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Motivation within the DMGT 2.0 framework

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This article begins with a brief survey of the recent update of the Differentiated Model of Giftedness and Talent (DMGT). The DMGT defines talent development as the transformation of outstanding natural abilities (called gifts) into outstanding knowledge and skills (called talents). Two types of catalysts, intrapersonal and environmental, actively moderate the talent development process. The concept of motivation is situated at the core of the intrapersonal catalysts. Borrowing from action control theory, two goal management sets of processes are differentiated. The first set targets goal-identification (pre-decisional) activities, whereas the second set deals with goal-attainment (post-decisional) activities. They are labeled ‘motivation’ and ‘volition’ respectively. The article describes these two sets of processes, especially the distinction between goals and motives, as well as some practical impacts of individual differences in motivation and volition.

Keywords: DMGT; goal management; motivation; volition; passion; intrinsic/extrinsic motives

The present issue of HAS focuses on the phenomenon of motivation as it relates to the process of talent development. My own objective within this article will be to circumscribe the role(s) played by motivation within my theory of talent development, called the Differentiated Model of Giftedness and Talent, version 2.0 (DMGT 2.0).

There is no doubt among researchers and professionals interested by the phenomenon of talent development that motivation, however it is specifically defined, plays a crucial role in the long process through which youth and adults attempt to reach excellence in any field of human activity: excellence in academic pursuits, occupational performance, artistic realizations, or athletic prowess. When Hemery (1986, p. 204) concluded his book of interviews with famous athletes by saying ‘they tell us all something about ourselves and what we may be capable of achieving, if we dream and make the commitment to work hard towards that vision’, he was directly referring to motivation. When Albert Einstein summarized the source of his achievements by saying ‘It was curiosity, obsession, and sheer perseverance that brought me to my ideas’ (Folsing, 1998, p. 7), he was also focusing on motivational concepts. Francis Galton was also highlighting these factors when he explained the source of eminence by saying ‘I do not mean capacity without zeal, nor zeal without an adequate power of doing a great deal of very laborious work ’ (1892, p. 77). I could add dozens of similar quotes going all the way back to the musings on human nature by early philosophers.

The main difficulty for any scholar interested by this domain of inquiry resides in its complexity: dozens of definitions and theories have been proposed since the early
days of scientific psychology. Dozens of terms – if not hundreds – have been more or less closely associated with this phenomenon: interests, passion, needs, values, will power, determination, perseverance, intrinsic/extrinsic motivation, and countless others. And this short list doesn’t even begin to survey the vast inventory of human motives. I do not consider myself an expert in this particular domain. But, as I tried to further analyze the components of the DMGT, I could not avoid deepening my knowledge of that complex domain. That review of the empirical literature brought me to assemble a series of ideas on the role of motivation in talent development, which I will try to summarize in the next pages. Since many readers might not have discovered yet the DMGT, especially its recent 2.0 version, I judged important to offer a basic overview of the theory; it will help them better understand where the concept of motivation fits within the model. More detailed descriptions of the theory appear elsewhere (e.g., Gagné, 2009).¹

The Differentiated Model of Giftedness and Talent (DMGT)

Among current conceptions of giftedness (see Sternberg & Davidson, 2005), the DMGT stands alone in its clear, distinct, and well-operationalized definitions of two key concepts in the field of gifted education: giftedness and talent. Most scholars in the field commonly use these two terms as synonyms, just like in the common expression: ‘the gifted and talented are...’ Occasional distinctions between the two terms will take many forms, and give rise to a diversity of views and theories (Gagné, 2004). But, an in-depth look at these divergent views brings forth one underlying consensus, namely a distinction between early emerging forms of ‘giftedness/talent’ with strong biological roots on the one hand, as opposed to fully developed adult forms of ‘giftedness/talent’. Scholars will express that distinction through pairs of terms like potential/realization, aptitude/achievement, and promise/fulfillment. It manifests itself in statements like these: ‘Talent development is important to achieving one’s full potential’ (Brody & Stanley, 2005, p. 28); ‘Being gifted means moving beyond potential to actual performance’ (Cross & Coleman, 2005, p. 53); ‘To be born with high talent potential and later possibly be talented in some career-oriented field’ (Feldhusen, 2005, p. 74).

The DMGT was created to take advantage of that distinction. As shown in Figure 1, it brings together five components: gifts (G), talents (T), a talent development process (D), intrapersonal catalysts (I) and environmental catalysts (E).

The basic talent development trio

The first trio includes the three components whose interaction summarizes the essence of the DMGT’s conception of talent development: the progressive transformation (D) of gifts (G) into talents (T). 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’ (those who have accumulated a similar amount of learning time from either current or past training).
Gifts (G)

The DMGT distinguishes six natural ability domains (see Figure 1), four of them belonging to the mental realm (intellectual-GI, creative-GC, social-GS, perceptual-GP), and the other two to the physical realm (muscular-GM, motor control-GR). Each domain constitutes a sub-component with multiple facets. Natural abilities are not innate; they do develop, especially during childhood, through maturational processes and informal exercise. Yet, that development and level of expression are partially controlled by the individual’s genetic endowment. 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, 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 and speed in learning is the trademark of any type of giftedness.

