 9, with an IQ over 200, described the process of putting himself on paper as he drew a continuing comic strip in which he was the central superhero. He thought the process was a reciprocal one in which he felt how the hero would act and feel and used that to create the scene. This led to thinking how to solve the hero's conflict. As he solved the hero's dilemmas, he felt he solved his own. James also described his understanding of nuclear physics as a process of becoming one of the subatomic particles, and feeling his relationships with space, energy, and other particles. Other exceptionally gifted children describe a similar process of projective identification in writing poetry and composing music.

Examples of this kind of projective empathy exist in the literature. Lorin Hollander (Feldman, 1986) portrayed himself at age 3 1/2 as "falling into the music" after coming home from hearing a Haydn quartet and wanting to reproduce what he had heard. He had internally incorporated the entire piece after the single exposure.

Moderately gifted children never described this process of projective identification. Typically, they discussed their creations in terms such as "I just feel it" or "It sort of happens automatically; I don't know how." Possibly they experience the same process as exceptionally gifted children but don't have the cognitive concepts to describe it.

In addition, many (but not all) exceptionally gifted children show direct empathy for others (Lovecky, 1992c; Piechowski, 1991; Silverman, 1993a). While it is more difficult to determine the internal processes of thought to discern projective identification with animals, ideas and nature in general, the effects of personal empathy can be seen in the child's concerns for others.

Lisa, age 18 months, with an IQ in the 170's, after watching the Democratic National Convention asked her mother why one public figure seemed so sad. Her mother was astonished that Lisa would have detected what was a secret in the community: that the public figure was quite despondent over his wife's terminal illness but strove to suppress his feelings in public. Everyone had thought he was successful. Silverman (1993a) described a 4-year-old boy who never hit or hurt anyone but was extremely loving in his relationships, even purposely helping peers to make the best moves in games and losing at times while telling them how good they were. Such empathy is rare even among the exceptionally gifted.

Exceptional Memory Unusual memory capacity is one characteristic often attributed to exceptionally gifted children. William Sidis (Wallace, 1986) not only remembered everything he read, he also remembered the page numbers. Lorin Hollander remembered entire music scores after hearing them once. Adam, the child Feldman termed an omnibus prodigy, apparently remembered events from his prenatal and peri-natal days (Feldman, 1986).

Exceptional memory covers a number of different phenomena. Gross (1993) discussed the earliest memories recorded by parents of the exceptionally gifted children she studied. These memories were linked to early development of language, although sometimes children remembered events from times before they were verbal. Earliest examples of exceptional memory

included memory of previous events and early language development such as a child singing herself to sleep with nursery rhymes at 18 months of age, another reciting passages at 12 months of age from books read to him, and a third who at age 2 1/2 recited all of a very long epic Australian poem she had memorized (Gross, 1993).

Many of the children in this study exhibited signs of early prodigious memory for television commercials, nursery rhymes, songs, stories, numbers, and personal events. Eddie, at age 2 years 10 months, could look up songs in a songbook after hearing one line. He looked in the index where songs were listed by title, then turned to the correct page. One adolescent described a memory of swallowing a splinter at age 15 months, and was able to recount the entire conversation she had with her mother, how she had felt, how she remembered perceiving what her mother felt, what she wore, the trip to the hospital, and what the doctor said.

Moderately gifted children also tended to exhibit prodigious memories and were often precocious talkers and readers though the ages at which parents pinpoint exceptional memory for events tends to be slightly later (21/2 to 3 years old as opposed to 12 to 18 months).

### **Inclination Towards Immersion**

Many exceptionally gifted children learn in a non-linear manner in which they take in large amounts of information and integrate it into an underlying big picture. Zachery, for example, at age 7, was interested in Egyptian hieroglyphics and computers; he attempted to use computer language to study other types of language.

Lydia, age 11, read extensively in the classics and has read many of the interpretive commentaries about these works. She also developed her own literary analyses. Eric, age 9, memorized every detail of every Star Trek episode ever written. He and other exceptionally gifted children find it a challenge, to master this ever-expanding body of knowledge. They also imagine their own planets, enact their own episodes, and have continuing debates about details of plot and character. Hollingworth (1942) speculated on her subjects' unusually keen interest in astronomy. Today's exceptionally gifted children integrate knowledge of astronomy, astrophysics and science fiction with equal enthusiasm. A high proportion of the exceptionally gifted children in this study (47%) appeared to share this interest.

The literature also focuses on the immersion learning style and breadth of knowledge exhibited by exceptionally gifted children. Feldman (1986) described the learning style of Adam as both nonlinear and omnivorous in his desire for knowledge. His style is further described as being "non-Western" and untraditional so that a regular school program did not work for him. Adam grasped concepts holistically and intuitively. Once he acquired the basic framework, he filled in the particulars. His parents thought he first developed theory, then learned basic facts and skills. Later, he questioned basic assumptions about theory. Adam had a number of ongoing interests which he explored at increasing levels of complexity including symbol systems (cartography and languages), music, science and mathematics (Feldman, 1986).

Gross (1993) discussed children who appeared to exhibit immersion type learning styles including Richard who, at age 4, could do mental arithmetic in binary, octal, hexadecimal and decimal systems. He also was a gifted musician, composer and chess player.

Many of the moderately gifted children in this study also immersed themselves in subject matter and accumulated large amounts of information. However, there are some limits on how they applied the information and far they progressed in their interest. Oliver, age 10, with an IQ in the 140's, was excellent at identifying geographical facts; he also invented his own countries and drew elaborate maps of them. Yet, his studies never progressed beyond mastering the volume of geographical facts. He did not integrate these facts with other subjects, nor consider how geographical features might influence life in a country. While he also had much knowledge of Western history, he had little interest in learning about other cultures. This limitation of interest was seen with other moderately gifted children who in earlier years had immersed themselves in a body of knowledge. Once the child became an expert in a field (geography, World War 11 fighter planes, types of dinosaurs, baseball facts, Star Trek, rock collecting) exploration of the field beyond further fact collecting was not pursued.

