LEADING CHANGE

IN GIFTED EDUCATION

THE FESTSCHRIFT OF DR. JOYCE VANTASSEL-BASKA

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CHAPTER 6

BUILDING GIFTS INTO TALENTS:

Detailed Overview of the DMGT 2.0

by

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I have no special gift. I am only passionately curious.

—Albert Einstein

The Differentiated Model of Giftedness and Talent (DMGT) first appeared in French 25 years ago, 2 years before being formally described—and named—in an American publication (Gagné, 1985). Over the next two decades, I regularly introduced minor improvements to the model, mainly by enriching either of its components. During that period, but mainly after my official retirement in 2001, I began accumulating questions, suggestions, and addenda aimed at improving further the DMGT. As the 25th anniversary of the DMGT's birth approached, I decided to bring all of these bits and pieces together into a major update of the former model, progressively transformed into a talent development theory. The term *major* might be judged an overstatement because the core of the DMGT remained untouched, namely the basic distinction between gifts and talents, as well as the five major components linked dynamically to express the talent development process. Still, the large number of minor changes to each component, as well as new additions (e.g., the DMGT's underpinnings, the three subcomponents of the talent development component), could justify in an aggregate way its designation as a major update. A

bit tongue-in-cheek, I followed the customs of the computer world, and named the updated theory DMGT 2.0.

No chapter-length text can encompass all of the details of the DMGT's contents and dynamics. Consequently, I propose the present text as a detailed overview—a potential oxymoron!—of the updated DMGT. This overview will cover five themes: (a) the DMGT's rationale; (b) the five components; (c) the "how many?" question; (d) the DMGT's biological underpinnings; and (e) some basic dynamic rules of talent development.

I. THE DMGT'S RATIONALE

The field of gifted education uses two key concepts, *gifted* and *talented*, to label its special population. Those who browse through the field's scientific and professional literature soon discover that the existence of these two terms does not mean the existence of two distinct concepts.

A Current Chaotic Situation

Most authors consider these two terms synonyms, just like in the common expression: "the gifted and talented are . . ." A few scholars (e.g., Joseph S. Renzulli, Robert Sternberg) even hesitate to use the term talent, focusing their whole conception of outstanding abilities on the concept of giftedness. When the two terms are differentiated, the distinction may take many forms. Some apply the term gifted to high cognitive abilities and the term talented to all other forms of excellence (e.g., arts, sports, technology). Others consider giftedness to represent a higher order of excellence than talent. Still others associate giftedness with some mature expression as opposed to a vision of talent as an undeveloped ability (U.S. Department of Education, 1993). In other words, if we were to extract from major publications in the field all of the proposed definitions for these two terms, we would end up with more than a dozen. It would not be too much of an exaggeration to associate the current status of our conceptual foundations with the biblical Tower of Babel.

As strange as it may seem, most of the field's scholars and professionals appear quite comfortable with this lack of consensus over the definition of our basic constructs. The most significant piece of evidence to that effect is a quasi-unanimous silence on that question. When specifically prodded, scholars will express either a doubt about the possibility of ever reaching some consensus or a strong opposition to any concerted effort in that direction. For instance, as part of a target article describing my positions on the nature of gifts and talents, I expressed my hope that my initiative would "launch an interactive process of discussion and debate" whose ultimate goal would be "to create a consensus among a large majority of professionals over scientifically clear and defensible positions concerning the meaning we give to the concepts of giftedness and talent" (Gagné, 1999b, p. 132). None of the five commentators reacted positively to this proposal. Two of them judged the priority of such an enterprise to be very low, while another associated my goal

with a "quixotic quest whose futility is, I believe, guaranteed" (Borland, 1999, p. 141). He concluded: "I do not think his way of doing the impossible and, in my opinion, the undesirable, will work" (Borland, 1999, p. 145). (See also Gagné, 1999a, 2004.)

Exploiting a Fundamental Dichotomy

Whereas conceptions abound and often contradict one another, scholars keep mentioning one particular idea in almost every discussion of the giftedness construct. They acknowledge, implicitly or explicitly, a distinction between early emerging forms of giftedness with strong biological roots and fully developed adult forms of giftedness. That distinction is expressed through pairs of terms like potential/realization, aptitude/achievement, and promise/fulfillment. The DMGT was created to take advantage of that distinction; it became the basis for new differentiated definitions of these two terms. *Giftedness* designates the possession and use of outstanding natural abilities, called aptitudes, 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 abilities, called 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 age peers who are or have been active in that field.

These definitions reveal that the two concepts share three characteristics: (a) both refer to human abilities; (b) both are normative, in the sense that they target individuals who differ from the norm or average; and (c) both target individuals whose "nonnormal" status comes from outstanding behaviors. These commonalities help understand why so many professionals and laypersons confound them. Indeed, most dictionaries, even those specialized in the social sciences, commonly define giftedness as talent and vice-versa. Note that both definitions concretize the meaning of *outstanding* with precise estimates of prevalence: the "how many?" question. Assuming that most human abilities manifest themselves as normal—or bell curve—distributions, the DMGT states that gifted and talented individuals occupy the top 10% of any such ability distribution. From these two definitions, we can extract a simple definition for the talent development process: Talent development corresponds to the progressive transformation of gifts into talents.

These three components, giftedness (G), talent (T), and the talent development process (D), constitute the basic trio of components within the DMGT. Two additional components (see Figure 6.1) complete the structure of this talent development theory: intrapersonal catalysts (I) and environmental (E) catalysts.

II. The Five Components

Gifts (G)

Domains. The G component of the DMGT clusters natural abilities into six groups, called *domains*. Four of these domains belong to a mental subcomponent:

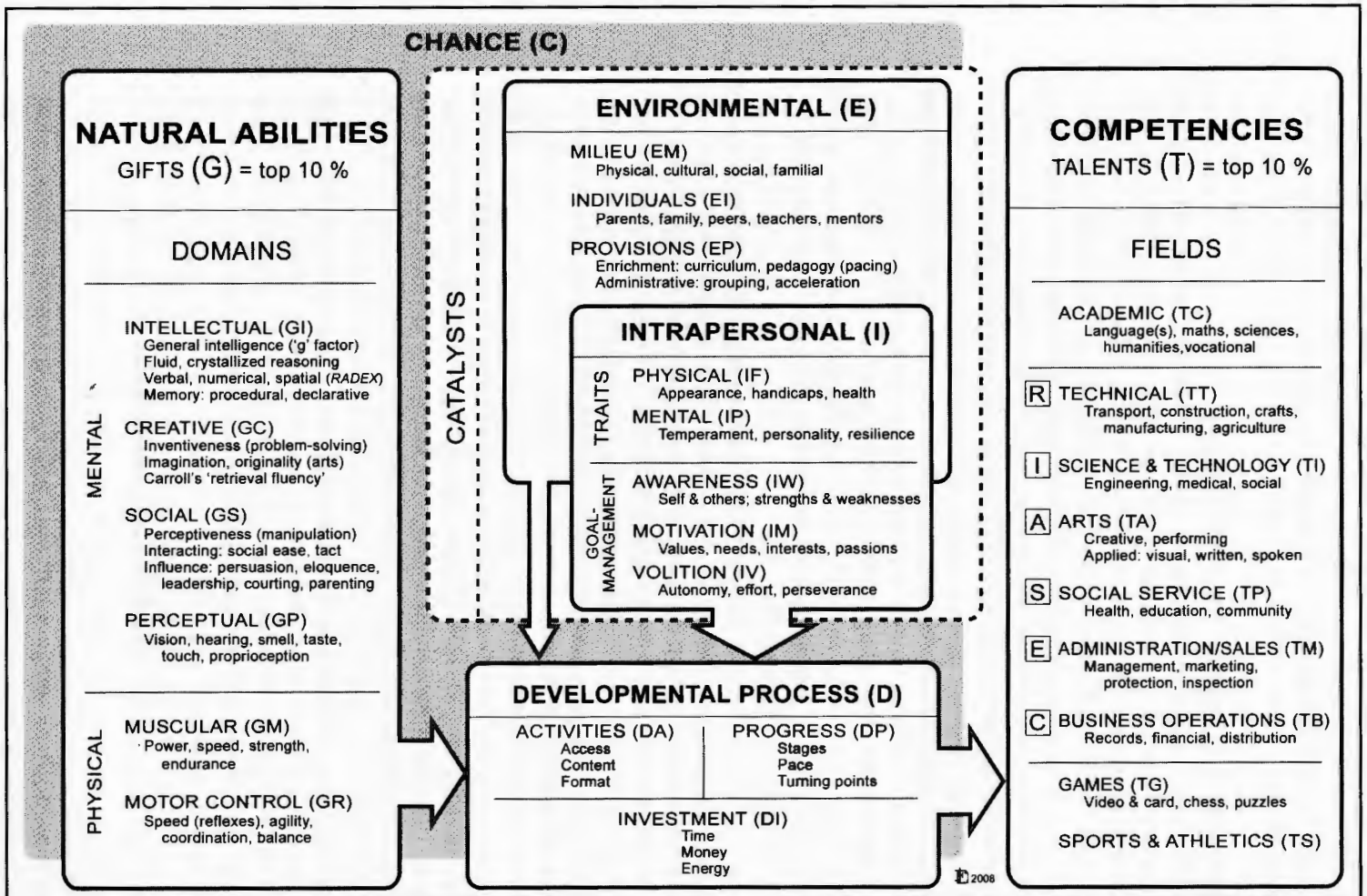

FIGURE 6.1. Gagné's Differentiated Model of Giftedness and Talent (DMGT), version 2.0, updated 2008.

intellectual (GI), creative (GC), social (GS), and perceptual (GP). Before the 2.0 update, the perceptual domain was embedded into a larger sensorimotor domain. Yet, although our knowledge of the outside world begins with sensory impressions, most of the treatment of that information happens within the brain, in areas devoted to each of the six senses, as well as the cortex. It is definitely much more mental than physical. On the other hand, even though they also begin as brain processes guiding neuronal impulses to the muscles, motor activities are directly observable in human movement. It justifies their recognized status as physical abilities. Examination of various category systems for physical abilities (e.g., Bouchard & Shepard, 1994; Burton & Miller, 1998) led to their subdivision into two major groups: muscular (GM) abilities devoted to large physical movements and abilities representing fine motor control and reflexes (GR). Both usually contribute to complex physical activities (e.g., tennis, baseball, gymnastics).

We can observe natural abilities in most tasks children confront in their daily activities and their schooling. Think, for instance, of the intellectual abilities needed to learn to read, speak a foreign language, or understand new mathematical concepts. Think of the creative abilities involved in writing a short story, composing a song, drawing an attractive poster, or playing with LEGO blocks. Notice also the social abilities children use in their daily interactions with classmates, teachers, and parents. Finally, perceptual and physical natural abilities guide activities in the schoolyard, in neighborhood sports, or arts (dance, sculpture, crafts).

Natural abilities are not innate; they do develop over the whole course of a person's life, but probably much more during the early part of that life (see Section IV). Gifts manifest themselves more easily and directly in young children because only limited systematic learning activities have begun transforming them into specific talents. Still, we can observe them in older children and adults through the facility and speed with which individuals acquire new knowledge and skills. We can assume that the easier or faster the learning process, the higher the underlying natural abilities. Many scholars have stressed the link between natural abilities and learning pace. For instance, Gottfredson (1997) stated: "Although researchers disagree on how they define intelligence, there is virtual unanimity that it reflects the ability to reason, solve problems, think abstractly, and acquire knowledge" (p. 93). Carroll (1997) similarly affirmed: "Experts have largely neglected what seems to be an obvious conclusion to be drawn from the evidence from IQ tests: that IQ represents the degree to which, and the rate at which, people are able to learn" (p. 44).

Measures. Three domains, the intellectual and both domains of the physical subcomponent, have developed psychometrically valid measures of natural abilities. IQ tests, administered either in groups or individually, are generally recognized as the most reliable and valid assessments of general cognitive functioning. In the two motor domains, one finds complex batteries of tests to assess the physical fitness of children in elementary or junior high schools (President's Council on Physical Fitness and Sports, 2001). The creative domain also has tests, but their psychometric qualities remain well below those of IQ tests, especially in terms of convergent validity (Plucker & Renzulli, 1999). Because of its more recent exploration, the

social domain lags behind in terms of psychometrically sound measures; available instruments predominantly revolve around self-assessments or peer judgments. Finally, some measures can be associated with the perceptual domain—for example, tests of auditory discrimination used to assess musical aptitudes.

Talents (T)

Fields. Before the 2.0 update, the DMGT figure illustrated the diversity of talent fields with examples applicable to high school students. No effort had been made to use an exhaustive taxonomy of occupations. I chose the ACT's World-of-Work map taxonomy (ACT, 2008). It has its source in John Holland's well-known RIASEC work-related classification of personality types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (RIASEC). These six basic types lead to the six major occupational groups in the center of the Talent component in Figure 6.1. Occupations are further subdivided into 26 smaller groups summarily identified within each of the RIASEC categories. The World-of-Work map omits three major talent fields: (a) K–12 academic subject matters, (b) games, and (c) athletics and sports. Their addition in Figure 6.1 should make the DMGT's talent taxonomy fairly complete. Note the lack of elitism in the DMGT's concept of talent. Contrary to most scholars, who tend to borrow their examples from eminent achievements in elite professions (e.g., inventors, internationally renowned artists, prize winners), I have defined the concept of talent in such a way that it ensures the presence of many individuals—the top 10%—in almost every human occupation.

Measures. An appropriate survey of assessment measures of developed skills would require covering hundreds of distinct occupations. Only general guidelines here are possible. Basically, the measurement of talent is a straightforward enterprise: Talent simply corresponds to outstanding performance in the use of the specific skills of any occupational field. During the developmental phase of any talent, whether academic, artistic, technological, or athletic, many occasions for normative assessments present themselves: teachers' exams, achievement tests, competitions, scholarships, and so forth. After individuals have completed their training, performance rankings usually disappear. How will you know if the plumber you have called is below or above average compared to peers? How about the mechanic working on your car, the dentist repairing a filling, the accountant preparing your income tax return, or the coach managing your child's hockey team? Most of the time, the only guideline will be word of mouth. Even when assessments are available, their validity often is partly questionable because they rely mostly on peer or superiors' ratings (Anastasi & Urbina, 1997). Athletics and sports stand out as the only major field in which talent assessment remains possible over the whole career of its members. As anyone could observe during the recently completed 2008 Olympics, individual differences between athletes is evidenced clearly on scoreboards. Only professional athletes have to deal with constant normative comparisons of their performances!

The Talent Development Process (D)

Until the present update, the talent development component had received much less attention than the others since the creation of the DMGT. I had said little about it beyond mentioning that it comprised four distinct processes: maturation, spontaneous learning, systematic but unstructured (autodidactic) skill development, and systematic and structured (e.g., school, team, conservatory) talent development. A review of the literature on talent development, not just in academics, but also in arts and sports, led to a more formal definition of the talent development process than the brief one proposed earlier in this chapter. *Talent development* is the systematic pursuit by talentees, over a significant period of time, of a structured program of activities aimed at a specific excellence goal. The neologism *talentee*—analogous to mentoree—labels anyone actively involved in a talent development program in any field. Based on my classification of the information I had gathered on the talent development process, I subdivided the D component into three main subcomponents (see Figure 6.1): Activities (DA), Investment (DI), and Progress (DP). Then, I further subdivided each of these three subcomponents into more specific elements. Here is a brief overview of the result of that differentiation.

Activities (DA). The talent development process begins when a child, an adolescent, or an adult accesses (DAA), through identification or selection, a systematic, talent-oriented and long-term program of activities. The talent development activities include a specific content (DAC), the curriculum, offered within a specific learning environment (DAF or format). That learning environment may be either unstructured (autodidactic learning) or structured (e.g., school, conservatory, sport organization).

Investment (DI). This subcomponent serves to illustrate *quantitatively* the intensity of the talent development process in terms of time (DIT), money (DIM), or psychological energy (DIE). These three indices usually lead to longitudinal curves showing increases or decreases over weeks, months, and years; they also can be used to compare talentees. The energy construct is not as easy to operationalize as the other two. It could be assessed as passion, concentration during practice, or determination to achieve; it parallels to a large extent the "deliberate" in Ericsson's concept of deliberate practice (Ericsson, Krampe, & Tesch-Römer, 1993).

Progress (DP). The progress of talentees from initial access to peak performance can be broken down into a series of stages (DPS). Researchers interested in the development of expertise often use a simple system of stages: novice, advanced, proficient, and expert. Sports and arts have adopted a geographically based system of stages: local excellence is the lowest rung, followed by regional, provincial/state, national, and international excellence (Oldenziel, Gagné, & Gulbin, 2003). Special access criteria and developmental activities characterize these different levels or stages. One of the best-known systems of stages found in education follows students from kindergarten through elementary school, high school, college, graduate, and postgraduate studies. Just completing either of its two highest levels could be considered a talented achievement.

The measurement of pace (DPP) constitutes the main quantitative representation of talentees' progress within and between developmental stages. We can assess pace with both ipsative and normative measures. Ipsatively, talentees can measure their progress over time, trying to improve on previous achievements or personal bests. But, within the context of talent development, normative assessments are the rule: how fast talentees are progressing with regard to peers who are pursuing a similar talent development program, at the same level of course.

Finally, the long-term developmental course of talentees will be marked by a series of more or less crucial turning points (DPT): being spotted by a teacher or coach, receiving an important scholarship, or accidents, as well as positive (falling in love) or negative (death of a close one) personal events impacting the developmental process. This element replaces a former environmental subcomponent called Events.

Intrapersonal (I) and Environmental (E) Catalysts

The 2.0 update of the DMGT has brought a few significant changes to the catalysts: (a) the repositioning of Chance outside the catalyst area, (b) the repositioning of the environmental catalysts on the same side, and partially behind, the intrapersonal catalysts, and (c) the already mentioned transfer of the Events subcomponent to the Progress subcomponent within the D component. I will discuss these changes later in this subsection.

Generalities. In chemistry, catalysts facilitate and accelerate a chemical process; they also remain unmodified after their contribution. Their DMGT metaphorical counterparts differ in two ways: (a) they may exert—by their presence or absence—both positive and negative influences, and (b) they may be permanently transformed through their involvement in the developmental process. With regard to the first difference, think of the various ways parents can impact, both positively and/or negatively, the talent development of their child. As for the second difference, there are so many examples of a talentee's motivation toward a field being permanently transformed, either positively or negatively, through his or her involvement in a talent development process.

Intrapersonal (I) catalysts. The set of intrapersonal catalysts went through an important update a few years before the recent 2.0 update (Gagné, 2003a). I partly borrowed the revised structure from a conception of self-management proposed by De Waele, Morval, & Sheitoyan (1993). This redefinition produced a new dichotomy among intrapersonal catalysts: (a) relatively stable physical and mental traits, and (b) goal-oriented processes.

Physical traits (IF) include general appearance, racial or ethnic traits, handicaps (think of the Paralympic Games), chronic illnesses, and so forth. These catalytic physical traits differ qualitatively (through their role) from physical characteristics that directly impact the level of natural physical and mental abilities (e.g., tallness in basketball, hand span in music, flexibility in dance). These templates help pinpoint young individuals who might succeed because of their specific "build." These ability-related physical characteristics belong to the DMGT's biological underpinnings (see Section IV).

Mental characteristics (IP) cluster around two major constructs: temperament and personality, which represent the nature and nurture poles respectively, or basic tendencies as opposed to behavioral styles (McCrae et al., 2000). Most personality researchers recognize the existence of five basic bipolar personality dimensions, called "The Big Five" (Digman, 1990) or the Five-Factor Model (FFM). There is growing evidence for a close relationship between temperament dimensions and adult personality traits; that relationship probably explains why all FFM dimensions have significant genetic underpinnings (Rowe, 1997).

The goal-management dimension includes three subcomponents: awareness (IW), motivation (IM), and volition (IV). Being aware of one's strengths and weaknesses, both within the G and I components, plays a crucial role in the planning of talentees' developmental activities; these strengths and weaknesses also concern environmental influences. Goal-oriented processes may be differentiated according to goal-identification activities (IM), as opposed to goal-attainment activities (IV): *what* we want to achieve and *how* we will go about reaching that goal. I borrowed this interesting dichotomy from Kuhl and Heckhausen's *Action Control* theory (see Corno, 1993). Note that the term *motivation* is given here a more restrictive definition than in lay language and most psychology textbooks, where it commonly covers both goal-identification and goal-reaching activities. The IM subcomponent includes the identification—and occasional reassessment—of an appropriate talent-development goal. Talentees will examine their values and their needs, as well as determine their interests or be swept by a potential—but rare—passion. The loftier the goal, the more difficulties talentees will encounter in their efforts (IV) to reach it. Long-term goals placed at a very high level will require an intense dedication, as well as daily acts of willpower to maintain practice through obstacles, boredom, and occasional failure.

Environmental (E) catalysts. In older versions of the DMGT, environmental catalysts appeared *below* a central arrow that graphically illustrates the developmental process as a progressive transformation of gifts into talents. In this 2.0 update, the E catalysts have been moved up and partially behind the intrapersonal catalysts. The partial overlap of the two catalysts signals the crucial *filtering* role that the I component plays with regard to environmental influences. The narrow arrow at left indicates some limited direct E influence on the developmental process. But, the bulk of environmental stimuli have to pass through the sieve of an individual's needs, interests, or personality traits. Talentees continually pick and choose which stimuli will receive their attention.

The E component comprises three distinct subcomponents. The first one, called *milieu* (EM), can be examined both at a macroscopic level (e.g., geographic, demographic, sociological) and a microscopic level (e.g., size of family, socioeconomic status, neighborhood services). For example, young gifted persons who live far from large urban centers do not have easy access to appropriate learning resources (e.g., sports training centers, music conservatories, magnet schools). Within the child's home environment, the parents' financial comfort, the absence of one of the caregivers, the number and age distribution of siblings within the family, as well

as many other elements of the immediate environment can have some degree of impact on the child's talent development. The second subcomponent, *individuals* (EI), focuses on the influence of significant persons in the talentee's social environment. It includes, of course, parents and siblings, but also the larger family, teachers and trainers, peers, mentors, and even public figures adopted as role models by talentees. The significant impact of interpersonal influences is probably easier to imagine than that of any other source of influence within the environment. Moreover, the traditional environmentalist beliefs of most professionals in the social sciences, for whom nurture is a much more powerful agent than nature, increases the importance of humans as significant agents in the lives of their fellow humans. Thus, it is not surprising that a good percentage of the professional literature on talent development examines the potential influence of significant individuals in the immediate environment of gifted or talented youngsters.

The third subcomponent, *provisions* (EP), covers all forms of talent development services and programs. The two traditional subcategories of enrichment and administrative provisions directly parallel the *Content* (DAC) and *Format* (DAF) subcategories of the DA subcomponent earlier described. Here we adopt a broader outlook rather than examine provisions from the strict perspective of a given talentee's talent development course. *Enrichment* (EPE) refers to specific talent development curricula or pedagogical strategies; its best-known example is called enrichment in density or curriculum compacting. *Administrative* (EPA) provisions are traditionally subdivided into two main practices: (a) part-time (e.g., clusters, pull-out classes) or full-time ability grouping, and (b) accelerative enrichment (e.g., early entrance to school, grade skipping, Advanced Placement programs).

About the Chance Factor

I borrowed the chance factor from Tannenbaum (1983), the first scholar in the field to discuss its role in talent development. Chance's placement within the DMGT has evolved considerably over the years. It was first introduced as one of five environmental subcomponents. In the early 1990s, it became a qualifier of environmental factors, and was placed in the margin of that component. But, that solution did not satisfy me; chance did influence other components. After disappearing for a few years, chance came back as the third member of a trio of catalysts. Although its reappearance as a full-fledged component pleased a majority of DMGT aficionados, I remained dissatisfied with that solution. I finally realized that its true role was that of a *qualifier* of *any* causal influence, along with direction (positive/negative) and intensity (see Generalities above); chance represented the degree of control that talentees had over the various causal factors affecting their talent development.

A famous psychologist in motivation, John William Atkinson, once stated that all human accomplishments could be ascribed to two crucial "rolls of the dice" over which no individual exerts any personal control: the accidents of birth and background. Indeed, we do not control the genetic endowment received at conception; yet, that genetic endowment affects both our natural abilities (the G component) and our temperament, as well as other elements of the I component.

Moreover, we do not control in which family and social environment we are raised. These two impacts alone give a powerful role to chance in sowing the bases of a person's talent development possibilities.

Because of this redefined role, the chance factor should no longer appear in a visual representation of the DMGT. But, because of its popularity among DMGT fans—as well as my personal attachment to it—I created some room for it (see Figure 6.1) in the background of the components it influences.

III. Prevalence and Levels

How many people are gifted and/or talented? The prevalence question represents a crucial definitional element in the case of normative constructs, which, like giftedness and talent, target a small proportion of the whole population. Practically speaking, adopting a threshold of 10% instead of 1%—a tenfold difference in estimated prevalence—has a huge impact on selection practices and educational provisions!

Current Situation

The "how many?" question has no absolute answer; nowhere will we find a magical number that automatically separates those labeled gifted or talented from the rest of the population. The choice of an appropriate threshold requires that professionals come to a consensus. Nutritionists achieved such a consensus when they created the Body Mass Index, with its thresholds of 25 and 30 respectively to separate normal weight from overweight, and overweight from obesity (National Institute of Health, 1998). But, such a consensus does not exist in our professional field. It leaves room to a diversity of practical thresholds. Scholars' proposals can easily range from the 1% adopted by Terman (1925) with his threshold of a 135 IQ, or the 3% to 5% in the famous Marland (1972) definition, to the 20% advanced by Renzulli (1986) to create the talent pools in his Revolving Door model. What about the ratios used in school districts? In a survey of state policies, Mitchell (1988) pointed out that "states using intelligence and achievement test scores for identification generally use cut-off points which range between the 95th and 98th percentile levels" (p. 240).

The MB System

In the DMGT, the threshold for both the giftedness and talent concepts is placed at the 90th percentile (Gagné, 1998b). 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) deserve the relevant label. This generous choice of threshold is counterbalanced by the recognition of levels or degrees of giftedness or talent. There are five hierarchically structured levels inspired by the metric system; each new level includes the top 10% (one decimal place) of the preceding level. This metric-based (MB) system of levels constitutes an intrinsic constituent of the DMGT. Within the top 10% of *mildly* gifted or talented persons, the four

progressively more selective subgroups are labeled *moderately* (top 1%), *highly* (top 1:1,000), *exceptionally* (top 1:10,000), and *extremely* or *profoundly* (top 1:100,000). Note that the MB system of levels applies to every domain of giftedness and every field of talent. Because giftedness domains are not closely correlated, individuals gifted in one domain are not necessarily the same as those gifted in another. Consequently, the total number of gifted and talented individuals largely exceeds the 10% value. Some studies indicate that it might well be two or three times larger (Bélanger & Gagné, 2006; Gagné, 1998a).

Comment

An unfortunate habit of many keynote speakers in the field of gifted education consists in using examples of gifted or talented behaviors taken from children who show extraordinary precocity either in verbal, mathematical, scientific, moral, or social development. As attractive as such examples may be to impress an audience, they illustrate behaviors that the vast majority of gifted students identified in school districts—the *mildly* gifted or talented between the 90th and 99th percentiles—will rarely show. According to the DMGT's MB system of levels, the prevalence of *exceptionally* gifted individuals (intellectually), those with IQs of 155 or more, is approximately 1:10,000 within the general population. Because the DMGT defines the total gifted population as the top 10% (IQs ≥ 120) of the same-age general population, the prevalence of exceptionally gifted individuals *within the gifted population* does not exceed 1:1,000. It corresponds to one such student in 30 to 40 homogeneous groups of intellectually gifted students. Even full-time teachers of the gifted would, in the course of their 35-year professional career, encounter at best just a few of them. In short, exceptional giftedness or talent—and all the more *extreme* giftedness or talent—is a very rare phenomenon. Consequently, when we present extreme examples of behavior to groups of parents or teachers, we risk conveying a distorted image of who the "garden variety" of gifted and talented individuals really is. And, if we present giftedness and talent as very exceptional phenomena, we might tempt school administrators to judge that such a rare population does not require large investments of time and money to cater to their special needs.

IV. UNDERNEATH THE DMGT

The subject of the biological underpinnings of talent development originates from users' questions and personal observations. The questions addressed the absence in the DMGT of specific references to anatomical structure (e.g., tallness for basketball players, joint flexibility for gymnasts, or brain size for intelligence), physiological processes (e.g., speed of nerve impulses, VO_2max), or specific genetic effects as causal influences in the emergence of outstanding gifts or talents. The observations relevant to this question concerned a frequent misinterpretation by DMGT users of the giftedness vs. talent differentiation. They oversimplified that differentiation by

opposing the terms *innate* and *systematically developed.* Judging natural abilities to be innate went far beyond recognizing a genetic origin for natural abilities.

About Innateness

When we say that little Mary is a "born" pianist, we are certainly not implying that she began playing the piano in the hospital nursery, nor that she was able to play a concerto within weeks of beginning her piano lessons. Describing her talent as innate only makes sense metaphorically. It will convey the idea that Mary progressed rapidly and seemingly effortlessly through her talent development program, at a much more rapid pace than that of her learning peers. The same applies to any natural ability. Intellectually precocious children develop their cognitive abilities by going through the same developmental stages as any other child. The difference resides in the ease and speed with which they will advance through these successive stages. The term *precocious* says it all: They reach a given level of knowledge and reasoning *before* the vast majority of learning peers. And, the higher their intellectual giftedness will be, the earlier these successive stages will be reached.

So, what does the term innate really mean? Researchers in behavioral genetics have given that term a very specific definition. At the behavioral level, it implies

> hard-wired, fixed action patterns of a species that are impervious to experience. Genetic influence on abilities and other complex traits does not denote the hard-wired deterministic effect of a single gene but rather probabilistic propensities of many genes in multiple-gene systems. (Plomin, 1998, p. 421)

Because of its restricted meaning, very few scientists use the term innate to describe any type of natural ability or temperamental characteristic. If natural abilities by themselves cannot be considered innate as defined above, what exactly is innate? Where does the "given" in giftedness reside? To answer that question, we need to look at the biological underpinnings of human behavior.

The DMGT's Basements

The biological underpinnings of human behavior—and by extension talent development—range in depth from gene activity at the deepest level to directly observable anatomical characteristics like tallness or body build. There are extremely complex causal paths linking these various levels of biological structures and processes. Now that the human genome has been decoded, researchers have reoriented their efforts toward pinpointing specific genes responsible for various human abilities and other personal characteristics. But, their scientific activities go well beyond the identification process itself. They try to reconstruct the complete biological chain of impacts from the proteins encoded by the identified genes to the specific intervening physiological structures and processes, all the way up to their impact on mental or physical abilities, as well as intrapersonal catalysts.

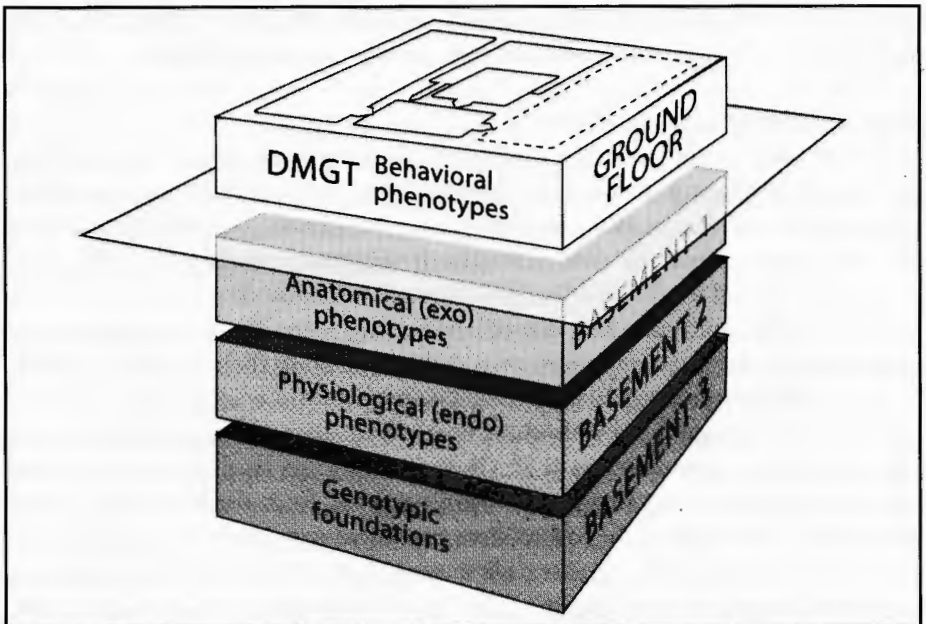

FIGURE 6.2. The DMGT's biological underpinnings.

Let us adopt a house metaphor to illustrate these various levels of influence from gene activity to behavioral expression. The house in question has a ground floor and a series of underground basements. As shown in Figure 6.2, the DMGT occupies the ground floor where directly observable and measurable behaviors manifest themselves. We often call them *phenotypes* to contrast them with gene-level, or *genotypic* activity. Every component and subcomponent we have described in Section II belongs to that ground level. Note that the talent component (T) appears as a broken line; it underlines the fact that the T component, because of its status as outcome of the talent development process, has no *direct* biological underpinnings.

A series of basements appear underneath that ground floor; they represent progressively deeper biological substrates. The number of these basements would probably provoke heated discussions among specialists. As an outsider, I gave myself the privilege of subdividing the whole gene-to-behavior substructure into three basements. At the deepest level (B-3), we find genotypic structures and processes (e.g., DNA, RNA, protein production). The second basement (B-2) contains a large diversity of physiological and neurological processes (called *endophenotypes*) that not only control a person's biological development from conception to death, but also ensure the proper functioning of body and brain. A certain number of such structures or processes already have been identified as influencing individual differences in cognitive processing, for instance, cerebral glucose metabolism or brain nerve conduction velocity (Hoppe & Stojanovic, 2008; Jensen, 1998). The highest basement (B-1) includes anatomical structures (e.g., brain size, tallness, joint flexibility) that have been associated with abilities and other personal characteristics. They are called *exophenotypes*. Most of the structures and processes associated with

either basement have little bearing on the talent development process; only relevant ones would be included in an inventory of the DMGT's basements.

Where among these three subterranean levels do we find "innate" elements? Certainly not at the first (B-1) level. Most of these anatomical structures result from extensive development; they do not achieve their maturity until adolescence or adulthood; they are clearly not innate in the way we defined that term. If we go one basement down to the level of physiological processes, we might be in a gray zone where it becomes difficult to separate innate processes from those that result from development. What seems clear is that the lowest basement, devoted to gene activity, is almost completely under inborn control.

In conclusion, the present section should have made it clear that natural abilities are neither innate nor do they appear suddenly at some point during a person's early—or later—development. Just like any other type of ability, natural abilities need to develop progressively, in large part during a person's younger years; but they will do so spontaneously, without the structured learning and training activities typical of the talent development process.

V. The Dynamics of Talent Development

The DMGT is a talent-development model. It is *not* a model representing a person's total personal development; it was not designed to address questions of moral or ethical development, or consider the growth of personal maturity. Consequently, only elements that have a significant influence on the talentee's developmental process should be introduced.

Basic Dynamic Rules

Within the DMGT, natural abilities or aptitudes act as the "raw materials" or the constituent elements of talent. It follows from this relationship that talent necessarily implies the presence of well-above-average natural abilities; in most situations, one cannot become talented without first being gifted, or close to that threshold. The reverse is not true: High natural abilities may simply remain gifts, and not be translated into talents, as witnessed by the phenomenon of academic underachievement among intellectually gifted children. There also is a dynamic association between specific gifts and talents. Because of their status as raw materials, gifts represent generic abilities that can be molded into somewhat divergent skills, depending on the field of activity adopted by a talentee. For example, manual dexterity, one of many natural physical abilities, can be molded into the particular skills of a pianist, a dentist, a typist, or a video-game player. Similarly, analytical reasoning, one of many cognitive natural abilities, can be molded into the scientific reasoning of a chemist, the game analysis of a chess player, or the strategic planning of an athlete.

In most talent development situations, each of the four causal components (G, I, E, D) contributes positively to the emergence of talents. It is assumed that

this positive contribution will become more intense as talentees attempt to reach higher talent goals. These contributions can vary a lot in intensity and continuity from one talentee's story to another. No two developmental paths look alike. This is why talent development is a very complex process, a process where the four causal components modify their interactions over the course of a talentee's developmental path. Think, for instance, of the close supervision many parents give to their children's homework in elementary school, and its virtual disappearance by the time the kids reach high school.

Illustrative Scenarios

Within the K–12 educational system, it is not rare to observe academically talented students who have invested little more in their schooling than their high natural intellectual gifts. Most of these students never show much intrinsic motivation for learning, need almost no environmental support, and invest little time in their schooling beyond presence in the classroom and occasional preexam cramming. Here are students who literally surf on their intellectual gifts. Conversely, a few students with barely above-average natural intellectual abilities may reach the bottom rung of the MB system of levels—mild academic talent—thanks to intense dedication and effort (IV), long hours of deliberate study (DI), and continuous support from both parents and teachers (EI). These two examples illustrate diverse dynamic interactions between the four causal components.

What Makes a Difference?

Do some components generally—on average—exercise more powerful influences on talent emergence? My own review of the existing literature has brought me to propose the following downward hierarchy among the four components: G, I, D, E. I have discussed this hierarchy in detail elsewhere (e.g., Gagné, 2003b). But, creating a causal hierarchy should not make us forget that in most situations all components play a crucial role in the talent development process. In a nutshell, talent emergence results from a complex choreography between the four causal components, a choreography that is unique to each individual.

VI. CONCLUSION

Four specific characteristics of the DMGT jointly make the model a distinct and unique conception of giftedness and talent.

1. The DMGT stands alone in its clearly differentiated definitions of the field's two key concepts. The separation of potentialities/aptitudes from realizations/achievements is well operationalized through a distinction between natural abilities and systematically developed skills, both concepts associated with the labels *giftedness* and *talent* respectively. This distinction leads to another clear definition, that of talent development, which becomes the transformation of specific natural abilities in one or more domains into the systematically developed skills typical of

an occupational field. Only in the DMGT does the concept of talent become as important as that of giftedness to understand the development of outstanding skills and knowledge. Finally, this differentiation between potentialities and realizations permits a much clearer definition of underachievement among gifted individuals. It becomes simply the *non*transformation of high natural abilities into systematically developed skills in a particular occupational field.

2. The introduction within the giftedness and talent definitions of prevalence estimates (top 10%) also constitutes a unique facet of the DMGT among existing conceptions of giftedness. Because it confronts the prevalence issue and proposes a metric-based system of five levels that applies to any giftedness domain or talent field, the DMGT helps maintain a constant awareness of differences *within* the subpopulations of gifted and talented individuals. The availability of clear thresholds and labels could facilitate not only the selection and description of study samples, but also the comparison of results from different studies. Moreover, the MB system of levels should remind educators in the field that the vast majority of gifted or talented individuals (90% of the top 10%) belong to the lowest or *mild* category, and that only a tiny fraction of those identified as talented in their youth will ever achieve eminence in their chosen field.

3. The DMGT's complex structure clearly identifies every significant causal factor of talent emergence, especially those located within the intrapersonal and environmental catalysts. But, that comprehensive outlook maintains the individuality of each component, clearly specifying its precise nature and role within this talent development theory. The giftedness construct remains well circumscribed, thus more easily operationalized. The catalysts are clearly situated outside the giftedness and talent concepts themselves. This sets the DMGT apart from many rival conceptions where disparate elements are lumped together in the giftedness definition itself. For instance, Feldhusen (1986) defined giftedness as follows: "Our composite conception of giftedness then includes (a) general intellectual ability, (b) positive self-concept, (c) achievement motivation, and (d) talent" (p. 112). Similarly, a group of professionals, calling themselves the Columbus Group, proposed the following definition: "Giftedness is asynchronous development in which advanced cognitive abilities and heightened intensity combine to create inner experiences and awareness that are qualitatively different from the norm" (Morelock, 1996, p. 8). Or, consider Renzulli's (1986) well-known definition: "Gifted behavior consists of behaviors that reflect an interaction among three basic clusters of human traits—these clusters being above average general and/or specific abilities, high levels of task commitment, and high levels of creativity" (p. 73).

4. Most published conceptions focus almost exclusively on intellectual giftedness (IG) and academic talent (AT), as well as academically based professions (e.g., scientists, lawyers, doctors, and so forth). That tendency led me to label IGAT the target population of most enrichment programs (Gagné, 1995). The DMGT follows an orientation adopted explicitly by only a few past scholars (e.g., DeHaan & Havighurst, 1961; Gardner, 1983; Marland, 1972), namely to broaden the concept of giftedness and acknowledge various qualitatively distinct manifestations. In that

respect, the DMGT stands almost alone in bringing physical giftedness within the fold of the giftedness construct, defining that domain much more broadly than Gardner's bodily-kinesthetic intelligence. This openness should foster closer ties between professionals focusing on academic talent development and those who devote their energies to the development of athletic talents.

Finally, there is one set of validating testimonies that this author is especially proud of. It comes from hundreds of professionals and teachers in the field of gifted education who, after discovering the DMGT, spontaneously say: "It makes so much sense."

AUTHOR'S NOTE

I consider as a great honor the invitation I received to participate in this memorial book celebrating the "official" completion of Joyce's immensely productive career as a professor, a researcher, an author, and a leader. From the first time we met 15 years ago in Iowa—guess where!—I have been one of her admirers and, hopefully, a good friend of hers. Our distinctly different professional interests have maintained our relationship more on a personal than a professional basis. As a psychologist by training, my interests lead me more spontaneously toward the DMGT's set of intrapersonal catalysts, whereas Joyce's career interests have given the lion's share to curriculum development, a clearly environmental provision (the DMGT's EPE subcomponent).

What has constantly fascinated me, year after year, is Joyce's unbounded energy and productivity, mixed with the subdued graciousness and gentility of a Southern Lady. Who would guess, at first glance, that her generous smile and ready friendliness are coupled with an iron hand and a will as strong as steel. That strong temperament regularly brought me to intense envy, thankfully of the positive, emulating type. But, just like my annual New Year vows, my regular self-promises of VanTassel-Baskaysian productivity never materialized. She is one of a kind, period! I wish her a happy well-deserved retirement, one as satisfying as the one I have enjoyed over the past 7 years. Yet, I still hope that she will regularly briefly put aside her new interests to offer us a few more of her pearls of wisdom.

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