Talents (T)

As defined in the DMGT, talents progressively emerge from the transformation of these outstanding natural 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 nine talent sub-components. Six of them have their origin in John Holland’s work-related classification of personality types: realistic, investigative,
artistic, social, enterprising, and conventional (RIASEC) (see Anastasi & Urbina, 1997, chapter 14). The three others ensure an almost complete coverage of existing human occupations, as exemplified in the International Standard Classification of Occupations (ISCO) (see International Labour Organization, 2008).

**Developmental process (D)**

In this theory, natural abilities or aptitudes act as the ‘raw materials’ or constituent elements of talents; they act through the talent development process. The concept of talent development is formally defined as the systematic pursuit by talentees, over a significant and continuous period of time, of a structured program of activities leading to a specific excellence goal. The neologism *talentee* describes anyone participating in a systematic talent development program, whatever the field.

The D component has three sub-components: activities (DA), investment (DI), and progress (DP), each of them with multiple facets. Talent development begins when a child or adult gains access (DAA), through identification or selection, to a systematic program of activities. These activities include a specific content (DAC), the curriculum, offered within a specific learning environment or format (DAF). The investment (DI) sub-component quantifies the intensity of the talent development process in terms of time (DIT), money (DIM), or psychological energy (DIE). Finally, the progress (DP) of talentees from initial access to peak performance can be broken down into a series of stages (DPS; e.g., novice, advanced, proficient, expert). Its main quantitative representation is pace (DPP), or how fast – compared to their initially planned progress rate (ipsative view) or to learning peers (normative view) – talentees are progressing toward their predefined excellence goal. The long-term developmental course of a talentee will be marked by a series of more or less crucial turning points (DPT) (e.g., being spotted by a teacher or coach, receiving an important scholarship, accidents, death of a close one).

**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 (Gagné, 1998). 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) may 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. Thus, within the top 10% of ‘mildly’ gifted or talented persons, the *DMGT* identifies the following four progressively more selective subgroups, respectively labeled ‘moderately’ (top 1%), ‘highly’ (top 1:1,000), ‘exceptionally’ (top 1:10,000), and ‘extremely’ or ‘profoundly’ (top 1:100,000).

**The ‘supporting cast’**

The talent development process is facilitated (or hindered) by the action of two types of catalysts; *intrapersonal* and *environmental* (see Figure 1).
Intrapersonal catalysts (I)

The I component has five sub-components grouped into two main dimensions, namely stable traits (physical-IF, or mental-IP), and goal management processes (self-awareness-IW, motivation-IM, and volition-IV). Within the mental or personality (IP) category, we find an almost infinite list of descriptive qualities. The concept of temperament refers to behavioral predispositions with a strong genetic component, whereas the term personality encompasses a large diversity of positive or negative acquired styles of behavior (McCrea et al., 2000). The dimension called goal-management was inspired by a theory of self-management proposed by De Waele, Morval, and Sheitoyan (1993). Two of its subdivisions, IM and IV, are the focus of this article; consequently, the three sub-components of that whole dimension will receive detailed attention in the next part of this article.

Environmental catalysts (E)

The E component used to be placed below a central arrow representing the developmental process. In the 2.0 update, the E catalysts have been moved up and behind the I component. This partial overlap signals the crucial filtering role played by the I component with regard to environmental influences; the bulk of environmental stimuli have to pass through the ‘sieve’ of an individual’s needs, interests, or personality traits. The E component comprises three distinct sub-components: Milieu-EM, Individuals-EI, and Provisions-EP. The first one (EM) includes a diversity of environmental influences, from physical or geographical ones (e.g., climate, rural vs. urban living) to social or cultural ones. The second sub-component (EI) focuses on the psychological influence of significant persons in the talentees’ immediate environment. The third sub-component (EP) covers all forms of talent development services and programs. The two traditional facets of enrichment and administrative provisions directly parallel the ‘content’ and ‘format’ sub-categories of the DA sub-component earlier described. Here we adopt a broader outlook rather than examine provisions from the strict perspective of a given talentee’s talent development course. Administrative provisions are traditionally subdivided into two main practices: (a) part-time or full-time ability grouping, and (b) accelerative enrichment (e.g., early entrance to school, grade skipping).

The Chance (C) factor

Chance used to be introduced as a fifth causal factor associated with the environment, for instance the chance of being born in a particular family, or the chance of the school in which the child is enrolled developing (or not) a program for talented students. But, strictly speaking, chance is not a causal factor. Just like the type of influence (positive vs. negative), chance qualifies the various causal influences (G, I, D, E) in terms of the degree of control a person possesses with regard to any one of these causal influences. Chance’s crucial involvement is well summarized in a statement made by the late John W. Atkinson, a pioneer researcher in the field of achievement motivation. He believed that all human accomplishments could 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’ (1978, p. 221). These two impacts alone give a powerful role
to chance in sowing the bases of a person’s talent development possibilities. Because of its redefined role, the ‘chance’ factor should no longer appear in a visual representation of the DMGT. Yet, its popularity among DMGT ‘fans’ – as well as my personal attachment to it – brought me to create some room for it in the background of the components it influences.

**Developmental dynamics**

Any significant coverage of the dynamics of talent development within the DMGT framework well exceeds the scope of this brief overview. Here are a few highlights.

In the DMGT, outstanding natural abilities are treated as the raw materials or the constituent elements of talents. Because of this basic relationship, the presence of talent necessarily implies the possession of well above average natural abilities; one cannot become talented without first being gifted, or almost so. The reverse is not true however. It is possible for outstanding natural abilities to remain potentialities, as witnessed by the well-known phenomenon of academic underachievement. The arrows in Figure 1 indicate that intrapersonal and environmental catalysts typically act through the talent development process. That moderator role of the learning/practice process is quite normal: it confirms that talent does not manifest itself overnight. The skills have to be built over time even when, thanks to very high natural abilities, the first achievements appear almost immediately and without apparent effort.

Interactions can be very complex. Indeed, it is my conviction that empirical evidence exists to support causal interactions between *any* pairing of the five components, and in both directions in each case. For instance, the impact – positive or negative – on one’s self-concept of being labeled ‘gifted’ or ‘talented’ is a typical case of $G \rightarrow I$ interaction. Conversely, $I$ factors may exert an impact on the development of natural abilities. Moreover, interactions can manifest themselves within a given component. The relationships between parents and teachers regarding a child’s special educational needs, whether they are collaborative or tainted with conflict, represent one of the most common instances of direct interactions within the $E$ component. Similarly, within the $I$ component, personality disorders may affect the goal setting process. Finally, talented outcomes may themselves enter into a feedback loop and influence the talentees and/or influential persons in their environment. No doubt that the early successes of young students, young artists, or young athletes serve to heighten their motivation to pursue their training and even increase its intensity.

In summary, no causal component stands alone. They all interact with one another and with the developmental processes in very complex ways; and these interaction patterns will differ significantly from one person to the next, as well as at different stages of that process.

**Focusing on the motivation–volition sub-components**

The concept of motivation has been a crucial element of the DMGT since its first English publication (Gagné, 1985). At that time, my implicit definition of that concept espoused the common view of motivation found in most psychology handbooks, namely that complex mixture of desires, needs, goals, dedication, effort, will power, and dozens of related concepts. Its placement within the DMGT, namely as one of the major intrapersonal catalysts, has remained unchanged over the intervening years; it simply has been better circumscribed and operationalized. As mentioned above, the
The concept of motivation (IM) belongs to a more general dimension called goal management, which also includes self-awareness (IW), and volition (IV).

Goal management first appeared in the DMGT under the label ‘self-management’ (Gagné, 2003). The need to insert some forms of personal management activities originates in an interview study with a group of multitalented young adults and their parents (Gagné, 1999). One of the unexpected results from that study was a quasi-unanimous mention by the parents that their child had shown from a very early age a high level of autonomy and independence in the management of his/her very heavy personal schedule of activities. According to these parents, their children never had to be reminded of the numerous daily tasks involved in the pursuit of their multiple talents (e.g., study or homework, sport or music practice, preparation for competitions – even household chores!). That dimension owes its original structure to a theory of self-management proposed by De Waele, Morval, and Sheitoyan (1993); but it did not include the IM–IV differentiation. Self-management was soon relabeled ‘goal-management’ to respect the specific nature of the DMGT as a talent development theory, and not as a broader personal development theory (see for instance Moon, 2003, for such a broader outlook). In other words, the DMGT’s goal management dimension focuses on how talentees define their excellence goals, and how they work at reaching them, whatever the field.

The general idea of personal management is certainly not new in psychology or education; it has been discussed under a variety of labels, like self-actualization (Maslow, 1954), self-determination (Deci & Ryan, 1985), self-regulation (Zimmerman, 1998), and a few other synonyms. There are of course significant differences between these various theories, but these subtleties are not relevant here. Goal management has become the umbrella concept for a group of processes related to the management of all talent-related conative – from the Latin ‘conatum’, meaning effortful behavior – activities. The term conation brings back a very old, but still useful, trilology: cognition, affection, and conation. They refer respectively to thoughts, emotions, and actions, considered in early scientific psychology as the three major forms of human behaviors. The first of the three sub-components of goal management, namely self-awareness (IW), covers a series of ‘social’ abilities associated with perceptiveness, but focused on oneself as the target. Knowing one’s abilities (GI, GC, etc) and personal traits (IF and IP) is crucial for an appropriate selection of one’s talent goal(s), as well as the precise assessment of one’s strengths to pursue any goals, especially challenging ones, to their successful completion.

The two other sub-components, motivation (IM) and volition (IV), have their source in action control theory (ACT), a motivational theory developed by two German scholars, Heinz Heckhausen and Julius Kuhl (see Kuhl & Beckman, 1985), in which they propose a clear differentiation between (a) activities related to the identification of appropriate – macro or micro – goals, and (b) ulterior activities devoted to reaching the chosen goal(s). They use the terms ‘motivation’ and ‘volition’ respectively as labels for these two sets of behaviors, also referred to as ‘pre-decisional’ and ‘post-decisional’. Lynn Corno (see Corno, 1993; Corno & Kanfer, 1993) adapted the theory to the classroom context. I was immediately attracted by that theory, and from 1997 onwards it became a central part of the I component. Corno’s presentation leaves aside the motivation member of that pair to focus on the volition construct. She considers the ACT to have given renewed – and deserved – importance to a construct that was for too long subsumed under the encompassing umbrella of the motivation concept. She points out that ‘prominent psychologists of the 1920s and 1930s effectively removed volition from
the investigative scene by arguing that it could be accounted for by motivation’ (Corno, 1993, p. 14). In her view, the ACT gives volition a distinct and significant role in every goal-related endeavor. Let’s examine more closely these two sub-components of the DMGT.

Motivation (IM)
The motivation sub-component can be subdivided into two distinct elements: goals (IMG) and motives (IMM). These two facets represent respectively the ‘what’ and the ‘why’ of any motivational process.

Goals (IMG)
When individuals identify a particular goal they want to reach they are pinpointing WHAT they want to achieve, either at a microscopic level (e.g., I want to complete this school assignment) or at a macroscopic level (e.g., I want to become a firefighter). Within the context of the DMGT’s talent development theory, goals exclusively represent expected or desired outstanding performance outcomes, in other words achievement goals expressed as talented performances. Of course, these performance goals are field-related: academic performances, athletic performances, artistic performances, and so forth. All other macroscopic or microscopic goals (e.g., wanting to get married and have children, wanting to take a vacation in a foreign country, wanting to build a close friendship with another person) have no relevance to the DMGT. Excellence goals vary as much as the breadth of available talent fields. They may appear when children or adults discover a personal interest in a particular field. Accustomed as we are of associating talent development with academic excellence, we tend to forget that most excellence goals have nothing to do with that limited field. We will see below that goals and motives are closely related through the concept of intrinsic motivation.

The content of a goal represents its qualitative dimension, whereas its distance from a baseline situation, usually expressed as a time frame (e.g., I want to complete the second year of the music course within the next six months), represents its quantitative dimension. For instance, if two equally talented young swimmers look at their next semester’s improvement, with Swimmer A planning to deduct 0,5 second from her present time and Swimmer B expecting a 0,7 second reduction, then Swimmer B’s goal will be quantitatively higher than Swimmer A’s goal. In fact, goals can be expressed through a second quantitative aspect, namely their perceived level of importance in the eyes of talentees. How much does that talentee want to reach that particular goal? It can certainly be assessed at least on some ordinal scale (not very important… extremely important). In theory, the answer to that question should correlate strongly with the volitional energy expended in reaching it. In practice, no certainty exists that we will observe a high correlation; as Corno points out, some highly desired but low level goals might not require high volitional outputs. For instance, a majority of high school students with moderate (top 1%) academic talent may judge it very important – for whatever ‘motive’ – to maintain their top level achievement; yet, they will have little difficulty reaching that goal, because, sadly, the regular high school curriculum offers very few occasions for these talented students to explore the limits of their volitional strengths. In other situations, an originally highly desired goal might progressively lose its attraction because it requires a much
higher level of effort than originally anticipated. This is what happened to this author’s dream of becoming a competent – not even talented – clarinetist, after investing two years in lessons!

Motives (IMM)

As important as goals are, most of the research in the field of motivation has been devoted to motives, that is the reasons, conscious or not, which serve as the rationale for both the qualitative and quantitative dimensions of goal choices. The question that underlies the analysis of motives is ‘Why do people pursue that specific goal with that particular, high or low, level of intensity? ’ Motives can take many forms, as shown through examples given in the top part of Figure 2. The most basic dichotomy differentiates approach/attraction motives (the proverbial ‘carrot’) from avoidance motives (the proverbial ‘stick’). That basic dichotomy applies to all levels of living species, from *homo sapiens* down to unicellular organisms. In practice, few specialists use it because of its excessive broadness; they prefer focusing on more specific instances of either member of this pair. The top part of Figure 2 also shows a major motivational role played by needs, interests, and values, as well as intrinsic vs. extrinsic motives that define the two apparently opposite poles of a self-determination continuum described in Deci and Ryan’s (1985) theory. Other taxonomies could have been added, like Maslow’s well-known hierarchy of five basic needs (Maslow, 1954), Holland’s RIASEC hexagon of occupation-related personal interests mentioned earlier (see the T component), or Henry Murray’s list of needs and press initially created to analyze

![Figure 2. ‘Crossing the Rubicon’ (adapted from Corno, 1993, Figure 2, p. 18).](image-url)
the Thematic Apperception Test’s stories (Murray et al., 1943). It is well beyond the scope of the present article to examine in detail the complex realm of human motives with regard to talent development; the DMGT framework can embrace whichever among them will be recognized as the most significant. I will briefly comment here on a few that appear more frequently in the professional literature or among teachers.

**Intrinsic/extrinsic motives**

Intrinsic motivation (IMI) probably qualifies as one of the most talked about motivational concepts in educational fields; it is usually defined as the pursuit of a learning activity for its own sake, for the ‘intrinsic’ pleasure of doing it. Some will call its stronger expressions ‘love of learning’ or ‘passion for learning’. Although IMI has been studied mainly within the schooling process, the concept applies to any area of interest. Indeed, I consider the concept of ‘interest’ as a perfect overlap of IMI. People who like/love tap dancing, science fiction, gardening, kayaking, spelunking, astrology, entomology, football, or any one of thousands of interest areas available to youth and adults, all exemplify intrinsic motivation, namely exploring an interest area for the simple pleasure gained from that activity. Intrinsic motivations vary immensely at the individual level. Each person will express qualitatively and quantitatively different reactions to any interest area; some love playing cards, others hate it, some love reading, others don’t like it, and so forth. Indeed, these individual differences have been the basis for interest inventories, as exemplified by the famous Strong Interest Inventory (see Anastasi & Urbina, 1997), whose profile structure is based on the RIASEC types mentioned above.

In the realm of human conduct, any motive other than the pursuit of an activity (e.g., a learning activity, practicing a trade, a profession, or a hobby) for the pleasure gained from the practice itself will be considered an extrinsic motive (IMX). Going to school to get a more prestigious or well-paying job, to please one’s parents, or to enjoy a nice group of peers, are all extrinsic motives. Consequently, most of the human needs identified by scholars over the past century, both approach and avoidance needs, even outside pressures transformed into motives (e.g., doing something under the pressure of a gun), all members of that vast panoply of motivations will be considered extrinsic motives to pursue some activity.

The vast majority of educators look down on extrinsic motives as less ‘noble’ than intrinsic ones. Think of all these professional development activities that aim to improve teachers’ skills as stimulators of intrinsic motivation in their students. I have stopped counting the number of parents and teachers asking for my advice on how best to bring about that IMI for a particular subject matter – or all of them! – in students who appear little motivated by their school learning. There is a strong belief among educators that academic success goes hand in hand with high intrinsic motivation. In point of fact, the authors of the self-determination theory that brought the IMI and IMX concepts into popularity did present these two constructs as the opposite poles of a self-determination continuum.

Intrinsically motivated behaviors are engaged in for their own sake – for the pleasure and satisfaction derived from their performance… Extrinsically motivated behaviors, on the other hand, are instrumental in nature. They are performed not out of interest but because they are believed to be instrumental to some separable consequence… Self-determination theory posits that the four types of extrinsic motivation [external, introjected, identified, integrated] result from the internalization processes having been differentially effective. The resulting regulatory styles thus fall at different points along
The above quote clearly mentions an ‘autonomous continuum’ whose positive pole is represented by intrinsic motivations, and negative pole by ‘external’ extrinsic motivations, with various forms of more internalized IMX somewhere in between these two extremes. It should follow from that view that intensities in IMI will be negatively correlated with parallel intensities in IMX. That hypothesis has not resisted the search for empirical support. For instance, Gagné and St Père (2002) separately measured these two constructs with a large sample of high school girls using a self-administered questionnaire developed by Vallerand, Blais, Brière, and Pelletier (1989); assessments were done both at the beginning and at the end of a fall semester. Here are their conclusions.

It is also interesting that the IM [Intrinsic] and EM [Extrinsic] constructs, contrary to theory, are not negatively correlated. The students implicitly see them as independent, while the parents’ ratings make them positively correlated. These results show that it is possible for intrinsic and extrinsic motives to be pursued in parallel, for the intrinsic pleasure of learning to coexist with the desire to find a well-paying job (EM.Ex) or to prove to oneself that one can attain the goal of a high school diploma (EM.Ij). This is not the place for a full-fledged reexamination of Deci and Ryan’s self-determination continuum, but our results clearly question that central aspect of their theory. Moreover, other recent empirical work (e.g., Hoekman, McCormick, & Gross, 1999; Nicholls, 1992) supports that questioning. (Gagné & St Père, 2002, p. 94)

In brief, it is my conviction that extrinsic motives are as important in any talent development situation than intrinsic ones. No one would believe that athletes progressing toward international excellence do not have in mind a possible Olympic medal (extrinsic), or a huge income (extrinsic), or the power felt from being the best (see the famous film Chariots of fire on that subject).

**Passion**

As mentioned earlier, quantitative differences in intrinsic motivation can range from high levels to total lack (I hate…). Very high levels of interest have made popular the use of a label originally associated with romantic love: passion. Of course, lay people have always used the term passion to describe intense involvement in an interest area, related either to work or leisure. Its exploration as a scientific construct is quite recent. Robert Vallerand, with his colleagues and students, can be credited for having studied that construct more than anyone (see Vallerand et al., 2003). These scholars define passion as follows.

[It is] a strong inclination toward an activity that people like, that they find important, and in which they invest time and energy. Thus, for an activity to represent a passion for people, it has to be significant in their lives, something that they like, and something at which they spend time on a regular basis… Such passions become central features of one’s identity and serve to define the person. Those who have a passion for playing the guitar, for reading, or for jogging do not merely play the guitar, read, or jog. They are ‘guitar players’, ‘readers’, or ‘joggers’. (Valerand et al., 2003, p. 757)

Vallerand et al. (2003) distinguish two types of passions: harmonious (HP) and obsessive (OP). In the first case, ‘individuals are not compelled to do the activity but
rather they freely choose to do so… the activity occupies a significant but not overpowering space in the person’s identity and is in harmony with other aspects of the person’s life’ (p. 757). In the second case, people ‘cannot help but to engage in the passionate activity. The passion must run its course as it controls the person. Because activity engagement is out of the person’s control, it eventually takes disproportionate space in the person’s identity and causes conflict with other activities in the person’s life’ (p. 757). In order to assess the prevalence of passion among youth and adults, Vallerand and his coworkers created a 34-item self-administered passion scale to assess both OP and HP dimensions of the passion construct, to which were added a few general items about the nature of passion. One key item assessed to what extent respondents considered an activity ‘dear to their heart’ to be a passion (using a seven-point scale ranging from ‘1’ = do not agree at all to ‘7’ = completely agree). They decided that a score of four and above on that specific question would mean a ‘passionate’ level of identification.

In one study, they asked a group of 559 college students to identify such a ‘dear to their heart’ activity, and use it as the target of their passion scale. All the participants were able to do so, and only 16% gave a rating lower than four on the key ‘passion’ question. Do 85% of adults really possess a ‘passionate’ center of interest in their life? Such a large percentage makes me question whether their choice of a 4+ threshold for that key question represents an appropriate threshold or an overly generous one. I must point out that this dissatisfaction in no way questions Vallerand’s general theoretical or empirical approach. It was interesting to observe that 60% of the activities identified concerned sports (individual or team), that 35% were related to active (e.g., playing music or painting) or passive (e.g., listening to music, reading) leisure activities, but that less than 4% concerned work or education-related activities. These researchers’ work opens an interesting door to the empirical study of an important motivational construct in the context of talent development. Still, much remains to be explored, especially the presence of that extreme form of intrinsic motivation in talent development endeavors, and its relationship with extrinsic motives, like the needs for power and achievement. This comment brings us to the last of my observations with regard to the motivation construct.

**Talent-related motives**

Which motives appear, more so than most others, to foster exceptional achievements? In his fascinating book on the origins of ‘greatness’, Dean Keith Simonton (1994) devotes a full chapter to the subject of motivation. Borrowing from the work of Henry Murray and David McClelland, he targets their famous triad of motives: achievement (IMA), power (IMP), and affiliation (IMF). Simonton considers two of them, the needs for achievement and/or power, as the more plausible drivers of exceptional productivity. If the concept of power seems clear to circumscribe theoretically, the need for achievement leaves room in my view to definite ambiguity. Simonton borrows McClelland’s definition of that construct, stating that it is ‘the desire to do “something for its own sake, for the intrinsic satisfaction of doing something better”. Such individuals set high standards for themselves, and try to surpass what has been done before’ (p. 125).

That definition leaves me somewhat dissatisfied. At first glance, it clearly considers the achievement motive as a form of intrinsic motivation; the first part of the quote makes that clear. On the other hand, it seems to me that the need to ‘surpass what has
been done before’ (by others?) has a definite normative component; it sounds like a desire to show one’s superiority over others. To use a sport analogy, I am not convinced that winning athletes can easily dissociate their intrinsic – and ipsative – pleasure at surpassing themselves from that most extrinsic satisfaction of surpassing others, of gaining power by making others the losers. At low levels of excellence or at early stages of a talent development process, it might be easy to accept a limited role for the power motive, but as the competition gets tougher and the excellence goals approach a maximum level, no doubt that the power motive will increase its presence as a driver of further learning and practice.

Simonton ends his chapter on motivation with a section called ‘the ultimate motive for greatness?’ Note the question mark. He begins by showing that extraordinary scientific or artistic productivity, both in quality and quantity, results from a huge amount of work: long weeks, month after month, and year after year. He gives examples of many giants’ enormous career productivity, like Edison’s close to 1100 patents, Balzac’s 85 novels, or Picasso’s 20,000 works. As he says:

It takes work to become a renowned genius. These individuals are driven by huge motivational forces that far eclipse the impetus behind less accomplished colleagues… Where does this drive come from? The answer to this question is one of the great mysteries of psychology… The genius may be in the highest percentiles on the achievement motive, or the power motive, or maybe both together… Moreover, we certainly must be willing to credit the genius with some intrinsic motives as well. Geniuses cannot spend so many hours without an inherent passion for what they do. (Simonton, 1994, pp. 140–141)

This is a fascinating quote, and so for many reasons. First, Simonton confounds elements of Heckhausen and Kuhl’s motivation (the urge and passion) and volition (the determination, the drive, and the hard work). In other words, it confirms my earlier statement to the effect that few scholars acknowledge this differentiation. Second, when Simonton says ‘or maybe both together’, he confirms my own observation that power and achievement cannot be easily distinguished, at least in practice. Finally, his statement that ‘we must be willing to credit the genius with some intrinsic motives as well’ (my emphasis) directly places the power and achievement motives among extrinsic (IMX) motives, thus contradicting his earlier definition of the achievement motive. As a final touch, it is worth quoting Simonton’s conclusion: ‘In all likelihood, there can be no ultimate motive behind success’ (p. 141). That is a statement I fully endorse.

**Volition**

The authors of action control theory labeled the point of commitment ‘crossing the Rubicon’, a reference to Julius Cesar’s fateful decision in 49BC to bring his army south of that northern border and attack the Roman government. He is said to have uttered there that famous sentence ‘alea jacta est’ (the dice are cast), meaning that his decision meant a point of no return. In practice, as shown in Figure 2, that commitment need not be as final as the metaphor implies; when individuals experience major – in their views, of course – difficulties, they will not hesitate to re-cross that virtual Rubicon in order to reassess their initial goal. Still, that Rubicon-like commitment means, in Corno’s words, that ‘goals are typically protected and fostered by self-regulatory activity rather than reconsidered or changed, often even when challenged’ (1993, p. 15).
Components

Even though Corno (1993) introduces ACT at a microscopic level, that of day-to-day student decisions in the classroom, it remains quite easy to extrapolate the theory at the macroscopic level typical of the DMGT’s approach to talent development. The main function of the volitional processes consists in directing and controlling intellectual, emotional, and behavioral activities in order to maximize goal attainment in situations when such goal(s) is/are perceived as hard to reach; an easy goal requires no volition at all. For instance, I confess needing no volition to keep reading a good thriller; in fact, volition will be harnessed to put it aside! Figure 2 illustrates two types of strategies that individuals will utilize during the implementation period, especially when ‘the going gets tough’: (a) goal-related cognitions, and (b) action control processes. Corno (1993) describes them as follows.

Action control processes refer to knowledge and strategies used to manage cognitive and non-cognitive resources for the purpose of goal attainment. How students allocate and control their attention, as well as enlist techniques for self-motivation and for handling intrusive emotions, are examples of processes included in this cluster. The second cluster consists of goal-related cognitions that form the basis for adaptive use of learning strategies (or mindful effort investment) in tasks (Salomon, 1983, p. 13). These include (a) the well-timed application of deep or elaborative processing and (b) the monitoring and appraisal processes that help determine the extent to which effort investments are sustained. (Corno, 1993, p. 17)

Note the looping arrow in the bottom center of Figure 2; it conveys the dynamic idea of recurring volitional strategies through the long period – at least within the DMGT’s macroscopic perspective – between commitment to a goal and reaching it. The other dotted arrow at left identifies occasional dropping out of the implementation loop in order to re-cross the Rubicon and reassess the relevance of a goal. Most students, artists, and athletes need to do that once in a while during the course of their talent development process. The last item in Figure 2 is called ‘volitional styles’. The expression refers to relatively stable individual differences in temperament that affect goal choices and striving through the action-control processes. The concept of will power as a human trait, one of the five personality dimensions in the Big Five theory of personality (Digman, 1990), comes immediately to mind. This particularity of the ACT’s volition construct creates an automatic link with the IP sub-component of the DMGT, exemplifying the complex interactions between components and sub-components in the dynamic process of talent development.

IM–IV relationships

The most common approach to assess volitional intensity or strength uses self-report items, usually embedded in broader ‘motivation’ questionnaires (see Gagné & St Père, 2002, for a literature review). But, there is another way to examine volition more directly, namely through the investment (DI) sub-component (see Figure 1). The time, energy, or money that talentees do invest in the pursuit of their excellence goal(s) can tell a lot about their determination not to re-cross the Rubicon. How talentees will react to occasional failures or setbacks can also be used as a volitional index, although that must be done with caution, because of the parallel impact of other personality characteristics (e.g., optimism, emotional stability) or outside pressures.
The distinction between IM and IV measures confirms the conceptual differentiation between the two constructs. And that differentiation has practical impacts. When talentees express their motivational intensity – how important the goal is, how important the motive is – we remain within the confines of the motivational phase, even though that information announces volitional ‘intentions’. These intentions do not guarantee their actual manifestation throughout the implementation phase of the goal-management process. As New Year promises and yo-yo dieting have shown again and again, the road to hell is paved with good intentions! Said differently, we cannot expect a close relationship between quantitative assessments of motivation and volition. Some young people easily ‘fall in love’ with a new activity, while others will slowly develop their liking, keeping it at a lower level. Similar individual differences can be observed in the strength of will power or level of investment in a given talent development process. These disparities lead to interesting differential profiles, with high-M behavior being sometimes associated with high-V behavior, but also with moderate-V or even low-V behavior; and vice versa.

The present lack of good IV measures limits an in-depth analysis of IM–IV relationships. In an attempt in that direction, Gagné and St Père (2002) separately assessed high school students’ intrinsic (IM) and extrinsic (EM) motivation for school, as well as their level of volition (labeled P for perseverance). They observed among other things that ‘the students’ EM scores entertain no relationship whatsoever with either IM or P, but these last two are partially correlated (.45/.44)” (p. 85). The IM–P correlations, obtained both at the beginning and end of a fall semester, indicate a moderate relationship between students’ self-assessments of their school-related intrinsic motivation and volition, but not between extrinsic motivations and volition. As interesting as they may be, such exploratory results need to be replicated, not only within the general education system, but also in other major fields of talent development.

Closing comments
Because of space constraints, it is not possible to explore in more detail the motivation-volition pair of constructs that play such a central role within the I component of the DMGT. Still, I couldn’t end this short article without discussing briefly two questions I consider crucial for a better understanding of the role of motivation in talent development: (a) nature’s involvement in goal-directed behavior, and (b) the IM–IV ranking among causal influences on talent emergence.

Biological underpinnings
The subject of the hereditary or biological underpinnings of common motivational constructs is rarely discussed in the talent development literature. Most discussions assume that, except for occasional unconscious influences, goals, motives, or volition are under the total control of talentees. Yet, a large and growing pool of empirical research has shown significant hereditary roots for most facets of both IM and IV subcomponents: interests, values, needs, motives, or volitional styles. For example, Plomin, De Fries, and McClearn (1990) cite a study of Roberts and Johansson (1974), which ‘included over 1500 twin pairs [both fraternal and identical] and indicated that all of the vocational types – called realistic, intellectual, social, enterprising, conventional, and artistic – show approximately the same level of genetic influence’ (p. 387), namely identical twin correlations of about .50 as opposed to correlations of about .25
for fraternal twins. These were later confirmed through the data accumulated within the renowned Minnesota Study of Twins Reared Apart (see Bouchard et al., 1990). Plomin et al. (1990) also mention a significant genetic component for the achievement motive.

We can also mention heritability data associated with the Big Five personality factors mentioned above, also called the Five Factor Model (FFM). These five factors are commonly labeled extraversion (E), agreeableness (A), conscientiousness (C), neuroticism (N), and intellect/openness (O). Recall that I identified the C element as a clear volitional style. Concerning all members of the FFM, there is growing evidence for a close relationship between temperament dimensions and adult personality traits (Rothbart, Ahadi, & Evans, 2000); this relationship probably explains why all FFM dimensions have significant genetic underpinnings (Rowe, 1997). Finally, I can direct readers to two massive surveys of hundreds of studies on the biological bases of most social and affective characteristics (e.g., altruism, impulsivity, shyness, aggressiveness, empathy); they can be found in Daniel Goleman’s two bestsellers: *Emotional intelligence* (1995) and *Social intelligence* (2006), especially the last one.

The fact that most IM and IV facets have their roots in a person’s genotype significantly reduces individual control over the expression of these characteristics. Recall the Atkinson quote mentioned earlier about one of the two crucial ‘rolls of the dice’ being dealt by Nature, what he called ‘the accident of birth’. Those who promote a variety of interventions by parents and teachers aimed at increasing student motivation and volition should keep in mind the constraints they will unavoidably face from their subjects’ I characteristics. On the other hand, as the new science of epigenetics – the influence of environmental agents on gene expression – has shown, genes are not destiny; there is much more to human behavior than the outmoded ‘Nature vs. Nurture’ dichotomy. Yet, genes do create predispositions to act in a certain way, and the strength of these predispositions varies considerably from one person to the next. Strong negative predispositions require much stronger environmental controls to ensure that they will not lead to behavioral dysfunction; and, in some instances, the required environmental support will exceed most available resources (see Ridley, 2003). In a nutshell, much remains to be discovered with regard to the complex interactions between genes and environments, but we should always keep in mind that significant biological constraints do act on our daily goal-oriented behavior.

**What makes a difference?**

Even though all four causal components are always active in any talent development process, it does not mean that they are equally powerful as agents of talent emergence; could it be that some of the components and/or sub-components of the DMGT play a more important causal role than others? Of course, this ‘what makes a difference’ (WMD) question makes little sense at the individual level, and so for many reasons, the most significant being that any answer given in the case of Subject X has little chance of applying to Subject Y’s talent development trajectory. Extreme individual differences abound, and I have accumulated over the years dozens of such examples. One of the more recent of such counter-intuitive examples targets the famous tennis player Andre Agassi. In his recent autobiography he states on the very first page: ‘I play tennis for a living, even though I hate tennis, hate it with a dark and secret passion,'
and always have’ (Agassi, 2009, p. 3) What does this say about the importance of intrinsic motivation as a driver of exceptional achievements?

But what about averages? Are some factors generally recognized as more powerful predictors of outstanding performances? For all those involved in identifying youth with high potential and planning the development of their talents, this is the ultimate question. Unfortunately, that question has yet to receive a clear answer in the empirical literature. In a target article published in this journal a few years ago (Gagné, 2004), I devoted over 20% of my text to that specific question. I summarized my tentative answer with the acronym C.GIPE. The GIPE part meant that I gave first rank to outstanding natural abilities (G), with successively lower ranks given in turn to intrapersonal catalysts (I), the developmental process (then labeled P), and finally to environmental catalysts (E). The chance factor (C) received a special priority (with a ‘dot’ separating it from the rest) to acknowledge its prominent role in creating individual differences in natural abilities and intrapersonal catalysts – Atkinson’s two crucial rolls of the dice. Space does not allow a discussion as extended as the one in the target article cited above. I will only briefly comment on the G vs. I ranking.

To explain the superiority given to G over I, I pointed out that virtually every comparative study of the unique explanatory power of motivational constructs over and beyond IQ measures had shown a clear superiority of the latter. I then quoted Gagné and St Père’s (2002) exhaustive literature review as follows.

Motivation’s independent contribution to the prediction of scholastic or occupational achievement appears limited. It is frequently non-existent… or much less powerful that the independent contribution of cognitive abilities… The 4:1 and 6:1 ratios respectively extracted from Walberg’s (1984) and Schmidt and Hunter’s (1998) syntheses, probably upper-limit estimates, are more or less equidistant from the two extremes. (Gagné & St Père, 2002, p. 10)

This quote means that IQ scores ‘explain’ on average about five times more achievement variance. As for other constructs included in the I component, there is little scientific literature on their unique contribution to talent development. Of course, that analysis applies strictly to academic talent development within the general K-12 schooling process. If we consider that the school system is the only field in which unmotivated talentees do not have the option to drop out – at least not until late high school – this might modify any comparison of various predictors of outstanding achievement. That special constraint does not exist in other fields, like arts or sports. After re-reading that long analysis in the 2004 HAS target article, I felt comfortable in maintaining the same GIPE hierarchy. The only small modification that came to my mind was to suggest that if I had to rank order the IM and IV sub-components, I would not hesitate to give priority to IV, especially in two situations: (a) K-12 academic talent development, and (b) the pursuit of exceptional or extreme levels of talent in any field.

In conclusion, allow me to ‘loop the loop’ by bringing back the very first quote I introduced in this article: ‘[famous athletes] tell us all something about ourselves and what we may be capable of achieving, if we dream and make the commitment to work hard towards that vision’ (Hemery, 1986, p. 204). It clearly differentiates the IM component – if we dream – from its volitional counterpart. And I believe that these two distinct sets of goal-management processes offer a very useful analytical framework to dissect the goal-oriented behavior of talentees in all fields of talent development.
Note
1. Interested readers can also find on the web an eight-page overview of the updated version. Just search for ‘DMGT 2.0 overview’. That overview is also available from the author (fygagne@gmail.com) in four other languages: French, Spanish, Portuguese, and German.

References


