

Three Perspectives for Assessing and Monitoring Talent Development: A Holistic Theoretical Approach with Empirical Applications

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Abstract: The study of giftedness and evolution toward talent development models have been approached mostly from an educational perspective. Talent potential development cannot be understood without comprehensively looking at all individuals' facets. This work proposes a theory by which talent potential, considered by the conjunction of cognitive and non cognitive individual traits, is evolutionary and dynamical, and can be manifested into three different talent dimensions that represent contributions to social development, knowledge and individuals' psychological balance. The holistic approach allows for cross-cultural conceptions of talent, and more flexible and dynamic organizations of education, which entail the recovery of individuals' potential and provides opportunities in any development stage. The paper provides a framework with quasi mathematical notation for its empirical application in research and talent management.

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1. Introduction

The experimental or scientific stage in giftedness and talent dates back one century (Ziegler & Heller, 2000). The concept has evolved since then (Dai 2018a, 2018b), and different conceptions co-exist and stem from perspectives and approaches that move from individual, or domain-centered models, of an immutable or non immutable nature of superior intellectual abilities, and from the consideration, or not, of the potential influence of external conditions.

Despite the evolution of theories, they maintain an educational focus that studies the factors which affect academic and professional performance and learning. Regardless of some models being person-centered, a psychological approach has not yet been integrated into models.

Talent education must be concerned with not only academic excellence, but also with how students use their potential to live their lives in balance, and to contribute to the world's positive and sustainable development (Sternberg, 2024a).

Furthermore in today's technology era with artificial intelligence, big data and simulation, the design of talent management systems could considerably benefit from applying these techniques. This would allow not only the systematic control of student talent development conditions and trajectories, but also the comprehensive study of the influence of different factors with research purposes.

Hence this paper proposes an individual-centered model that establishes a holistic theoretical framework of talent development with empirical applications. It combines and delimits the concepts raised in previous literature works by adding some original considerations that contribute to merge educational and psychological perspectives, and allows the longitudinal monitoring of individual talent development

trajectories. This paper suggests the integration of three perspectives to evaluate the impact of potential that serves as a guide to design educational strategies whose aim is the comprehensive training of the individual and the sustainable development of our societies in line with Sustainable Development Goal 4 (United Nations, 2015).

2. Non orthogonal Multidimensional Theory (NOMT)

2.1 The Optimal Talent Development Trajectory: Three Talent Perspectives

Manifestations of talent can be evaluated with different perspectives depending on where the impact of the talent potential is projected.

The following three perspectives can be assessed from which contributions or performances, from the most specific to the broadest, can be defined as the personal, the domain, and the social perspectives.

The Non Orthogonal Multidimensional Theory (NOMT) transcends the product and domain of talent, and proposes a measure for optimal developmental stages that considers the interaction and synergy of verifiable results (performances) with psychological outcomes on individuals, and their impact on the world.

2.1.1 The Personal Perspective

Psychological well-being is an individual's fundamental component of overall health (Trudel-Fitzgerald et al., 2013). Optimal development is conditioned by not only the improvement of skills, abilities and resulting products, but by also ensuring individuals' balance and well-being.

Well-being has been addressed in psychology from two different perspectives: subjective well-being (Diener & Ryan, 2009) and as a concept linked with the development of human potential (psychological well-being) as defined by Ryff and Keyes (1995). Psychological well-being refers to positive psychological functioning, and the theoretical model encompasses six distinct wellness dimensions. Psychological

balance would be obtained by balancing the following dimensions contained in psychological well-being: the capacity to make decisions and to act according to one's goals (autonomy) by perceiving oneself as competent to face contextual challenges (environmental mastery), the pursuit of personal development and self-realization through openness to change and taking a proactive attitude toward opportunities (personal growth), having quality and healthy personal relationships (positive relationships with others), having a sense of direction and a meaning in life that translate into commitment to goals that transcend oneself (purpose in life), and the complete acceptance of one's strengths and weaknesses (self-acceptance).

It is believed impossible to place individuals at the center of a model without integrally considering their characteristics in not only causal factors, but also in consequential ones. A person-centered model should imply both directing focus on individual trajectories (Dai, 2021; Preckel et al., 2020) and, as a novelty in the NOMT model, contemplating all the facets of the individual's life as modulators and a manifestation of the talent potential.

Hence the model proposes considering psychological balance to be one of the three dimensions of the talent development assessment.

Psychological balance would be a variable that measures the deviance to a balanced condition of different life dimensions according to the psychological well-being components established by Ryff (1989). In physiology, Bernard (1978) proposes that complex organisms can achieve free and independent existence only because of the stability of the internal milieu. The “*milieu intérieur*” is the internal environment in which the cells of living organisms lie and buffer external parameter variations. Its relative constancy is called homeostasis. As Lloyd et al. (2001) state, the more complex a system, the more degrees of freedom, and the wider the expected oscillations to the

steady or balanced state are. Hence homeodynamics is proposed as the continuous motion of a system's dynamics and its potentiality for shifting between states given its general tendency to self-organize.

Borrowing the "*milieu intérieur*" concept from Bernard (1927), which lays the foundations of the homeostasis idea that has evolved into homeodynamics (Lloyd et al., 2001), psychological balance may be considered a central part of individuals' self-regulation process. If psychological balance is dynamic, then individuals work to self-regulate and achieve new states of balance during the developmental process. In this way, psychological balance must be a variable to monitor the optimal development of talent trajectories. Furthermore, no constant psychological balance can be expected, but evolution and self-regulation should be valued as an alternative demonstration of developing the cognitive and non cognitive potential.

In this way, talent development considers contributions to all the psychological well-being components. These components evaluate individuals' complete adaptation and evolution to ensure their adequate and satisfactory survival in the physical, cultural and social environments in which they inhabit. So the model transcends traditionally considered domains and extends boundaries toward the use of the intellectual potential for individuals' benefit as a guarantor of the regulation and progress of their living conditions.

2.1.2 The Domain Perspective

The model proposes a second dimension for the talent development assessment from the domain perspective: the performance stage. This stage should be a continuous variable that considers the gradation of complex refinement of the skills manifested in excellent products in specific domains. For simplification reasons, it can be categorized

into four stages that fall in line with other recent theoretical models (Dai, 2021; Preckel et al., 2020).

In this way, the talent development stage in the domain perspective is specifically called the performance stage, and considers contributions to intellectual, technical and artistic capital that allow knowledge and technique to progress.

Performance stages result from a skill evolution process in a specific domain and are manifested in outstanding human accomplishments. Four performance stages are determined: foundational, refinement, advanced and transformative. These four performance stages are neutral as regards their ethical, humanitarian and sustainability analysis, or their contribution to individuals' well-being.

The foundational stage considers the manifestation of the potential that may be developed under appropriate conditions. In this stage, individuals exhibit innate abilities for the domain by significantly outperforming peers of comparable age, knowledge and training. Additionally, the individual might even surpass peers with more experience in the domain. In this stage, it is assumed that individuals have not accessed enough, or have not been able to take advantage of, opportunities to develop their talent assets.

The refinement stage is defined as the stage in which individuals are immersed in the process of perfecting specific domain skills. The performance and outputs in this stage surpass those of individuals with specific training, but without outstanding skills.

The advanced stage includes behaviors in the domain that demonstrate the necessary accumulated skill, knowledge and practice for excellent productions and mastery in execution.

The transformative stage is reserved for individuals who, after achieving domain mastery, transcend levels of excellence in productions to formulate new contributions to the domain or to reformulate existing ones. According to some of the criteria outlined

by Sternberg (2024b) for identifying giftedness, these contributions demonstrate exceptional international impacts that lead to identifiable changes in the domain, its foundations, paradigms and/or future directions.

2.1.3 The Social Perspective

The social perspective analyzes individuals' contribution to the optimization of the humanity situation. The evaluation of such contributions is no longer neutral, as in the case of the analysis of performance stages. The value (Sternberg, 2024b) of the contributions in this dimension are especially measured in a consistent and transversal way by moving more closely to a consensus for the sustainable progress of humanity, which takes us toward the humanitarian giftedness concept defined by Sternberg and Rodríguez-Fernández (2024, p. 1) as "the deployment of one's gifts and talents in a way that, at some level, benefits humanity."

When traditionally studying giftedness and talent development, a social perspective has been integrated into the domain perspective. The NOMT is a model that, by definition, proposes a neutral conceptualization of talent performance (domain perspective).

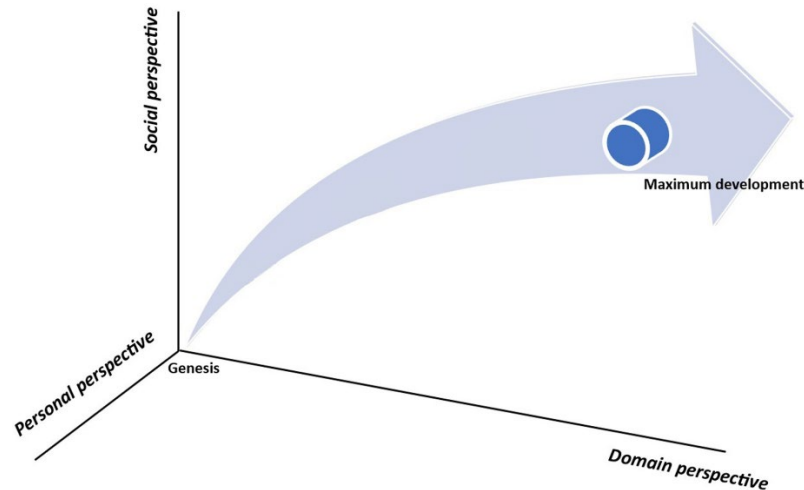
An evolutionary concept is proposed, exactly as in the previous perspectives. It is not so much about being humanitarian-gifted, but about becoming humanitarian. In the evolutionary trajectory of talent from the social perspective, the individual will go through stages that involve the development of ethical sensitivity, the search for ethical dilemmas that require action and active participation in solving them, and higher stages of excellence characterized by unconditional dedication to the common good.

2.1.4 The Combination of the Three Perspectives

By integrating the social perspective (Figure 1), optimal talent development is defined according to three dimensions as individuals who utilize cognitive and non

cognitive abilities through both contributions made to the advancement of technique, art or knowledge for human progress and individuals' optimal life performance under psychological balance conditions.

Figure 1. Diagram of optimal talent evolution on a three-dimensional approach.



The genesis would be the inception point, including the latent combination of genetically determined psycho-biological skills (Sastre-Riba, 2020). At this point, individuals harbor the probability of activating/deactivating those skills to unfold into talent development trajectories with evolution moving toward the next stage in some or any of the three talent perspectives, particularly in one specific domain or more. Although that probability is genetically determined at the beginning, it is dynamic and depends on other factors, which are introduced in the next section (Sauce & Matzel, 2018; Thomas, 2018; Tucker-Drob, 2018). In this way, not all the combinations of psycho-biological factors place individuals in the genesis with an identical probability of achieving a successful trajectory in all perspectives or domains.

Yet despite the initial diversity of the profiles that provide individuals with different initial success probabilities, it can be assumed that these probabilities are not fixed and immutable (Feinstein, 2003), but are modulated by all the model's interrelated factors. This indeterminacy of the aforementioned probability makes all individuals

susceptible to be in this initial state, which renders it necessary for, and far from using an approach that segregates those who are and are not gifted, the full spectrum of factors that will modulate this probability throughout life to be identified and monitored.

Trajectories are assumed to be a continuum with which different combinations of the three talent dimensions occur by transitioning from a foundational stage through different three-dimensional evolutionary stages to reach the zenith (maximum expression of human talent).

Individuals' maximum self-adaptation is understood as excellent manifestations in both the personal and domain perspectives. Therefore, reaching a stage from which the utilization of people's own and external resources allows them to make contributions that transform technique, art or knowledge, and ensures a vital balance state.

However, some individuals display outstanding performance on one dimension or more: people who contribute to maintain the social balance, even if it does not involve complex or innovative technical and/or theoretical actions; individuals with superior capacity and mechanisms to regulate their life facets; individuals who make notable contributions to the advancement of technique, art or knowledge, but with questionable ethical or humanitarian values.

The aim of extending the perspectives for assessing talent manifestations is not to increase the restrictions that allow people to be identified as gifted, but to broaden the socially accepted manifestations of the potential to lower expectations on individuals.

The combination of excellence from all three perspectives represents the maximum complete development of individuals' potential. Manifestation in any of the three perspectives is equally valid, with none of the perspectives prevailing in value over the others.

2.2 Definition of Dimensions

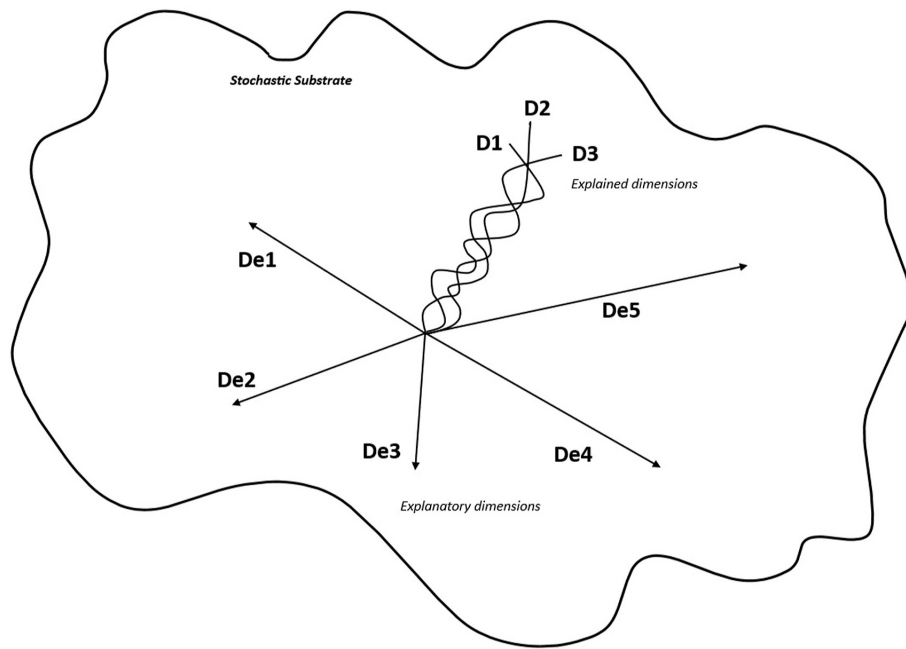
The three dimensions that define the talent development trajectory in the NOMT model form a subspace within a larger multidimensional space, which includes four other dimensions that group the endogenous and exogenous factors that impact and modulate the 3D talent trajectory.

In this way, constitutive and dependent dimensions of the talent concept (explained dimensions) and others can be distinguished that, despite affecting it, are not part of its essence (explanatory dimensions). Additionally, a base factor called *Stochastic Substrate* is included (Figure 2).

The model's three explained dimensions (D1, D2 and D3) were previously defined. They allow us to obtain, as a product, individuals' talent development trajectory stage by considering three different perspectives: social, domain and personal. Nevertheless, given the wide range of possible combinations of the stages of the three talent dimensions, it is impossible to provide each one with an adequate name. It seems more appropriate to treat manifestations as a spectrum by individually monitoring evolution on each dimension than as a product of all three.

The model's five explanatory dimensions can be subdivided into two groups: endogenous factors and exogenous factors. Endogenous factors include the cognitive profile dimension (De1), the psychosocial skills dimension (De2) and the non cognitive dimension (De3). Exogenous factors include the contextual dimension (De4) and time (De5).

Figure 2. Multidimensional talent development space.



2.2.1 Explanatory Dimensions

The cognitive profile (De1) includes intellectual resources, and their effective and efficient uses in conjunction with executive functions and creativity. To a certain extent there is a consensus about intellectual assets being necessary, albeit not sufficient for talent development from the domain perspective. Cognitive assets play an important role but, beyond a certain threshold, differences in talent development may be more due to individual differences in other factors than to differences in intellectual ability. For example, it remains unclear if a significantly high intellectual potential is required to make contributions of humanitarian value to the world (Sternberg and Rodríguez-Fernández, 2024).

The psychosocial skills dimension (De2) encompasses a list of variables associated with talent development across domains based on experts' consensus (Olszewski-Kubilius et al., 2019), which can be grouped into seven categories: creative risk-taking, social skills, meta-cognitive self-regulation, motivational self-regulation, emotional self-regulation, cognitive self-regulation and insider knowledge. Note that

this should not be confused with explained dimension D3 (psychological balance): the former refers to the psycho-social resources and skills that individuals possess; the latter indicates the result of balancing different well-being components by deploying various skills at a specific moment and in a given environment. For example, for personal growth in D3, individuals' self-realization through their own vision of continuous development is considered, and reflects, among others, more self-knowledge and effectiveness. To contribute to this personal development process, individuals may rely on their own psycho-social skills (De2), such as growth mindset (Dweck, 2000). Similarly, social skills (De2) are one of the factors that contribute to construct positive relationships with others (D3). In summary, the De2 components represent a tool, while the D3 components represent a product, the expression of a process that involves different endogenous and exogenous factors.

The non cognitive dimension (De3) includes individuals' profile of motor and sensory abilities. