
Talent Development: Exposing the Weakest Link*

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1. Talent Development: Exposing the Weakest Link

For talent to emerge, causal contributions from many sources are required, among them high natural abilities (called gifts), motivation, perseverance, supporting parents and teachers, as well as long-term investment in learning, training, and practicing. And as a person seeks a higher achievement goal, these contributing factors will need to manifest themselves more intensively. Eminence is rarely bestowed on those who chose the easy road to skilled performance. As we look at talent development from its first manifestations to its peak achievements, we can observe the contribution of each of the causal factors just mentioned. Together, they constitute a series of links in the causal chain that account for the emergence of talent in any field of human activity. The present text aims to examine the relative strength of these causal links in order to pinpoint the weakest among them. Aware of the weakest link, professionals in the

field of gifted education will be in a better position to design interventions that effectively counteract that Achilles' heel.

Before addressing the core question, we must identify all the links that build the talent development chain. For that purpose, I will briefly describe a talent theory I have developed over the past twenty-five years; it is called the Differentiated Model of Giftedness and Talent (DMGT). The DMGT identifies all significant causal influences in the talent development process. Among current conceptions of giftedness (Sternberg & Davidson, 2005), the *DMGT* stands alone in its clear, and well-operationalized definitions of two key concepts in the field of gifted education: giftedness and talent. Space being limited, I will survey its components and structure just enough to enlighten readers who have never encountered this theory. Interested readers will find detailed presentations of the *DMGT* in various recent sources (Gagné, 2003, 2004, 2005a, in press; Van Rossum & Gagné, 2005).

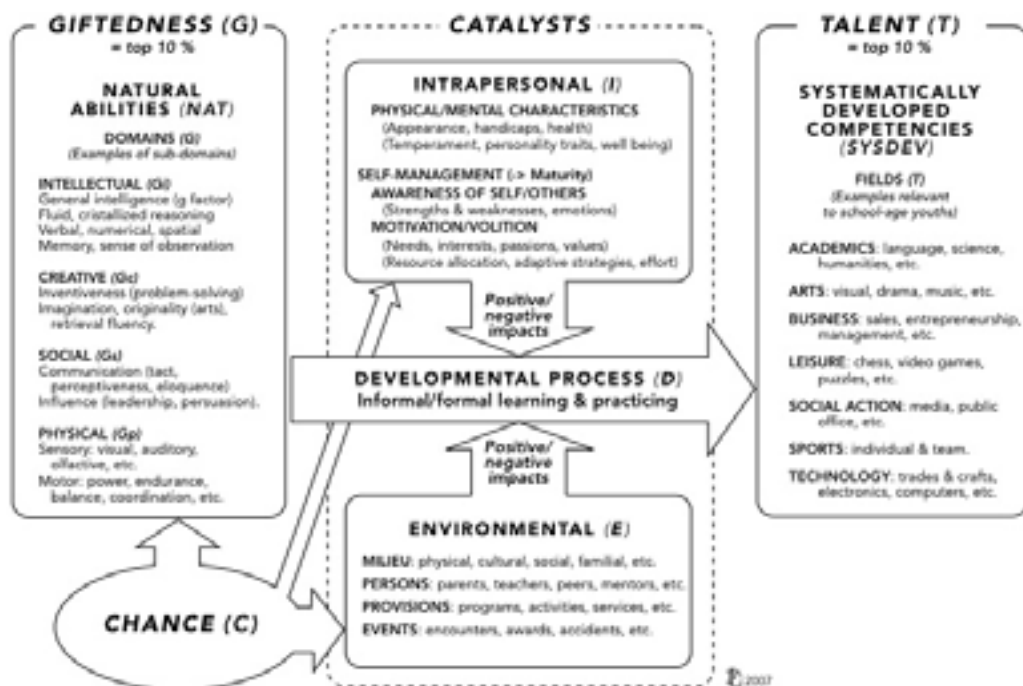
* This article is based on a keynote presentation at the Seventeenth Biannual Conference of the World Council for Gifted and Talented Children, held in Warwick, England, August 5-9, 2007. The title was chosen as a tongue-in-cheek reference to a popular game show created in England, but now internationally popular.

2. The Differentiated Model of Giftedness and Talent (DMGT)

As shown in Figure 1, the *DMGT* brings together six components: gifts (*G*), talents (*T*), the talent development process (*D*), intrapersonal catalysts (*I*),

environmental catalysts (*E*), and the chance factor (*C*). They can be grouped into two distinct trios: (a) the talent development trio (*G*, *T*, *D*), and the ‘supporting cast’ trio (*I*, *E*, *C*).

FIGURE 1: The Differentiated Model of Giftedness and Talent (DMGT.2007).



Gagné's Differentiated Model of Giftedness and Talent (DMGT.2007)

A. The talent development trio

The first trio includes the three components whose interaction summarizes the essence of the *DMGT*'s conception of talent development, namely the progressive transformation of gifts into talents. Here are formal definitions for the two target concepts.

Giftedness designates the possession and use of untrained and spontaneously

expressed outstanding natural abilities or aptitudes (called gifts), in at least one ability domain, to a degree that places an individual at least among the top 10% of age peers.

Talent designates the outstanding mastery of systematically developed competencies (knowledge and skills) in at least one field of human activity to a degree that places an individual at least

among the top 10% of 'learning peers' (all those who have accumulated a similar amount of learning time from either current or past training).

Gifts (G). The "DMGT distinguishes four natural ability domains (see Figure 1): intellectual (*Gi*), creative (*Gc*), social (*Gs*), and physical (*Gp*). These natural abilities, whose development and level of expression is partially controlled by the individual's genetic endowment, can be observed in every task children are confronted with in the course of their schooling. For instance, think of the natural intellectual abilities needed to learn to read, speak a foreign language, or understand new mathematical concepts; the natural creative abilities needed to solve different kinds of problems and produce original work in science, literature, and art; the natural physical abilities involved in sports, music, and sculpture; the natural social abilities that children use daily in interactions with classmates, teachers, and parents. Gifts can be observed more easily and directly in young children because environmental influences and systematic learning have exerted their moderating influence in a limited way. However, they still show themselves in older children and even in adults through the facility and speed with which individuals acquire new competencies (knowledge and skills) in any given field of human activity. Said differently, ease/speed in learning is the trademark of giftedness.

Talents (T). As defined in the DMGT, talents progressively emerge from the transformation of these outstanding na-

tural abilities or gifts into the well-trained and systematically developed competencies characteristic of a particular field of human activity. On the potential-performance continuum, talents represent the performance pole, thus the outcome of the talent development process. Talent fields can be extremely diverse. Figure 1 shows examples of talent fields relevant to school-aged youth. A given natural ability can express itself in many different ways, depending on the field(s) of activity adopted by an individual. For example, manual dexterity can be modeled into the particular skills of a pianist, a painter, or a video-game player. Similarly, intelligence can be modeled into the scientific reasoning of a chemist, the game analysis of a chess player, or the strategic planning of an athlete.

Developmental process (D). In this theory, natural abilities or aptitudes act as the "raw materials" or constituent elements of talents. The process of talent development manifests itself when the child or adolescent engages in systematic *learning and practicing*. The higher the level of talent sought, the more intensive this process will be. Developmental processes can take three different forms. (a) *Maturation* is a process largely controlled by the genetic endowment. It ensures the growth and transformation of all biological structures and physiological processes, called endophenotypes (Gottesman & Todd, 2003), which underlie phenotypic abilities. (b) *Spontaneous learning* corresponds essentially to knowledge and skills acquired as part of daily activities.

Much of what is called 'practical intelligence' (Sternberg & Wagner, 1986) is the result of such unstructured learning activities. The general knowledge, language skills, social skills or manual skills mastered by young children before they enter the school system result in large part from such unstructured activities. (c) *Systematic learning* is characterized not only by a conscious intention to attain specific learning goals, but also by a systematically planned sequence of learning steps to achieve these goals. When that systematic learning reaches high levels, Ericsson's concept of *deliberate practice* (Ericsson, Krampe, & Tesch-Römer, 1993) becomes a central part of the learning process. This third type is not necessarily formal. In its non-formal type, it corresponds to autodidactic or self-taught learning, done most of the time as a leisure activity. Still, the most common learning process remains formal or institutionally based, and leads to an official diploma recognizing competence or talent.

As a general rule, these three processes contribute in *inverse proportions* to the development of gifts and talents respectively. In the case of gifts, the major developmental agent is maturation, closely followed by informal learning; it is the opposite in the case of talents, with formal institutional learning accounting for most of the developmental activity, and spontaneous learning having a more modest contribution.

The prevalence question. Any definition of normative concepts must

specify how subjects differ from the norm and what it means in terms of the prevalence of the population subsumed by the label. In the *DMGT*, the threshold for both giftedness and talent is placed at the 90th percentile. In other words, those who belong to the top 10% of the relevant reference group in terms of natural ability (for giftedness) or achievement (for talent) receive the relevant label. This generous choice of threshold is counterbalanced by the use of five successive levels of giftedness or talent based on the metric system (Gagné, 1998). Thus, within the top 10% of "mildly" gifted or talented persons, the *DMGT* identifies the following four progressively more selective subgroups, labeled "moderately" (top 1%), "highly" (top 1:1,000), "exceptionally" (top 1:10,000), and "extremely," or "profoundly" as some scholars prefer (top 1:100,000), respectively.

B. *The 'supporting cast' trio*

The talent development process is facilitated (or hindered) by the action of two types of catalysts; *intrapersonal* and *environmental* (see Figure 1). The last component, chance, temporarily associated with the catalysts, will have its precise role revised in the near future.

Intrapersonal catalysts (I). The intrapersonal catalysts include physical and psychological factors, many of them under the partial influence of the genetic endowment. Among the psychological catalysts, motivation and volition play a crucial role in initiating the process of talent development, guiding it and

sustaining it through obstacles, boredom, and occasional failure. Self-management gives structure and efficiency to the talent development process, as it does to other daily activities. Hereditary predispositions to behave in certain ways (temperament) and acquired styles of behavior (e.g., traits and disorders) also contribute significantly to support and stimulate, or slow down and even block, talent development.

Environmental catalysts (E). The environment manifests its significant impact in four different ways. The *milieu* exerts its influence both at a macroscopic level (e.g., geographic, demographic, sociological) and at a more microscopic level (e.g., size of family, age and gender of siblings, socioeconomic status). Many different *persons*, not only parents and teachers, but also siblings and peers, may have positive or negative influences on an individual's talent development process. Gifted education programs within or outside the school belong to the *provisions* category, as do similar types of programs in other fields; these more systematic forms of intervention contribute to foster the talent development process, while their absence can affect that process negatively. Finally, significant *events* (the death of a parent, a prize or award, a major accident or illness) can alter the course of talent development one way or the other.

Chance (C). Chance could be added as a fifth causal factor associated with the environment (e.g., the chance of being born in a particular family; the chance of the school in which the child is enrolled

offering a program for talented students). But, strictly speaking, it is *not* a causal factor. Just like the type of influence (positive *vs.* negative), chance characterizes the *predictability* (controllable *vs.* uncontrollable) of elements belonging to three other components (*G, I, or E*). Chance's crucial involvement is well summarized by Atkinson's (1978) statement that all human accomplishments can be ascribed to "two crucial rolls of the dice over which no individual exerts any personal control. These are the accidents of birth and background. One roll of the dice determines an individual's heredity; the other, his formative environment" (p. 221).

C. *The dynamics of talent development*

For the model to become a theory, the six components need to be dynamically associated. Here are a few rules and principles of the theory part of the *DMGT*.

1. *Basic overview.* The relationships among the six components are expressed through a complex pattern of interactions. The most fundamental one is the causal relationship between natural abilities (gifts) and competencies (talents), illustrated by the large central arrow in Figure 1. Because gifts are the constituent elements (or raw materials) of talents, it follows that the presence of talents implies underlying gifts. But that statement needs to be qualified. Of course, *I* and *E* catalysts, as well as the *D* component, play a significant facilitating (or hindering) role in the

developmental process. As causal agents they take away from gifts part of the predictive power for talent emergence, thus reducing the causal power of gifts to a moderate level. Consequently, at low levels of talent, we could observe individuals with natural abilities below the gifted level reaching talent-level performances through strong inputs from intrapersonal and/or environmental catalysts, as well as from the developmental process itself (amount and intensity of learning and practicing). This moderate relationship between gifts and talents also means that gifts can remain undeveloped, as witnessed by the well-known phenomenon of academic underachievement among intellectually gifted children. As shown by the arrows in Figure 1, the causal components usually act through the developmental process, facilitating or hindering the learning activities and thus the performance.

2. *What makes a difference?* Are some components generally recognized as exercising more powerful influences on talent emergence? It is possible to find in the scientific literature strong defenders for each of the *DMGT*'s components. It is clear, for instance, that dedicated environmentalists (e.g., Bloom, 1985) will choose the *E* catalysts; others (e.g., Ericsson, Krampe, & Tesch-Römer, 1993; Ericsson, Roring, & Nandagopal, 2007) defend the role of practice as the crucial element in talent development. My own review of the existing literature has brought me to propose the following hierarchy among the four components: *G*, *I*, *D*, *E*. Note that this hierarchy was

developed with regard to academic talent development. As defined in the *DMGT*, academic talent refers to the high level knowledge and reasoning skills learned in the various subject matters of the K-12 curriculum. It is best measured by school exams or standardized achievement tests. Academic talent can be observed as early as Grade 1, and continues to be measured as long as the student remains in the educational system. Most of the scientific literature described below originates from that specific context. Yet, I recently found strong support for its extrapolation to talent development in sports. I only have space here to briefly survey some of the major arguments buttressing my proposed hierarchy (for extended discussions, see Gagné 2003, 2004, 2005a).

The highest rank given to the giftedness component follows from the role of natural abilities as the building blocks of the knowledge and skills that define a specific talent field. In the educational field, the most relevant natural abilities are cognitive. So, it is not surprising that the best predictor of academic talent is an IQ test, an excellent measure of general cognitive abilities (Jensen, 1980, 1998). In grade school, most correlations between IQ scores and standardized achievement tests easily reach .60. Even in high school settings, the correlations usually remain around .50.

The placement of intrapersonal catalysts in second rank brings up two questions: (a) why they follow gifts, and

(b) why they precede the developmental process. The research literature (e.g., Walberg, 1984) suggests that the best “contenders” to prominence among intrapersonal catalysts would be motivation-related constructs, namely interest —or passion— and perseverance. But, what does research say about these contenders? Virtually every comparative study of the *relative* explanatory power of motivational constructs over IQ measures has shown a clear superiority of the latter. After reviewing the literature, Gagné and St Père (2001) concluded that IQ scores were on average *five times* more powerful than motivation or volition in explaining individual differences in school achievement.

The second question concerns the priority of intrapersonal catalysts over the D component. A group of scholars, led by K. A. Ericsson (e.g., 1996), have been arguing for a strong causal relationship between level of talent and amount —and quality— of practice, almost to the exclusion of other causal sources, especially natural abilities (Ericsson et al., 2007; Howe, Davidson, & Sloboda, 1998). Their extreme position triggered numerous objections in the scholarly world (see comments in Howe et al., 1998). What they repeatedly overlook in their studies is the large individual differences *within* the groups they compare (e.g., amateurs vs. professionals; or music soloists vs. music teachers). In other words, Ericsson’s ‘road to excellence’ implies much more than just “practice makes perfect.” Moreover, to use a common metaphor, the D ‘engine’ needs fuel to run, and that fuel comes

directly from the intrapersonal and environmental catalysts. It is passion, competitiveness, parental support, coach admonitions, or other I or E elements that help maintain a steady regimen of learning and practice, especially when the learner encounters obstacles.

Relegating the environmental catalysts to the bottom of the causal hierarchy contradicts common sense, as well as much of the social sciences literature. Most analysts perceive environmentalism as the leading ideology in the behavioral sciences (Cohen, 1999; Harris, 1998; Pinker, 1997; Tooby & Cosmides, 1992). Yet, over the last two decades, researchers in behavioral genetics have strongly questioned the causal predominance of environmental inputs, thus triggering a heated debate (see Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000). Those who oppose the predominance of environmental interpretations advance three major arguments. The first one, commonly labeled ‘the nature of nurture,’ states that most environmental measures are partly influenced by the genotype, which artificially inflates their contribution. For example, Scarr and Carter-Saltzman (1982) demonstrated that the teaching abilities of mothers were strongly associated with their intelligence level. Rowe (1994) gives many additional examples of the genotype’s influence on ‘social’ measures. The second argument invokes the phenomenological perspective, according to which environmental influences are continuously filtered through the eyes of the persons who are targeted by them.

That perceptual filtering gives more importance to intrapersonal catalysts, strengthening the argument in favor of their placement immediately after the G component. Finally, the growing interest in the study of resilience (O'Connell Higgins, 1994), the ability of some individuals to achieve high personal maturity in spite of having suffered exceptionally negative environmental influences, suggests that major environmental obstacles can be surmounted (see Gagné, 2000, for a vivid illustration).

As a final note, creating a hierarchy should not make us forget that (a) *all* components play a crucial role in the talent developments process, and (b) that each individual story of talent emergence reveals a unique mixture of the four causal components. Said differently, the emergence of talents results from a complex choreography between the four causal components, a choreography unique to each individual situation.

3. The Weakest Link: Origin and Impacts

The above survey of the DMGT has identified four major causal links —G, I, D, and E—, each of them broken down into various sub-components that act as more specific causal links. Which of them should be judged the weakest link? This expression will have here a somewhat different meaning than in common usage. The expression targets the link most at risk to break when a chain is strongly pulled. In the present case, the expression 'weakest link' refers to the causal element

which, when compared to all others, plays *on average* the least significant role in the emergence of academic talent. In statistical terms, it would be the causal factor whose unique explanatory power is smallest in a multiple regression equation. So, which of the four components deserves the label of weakest link? It is important to specify immediately that the following discussion applies strictly to the development of academic talents within the K-12 educational system, or its equivalent outside North America. Applying this analysis to other fields, like arts, technology or sports, would possibly lead to a different diagnosis. I have not done the necessary research to ascertain how the present analysis would apply in other fields.

A. Examining environmental catalysts

The above discussion of the GIDE hierarchy points to my proposed answer. Indeed, by positioning the E component at the bottom of that hierarchy, I was fingering the environmental catalysts as the weakest link *on average* in the 'chain' of causes accounting for talent emergence. But do the four sub-components (see Figure 1) of that catalyst share equally that weakest role, or does one of them emerge more than the others?

Two unlikely candidates. I will promptly put aside two of the sub-components: special events and significant persons. In the case of special events, we only have access to anecdotal evidence in support of their presence, making it difficult to assess their

prevalence and significance in the talent development histories of individuals. In the second case, we have a somewhat similar problem. On the one hand, each young learner has parents, teachers and/or coaches, siblings (most of the time), some extended family, as well as friends. In that sense, that sub-component cannot be considered weak: there is at least a small group of these potential role figures around each child. But, do they play a significant causal role in the talent development process? Again, the available evidence remains mostly anecdotal. A few researchers did explore the beliefs of professionals and other relevant groups (e.g., college students, music students, athletes) on the question of relative causal importance of various factors (e.g., Gagné, Blanchard, & Bégin, 1999; Van Rossum & Gagné, 1994). For example, Gagné, Blanchard, & Bégin (1998) queried hundreds of young athletes and their trainers. They gave them a list of nine different characteristics (interest, perseverance, physical aptitudes, personal qualities, parental support, sport-centered family environment, amount of practice, quality of coaching, chance factors), asking them to choose two (ranks 1 and 2) that *best* distinguished very successful athletes (national or international eminence) from less successful ones (regional excellence), as well as two others (ranks 8 and 9) that *least* distinguished them. Perseverance came ahead of all others with an average ranking of 2.79, followed by three almost equally important factors: aptitudes (3.83), practice (3.89), and personality (4.04). The three environmental catalysts, as well as