### **Conclusion**

Leta Hollingworth (1942) noted that in the regular elementary classroom moderately gifted children wasted almost half their time and exceptionally gifted children almost all their time. In her day, with grade-skipping prevalent, moderately gifted children tolerated the regular classroom routine relatively well since they were already advanced, but even moderate advancement did not appreciably help the exceptionally gifted. Today, with little grade skipping or other types of advancement com-

mon, the plight of even the moderately gifted child is cause for concern. Yet, it is exceptionally gifted children whose needs are more difficult to meet by virtue of being, so few in number and because of the differences in their cognitive skills.

Many exceptionally gifted children remain invisible in school. Even when special talents are acknowledged, little is done to further their development. Thus, there are exceptionally gifted students like James, age 9, whose abilities in every subject are so far above those of age peers that his school has no idea how to meet his needs. Left to devise lessons for James, his fourth grade teacher gives him the same lessons as the rest of the class and tells him to develop some aspect of the topic further. When he does so, there is no time allotted for him to share discoveries with the class or teacher. Many of the children in this study face classrooms like James' with caring, but poorly prepared teachers, and few outside resources available to provide the extra texts, materials mentors, and support required to give them the education they really need. Over time, lack of support for their needs results in social and emotional crises.

Gross (1993) suggested that the difference of these children is a great cross for them to bear. She stated that if their needs are not met, they can come to feel there is something wrong with them, and to be ashamed of their talents. Exceptionally gifted children are children at risk, as much as are children whose achievement is below average. It is hoped that by understanding these gifted children's unique cognitive characteristics, their talents can be appreciated and further developed.

#### References

- Benbow, C. P. (1991). Mathematically talented children: Can acceleration meet their educational needs? In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 154-165) Needham Heights, MA: Allyn & Bacon.
- Cheng, P.W. (1993). Metacognition and giftedness: The state of the relationship. *Gifted Child, Quarterly*, 37, 105-112.
- Columbus Group (1991, July). Unpublished transcript of the meeting of the Columbus Group Columbus, OH.
- Dahlberg, W. (1992). Brilliance-The childhood dilemma of unusual intellect. *Roeper Review*, 15, 7-10.
- Feldman, D.H. with Goldsmith, L. (1986). *Nature's gambit*. New York: Basic Books.
- Gross, M.U.M. (1993). *Exceptionally gifted children*. New York; Routledge.
- Hollingworth, L.S. (1927). Who are gifted children? *Child Study*, 5(2), 3-5.
- Hollingworth, L.S. (1942). *Children above 180 IQ Stanford-Binet: Origins and development*. Yonkers, NY: World Book.
- Keller, E.F. (1983). *A feeling for the organism-The life and work of Barbara McClintock*. San Francisco: W.H. Freeman.
- Kline, B.E. & Meckstroth, E.A. (1985). Understanding and encouraging the exceptionally gifted, *Roeper Review*, 8, 24-30.
- Louis, B. (1993). How parents identify giftedness in young children. *Understanding Our Gifted*, 5(5), 1, 7-10.
- Lovecky, D.V. (1992a). The exceptionally gifted child. *Understanding Our Gifted*, 4 (4), 3-4.
- Lovecky, D.V. (1992b), The exceptionally gifted child (part II). *Understanding Our Gifted*, 4(5), 3.
- Lovecky, D.V. (1992c). Exploring social and emotional aspects of giftedness. *Roeper Review*, 15, 18-25.
- Lovecky, D.V. (1993). Three faces of empathy. *Understanding Our Gifted*. 6(1), 3.
- Morelock, M.J. (1993). Imposing order on chaos. A theoretical lexicon. *Understanding Our Gifted* 5(6), 15-16.
- Morelock, M.J. & Feldman, D.H. (1991). Extreme precocity. In N. Colangelo & G.A. Davis (Eds.), *Handbook of gifted education* (pp. 347-364). Needham Heights. MA: Allyn & Bacon.
- Piechowski, M.M. (1991). Emotional development and emotional giftedness. In N. Colangelo & G.A. Davis (Eds.), *Handbook of gifted education* (pp. 285-306). Needham Heights, MA: Allyn & Bacon.
- Rogers, K. (1986). Do the gifted think and learn differently? A review of recent research and its implications for instruction. *Journal for the Education of the Gifted*. 10, 17-39.
- Root-Bernstein, R.S. (1987). Tools of thought: Designing an integrated curriculum for lifelong learners. *Roeper Review*, 10, 17-21.
- Silverman, L.K. (1993a). A developmental model for Counseling the gifted. In L.K. Silverman (Ed.), *Counseling the gifted and talented* (pp. 51- 78). Denver, CO: Love Publishing.
- Silverman, L.K. (1993b). The gifted individual. In L.K. Silverman (Ed.). *Counseling the gifted and talented* (pp. 3-28). Denver, CO: Love Publishing.
- Silverman, L.K. (In press). Highly gifted children. In J. Gunshot, M. Barely, & C. Hollander (Eds.), *Serving gifted and talented students: A resource for school personnel*. Austin, TX: Pro-Ed.
- Steinberg, R.J. & Davidson, J.E. (1985). Cognitive development in the gifted and talented. In F.D. Horowitz & M. O'Brien (Eds.), *The gifted and talented: Developmental perspectives* (pp. 37-74) Washington, DC: American Psychological Association.
- Wallace, A. (1986). *The prodigy*. New York: E.P. Dutton.