chance factors, were judged least important. Schader (2001) replicated that methodology with a large group of U.S. female Olympians, and obtained very similar results. That same methodology was also used with students and teachers in music programs (Gagné & Blanchard, 2004). Again, the same four causal factors got the highest ranks, but aptitudes were judged to play the most important role. These choices again relegated environmental influences (parental supervision, family musical life) to the bottom of the list, with the chance factor. In summary, although some data would support a perceived limited causal role —of course by comparison to the other components— from surrounding individuals, there is not enough empirical information to choose that sub-component as the weakest link.

A localized candidate. Among the last two sub-components, the ‘milieu’ represents the large-scale geographic, cultural, and socio-economic dimensions of the environment. It encompasses a large diversity of factors that tend to impact talent development more indirectly than directly. For instance, a country’s climate will influence which sports will be practicable. That country’s economy will, to some extent determine how much will be available to build and maintain sport facilities. Religious beliefs will frequently influence —think of the talibans— what kind of education will be offered, and to whom. Cultural and historical circumstances will impact which talent fields become available (Csikszentmihalyi & Robinson, 1986). But, for our purposes, the most direct and relevant element of

that sub-component is the educational system, hardware (schools, personnel) as well as software (curricula). Worldwide differences between countries in terms of the quantity and quality of education systems are huge. In dozens of less developed countries (e.g., sub-Saharan Africa, central and south Asia, some Arab states), where a majority of the population survives with just a few dollars per day, a large proportion of school-age children do not have access to even the most basic form of education. In a recent report (Education For All, 2006), a UNESCO research team reveals sobering statistics. For example, close to 80 million school-aged children do not go to school at all, and tens of millions more do not attend school regularly. Moreover, not only do these countries lack teachers –well trained or not– but they suffer from high levels of teacher absenteeism. It does not mean that intellectually gifted children do not exist in these countries; according to the DMGT definition of giftedness, these countries have their top 10% just like other countries. But they lack the basic educational facilities so common in developed countries. These statistics make it clear that, in many countries, the ‘educational milieu’ sub-component would easily receive the title of weakest link. But, focusing on developed countries, where students receive a good and free education all the way up to the end of high school, does it mean that gifted and talented students are automatically offered educational services appropriate to their needs?

The real culprit. The answer to that question brings us to the last of the four

environmental sub-components: Provisions. This sub-component was earlier described with regard to the *specific* needs of gifted and talented students. Because the fundamental characteristic of these students is their easier and faster learning ability, the key concept subsuming all specific provisions for these students is ‘enrichment’ [1], namely a learning environment and curriculum that offers more than the regular classroom environment and its curriculum. That enriched learning environment can be analyzed according to two major dimensions: *content* and *format*. With regard to content, enrichment can take four different forms: Density, Difficulty, Depth, and Diversity. I call them the four Ds of enrichment (Gagné, 2007). They are named here in order of decreasing importance. The most important form, enrichment in density, corresponds essentially to faster pacing: more learning per unit of time. It is sometimes called curriculum compacting (Renzulli, Smith, & Reis, 1992). This type of enrichment leads almost spontaneously to academic acceleration. If students can cover the curriculum twice as fast as the average student, then they should be able to cover the curriculum of two grade levels in just one year. With regard to format, two major options are commonly mentioned: homogeneous grouping (ideally full-time) and accelerative enrichment, like early entrance to school, grade skipping, and the well-known Advanced Placement Program in American high schools. I find the expression ‘accelerative enrichment’ very important because it reinforces the idea that enrichment and acceleration should

not be presented as divergent avenues (one *or* the other). Indeed, every type of acceleration is inherently enriching because they all incorporate some form of enrichment in density.

In order for this sub-component to become the weakest link, we must demonstrate that neither enriched content nor relevant administrative provisions are generally available in the educational systems of developed countries. Because of the availability of empirical data, I will take as prototype the United States of America. Nobody will question their status as one of the few countries where talented students are very well served. So, how often do talented students receive appropriate pacing and enrichment? According to two major studies, published 25 and 15 years ago respectively, the answer is: "Almost never." Here are a few details.

Twenty-five years ago, the Richardson Foundation financed a large survey of enrichment practices in U.S. school districts. The results were published in a little book called *Educating Able Learners: Programs and Promising Practices* (Cox, Daniel, & Boston, 1985). One of my early readings in the field, that little book strongly influenced my beliefs and convictions concerning the special enrichment provisions that ought to be prioritized. The authors devoted a chapter to summarize the methodology and results of their national survey of enrichment provisions. They queried the total population of over four thousand school districts on their use of sixteen different types of provisions (e.g.,

enrichment in the regular classroom, part-time and full-time special classes, mentorships, special schools, early entrance to school, continuous progress, the College Board's Advanced Placement Program, dual enrollment). For each type mentioned, they included a few questions that would allow them to judge how well that particular provision was implemented in the district. The results were not very encouraging. First, about 75% of the districts sampled did not complete the survey, not a very good sign of active involvement in gifted and talented services! Among the 1172 school districts sending back completed surveys, 5930 different services were mentioned, about 4.5 on average per district out of the sixteen options proposed. But, although the authors had defined very generous criteria for "substantial" implementation, they judged that fewer than half of these services reached a minimal threshold of quality. For instance, the most common provision offered, enrichment activities in the regular classroom, was mentioned by almost 60% of the school districts. Yet, the survey analysts judged that only 25% of them were offering it with a minimal quality level. Here are some of the problems mentioned.

If we look at the Enrichment programs [in the regular classroom], we see that 58 percent of those reporting said that the students were involved in enrichment activities of some kind for fewer than three hours a week. That hardly constitutes a "program" of enrichment. Those activities involved "all the class" in 26 percent of the cases, which means

that there was no special effort among that 26 percent to offer programs specifically geared to the needs of able learners. (Cox et al., 1985, pp. 37-38).

In other words, only about 15% of the respondents were judged to offer their talented students a minimally substantial version of the most simple form of enrichment provision. As for the other fifteen types of provisions, the percentages were even lower. About a decade later, the National Research Center of the Gifted and Talented (NRCGT) conducted a large survey of ongoing enrichment practices in U.S. school districts (Archambault et al., 1993). Again, the results were, to put it mildly, disquieting. A representative U.S. sample of over 7000 third- and fourth-grade teachers received a detailed questionnaire “designed to determine the extent to which gifted and talented students are receiving differential education in the regular classroom setting” (Archambault et al., 1993, 2). The results revealed that most of the enriching activities were offered just a few times *per month*. Moreover, these activities usually targeted the whole class, leaving little specific enrichment for academically talented students. The authors concluded as follows:

“The results of this survey paint a disturbing picture of the types of instructional services gifted students receive in regular classrooms across the United States. It is clear from the results that teachers in regular third and fourth grade classrooms make only minor modifications in the

curriculum and their instruction to meet the needs of gifted students” (Archambault, et al., 1993, 5).

These studies confirm that the vast majority of gifted and talented students in U.S. elementary and middle schools have almost no access to even the most basic forms of enrichment, let alone more advanced or consistent services. Is it better at the high school level? Maybe a bit better, thanks to some honors classes, the Advanced Placement Program, and a few special ‘Governor’s schools’ for highly talented students in grades 11 and 12. Unfortunately, I know of no recent systematic survey of such provisions in American high schools. Finally, I firmly believe that the above diagnosis applies by and large to all other developed countries. It also applies indirectly to less-developed countries, since the need for a well-structured nationwide educational system becomes a much higher –and hard to reach– priority than the specific educational needs of any special population, especially intellectually gifted children.

B. *Impact on talent emergence*

One would expect that this lack of enrichment provisions would significantly affect the emergence of academically talented students. Yet, they are present in every classroom. Every teacher will easily identify at least two or three students who clearly stand out because of their constant high performances. How can academic talent emerge when schools do so little to foster its development? There is one very simple answer, and many more less simple ones.

A simple answer. The very simple answer points at the definition of talent. Recall that the DMGT defines talent as the mastery of systematically developed knowledge and skills to a level that places the learners among the top 10% of their peer group. That type of definition is typical of 'normative' concepts, concepts that target 'special' sub-populations within a larger population. Normative concepts abound. Think of terms like poverty, beauty, spiciness, obesity, tallness, city (vs. town), mountain (vs. hill). Even the concept of planet is normative, as we learned through the controversial demotion of Pluto less than two years ago. Normative concepts are operationalized through the identification of a threshold, below –or above– which objects will –or will not– receive the normative label. For example, one of the most common measures of obesity is the Body Mass Index or BMI (National Institute of Health, 1998). Nutritionists decided that people with a BMI of 25 to 29 would be called overweight, while the label 'obese' required a BMI of 30 or more. In the case of the planet Pluto, scientists used a series of criteria, among them size and sphericity, to determine which celestial bodies deserved the label of planet. These examples show that all normative concepts require some degree of consensus among professionals as to how the threshold between the haves and the have-nots will be specified. In the field of gifted education, no agreement has yet been reached concerning the position of the threshold separating the gifted –or talented– from more average peers.

But, even if professionals decided to

adopt the DMGT's threshold of top 10%, we would still have only a partial answer. Indeed, being in the top 10% certainly marks the target group as clearly above the majority of average performers, but it says little about the objective exceptionality of their achievements. It says also nothing about the size of individual differences within that small group of high achievers. There is some empirical evidence that could help estimate the extent of the negative impact –if any– of the lack of enrichment provisions. Some paint a rather optimistic picture, others less so.

Some optimistic evidence. In a recent study (Gagné, 2005b), I tried to answer various questions about individual differences in academic achievement. I adopted as my database the norms prepared by the publisher of the *Iowa Tests of Basic Skills (ITBS, 2001)*. The ITBS is a standardized achievement test administered in thousands of schools in the United States. It has many forms that cover grades 1 to 9. One of them is called the *Survey Battery*. The ITBS norms are based on grade level samples of approximately 20,000 students. The raw scores obtained by students on any form can be transformed into various standardized scales (e.g., percentiles, stanines), among them a 'developmental standard scale' (SS). The SS scale transforms raw scores from any grade level into a single continuum, thus allowing comparisons between students across all grades covered by the test. The SS scale values range from 110, the lowest score in Grade 1, to 369, the highest score in Grade 9.

Table 1 shows the grade level means and ranges of the *ITBS Survey Battery* developmental scores. Note how the lowest score barely increases between grades 1 and 9. Note also how the range of within-grade achievements increases substantially over the nine grade levels, from 90 SS units in Grade 1 to 220 SS units in Grade 9; that widening gap is commonly called a ‘fan spread’ effect (Lohman, 1999). Note finally from the series of means that the amount of basic academic knowledge, as measured with this instrument, increases by 110 SS ‘units’ (260 – 150) between the end of Grade 1 and the end of Grade 9. Interestingly, that span equals the range of scores between the average Grade 9 student (SS = 260) and the highest achiever in Grade 9 (SS = 369). In other words, there is as much difference in basic knowledge mastered between the top achievers in Grade 9 and their average peers than there is between average students eight school years apart! The large size of the individual differences among high achievers can be illustrated

in another way, as shown in the rightmost column of Table 1. Taking the Grade 5 subgroup as the target group, let us see how many of them achieve as well –as measured on the SS scale– as the average Grade 6 student (mean SS score of 228). The answer is 33%, or about a third of that cohort. The comparisons with average Grade 7, Grade 8, and Grade 9 students reveal corresponding percentages of 20%, 10%, and 4%. In other words, no fewer than 4% (about one in twenty-five, or approximately one per classroom on average) of that large representative sample of Grade 5 students performed at the level of an average Grade 9 student. That’s an academic advance of *four* school years. Similar percentages of academic advance can be computed for students from other grade levels. These percentages confirm that significant numbers of K-12 students achieve well beyond their grade level peers, even though most of them never benefited from any form of enrichment provisions.

TABLE 1: Descriptive statistics based on the 1993 norms of the Iowa Tests of Basic Skills.

Grade level	Mean SS score	Range	% of ‘exceeders’ ¹
1	150	110-199	---
2	169	120-229	---
3	186	130-259	---
4	200	140-289	---
5	215	140-309	50
6	228	140-329	33
7	240	150-339	20
8	250	150-359	10
9	260	150-369	4

Data adapted from Table 1 in Gagné, 2005, page 143.

¹ Percentage of Grade 5 students who exceed the mean SS score for grade levels 5 to 9.

The other side of the coin. We have just observed clear signs that many intellectually gifted students succeed in transforming their natural reasoning abilities into high levels of academic talent. But, what would happen if the majority of these talented students had regular access to good enrichment provisions from their early years in the K-12 educational system. Are there signs that these provisions would have a significant impact on student achievement and adaptation? Indeed there are such signs. For instance, let's consider the administrative procedure of homogeneous grouping. Dozens of studies have been conducted over the past five decades on that subject, using different forms of homogeneous grouping (e.g., tracking or XYZ grouping, cross-grade grouping, honors classes), as well as different methodologies (e.g., case studies, correlational, experimental). Different researchers independently reviewed these studies, reaching sometimes quite divergent conclusions. Kulik (2003) recently surveyed these reviews. Here are some of his observations.

XYZ programs usually have negligible effects on the achievement of students in middle and low groups and small effects on the achievement of students in high groups... Evaluation results are very different for programs in which groups follow curricula adjusted to their skill levels. Cross-grade and within-class grouping programs in reading and arithmetic, for example, adjust curricula to group skills, and these programs make important contributions to student achievement. Gains of one standard

deviation in test scores of slower students are common. [#] The gains associated with advanced and accelerated classes are especially large. Classes in which talented children cover four grades in three years, for example, boost achievement levels a good deal. Enriched classes boost student achievement by more moderate amounts. The average boost from these classes is four months on a grade-equivalent scale (Kulik, 2003, 279).

Let's look now at accelerative provisions; they generated the largest number of evaluation studies. In her seminal dissertation, Rogers (1991) identified no less than 314, as well as 19 literature reviews, covering a dozen different modalities of accelerative enrichment. In a recent review of various meta-analyses, Kulik (2005) concluded as follows.

The meta-analytic results show that bright students almost always benefit from accelerated programs of instruction. Two major findings support this conclusion. First, on achievement tests, bright accelerated youngsters usually perform like their bright, older non-accelerated classmates. Second, the accelerated youngsters usually score almost one grade-level higher on achievement tests than bright, same-age non-accelerated students do. [#] The results from studies comparing accelerated students with older pupils are especially impressive because the accelerated students are at a clear disadvantage in these comparisons. In most studies of this sort, the accelerated

students are at least one year younger than their non-accelerated classmates (Kulik, 2005, 20).

All in all, large-scale evaluation studies of various forms of enrichment provisions confirm their significant positive academic impact, as well as some more modest socio-affective advantages (Lubinski, 2005). Note that most of the provisions evaluated had been implemented for rarely more than a year. What would the impact be if students had access to adequate enrichment provisions over the whole course of their K-12 education? One can only wonder!

4. Conclusions

The divergent data presented above underline the complexity of assessing the impact of lack of enrichment provisions for gifted and talented students. Still, enough evidence exists to extract two conclusions. On the one hand, the lack of enrichment provisions does not seem to affect drastically the emergence of academically talented students. Thanks to the strength of the other causal components, a majority of young intellectually gifted students achieve well enough to receive the normative label of 'academically talented.' On the other hand, the confirmed effectiveness of well-structured enrichment provisions strongly suggests that there is much room for ipsative improvement, namely a better actualization of these gifted students' potentialities. If the weakest link was reinforced through permanent enrichment provisions over the course of their K-12 education, that would

undoubtedly increase the students' academic performance by a significant margin.

The normative and ipsative perspectives outlined above become munitions for two opposing groups. On the one hand, a large proportion of educators, administrators as well as teachers, bring up the large numbers of high and exceptional achievers to support their position, namely maintaining enrichment provisions toward the bottom of the education system's priority list. They assert: "See? Talent emerges anyway! Bright kids shine whether or not they get special services! There is no urgent need to plan special provisions for them." They point out simultaneously at a much larger percentage of low achievers who struggle every day just to remain afloat as teachers introduce new knowledge. Where should the priorities be put? Who should get immediate attention? For them, the answer is clear. On the other hand, educators who favor enrichment services advance the ipsative viewpoint. They bring forth the positive academic and social impacts of enrichment provisions, and try to convince their colleagues that talented students could progress at a much faster pace if a substantial proportion of their waiting time disappeared through enrichment in density. Moreover, that enriched environment would contribute simultaneously to increase their motivation for learning, strengthen their social and emotional well-being, as well as prepare them better to face later learning challenges.

At this point in time, as confirmed by the identity of the weakest link, the defenders of the low priority position clearly dominate in the educational community of all developed countries. The fact that this domination has endured since the very beginning of our modern educational system says a lot about the major challenge facing scholars and educators who believe in the special educational rights of intellectually gifted students. In order to confront that major ideological challenge, we will need to invest all our energies on planning powerful advocacy strategies. The Belin/Blank Center in Iowa, and GERRIC in Australia, generously supported financially by the Templeton Foundation, recently targeted the subject of accelerative enrichment; they showed what good advocacy could look like (Colangelo, Assouline, & Gross, 2004). But, that is just one initiative addressing one specific enrichment provision. Much more will be required if we hope to see enrichment provisions lose their 'weakest link' label in the near future. And that 'much more' should become THE priority in the field of gifted education. As I recently argued in proposing an eleventh commandment (Gagné, 2006) to my initial list of ten (Gagné, 2007): "Thou shalt advocate... unremittingly!"

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Notes

- [1] Although many scholars and professionals perceive the term "enrichment" as politically incorrect, I believe we should insist on its use instead of the term *differentiation* preferred by most professionals in the field. In my view, the term enrichment clearly describes the specific type of differentiation appropriate for talented students.

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Resumen:

El desarrollo del talento: sobre el eslabón más débil

En este trabajo se analizan, en primer lugar, los factores causales implicados en la aparición del talento de acuerdo con el modelo diferenciado de superdotación y talento del autor (DMGT). Después se describen los seis componentes del modelo y se establecen algunas de las relaciones entre ellos. A partir de las precisiones que se realizan acerca del subcomponente de "provisión de enriquecimiento", dentro del componente de los "catalizadores ambientales", se precisa que éste es, en general, el nexo causal más débil en la aparición y desarrollo del talento justificándose esta elección. Se analizan diversas implicaciones derivadas de este hecho y se apunta al desarrollo de programas como el único modo efectivo para asegurar una implantación mayor en las escuelas de actividades de enriquecimiento.

Descriptor: Superdotación, talento, desarrollo del talento, catalizadores intrapersonales, ambiente, medidas de enriquecimiento.

Summary:

Talent Development: Exposing the Weakest Link

This article first surveys the various causal factors involved in the emergence of academic talent as they appear in the author's *Differentiated Model of Giftedness and Talent* (DMGT). The model's six components are describe, as well as some interactions between them. The author then pinpoints the sub-component 'enrichment provisions' within the component 'environmental catalysts' as the weakest causal contributor to talent emergence *on average*, explaining how that choice was made. Various impacts of that weakest link status are discussed, leading to a plea for major advocacy programs as the only effective way to ensure a much larger implementation of enrichment provisions in schools.

Key Words: Giftedness, talent, talent development, intrapersonal catalysts, environment, enrichment provisions, advocacy.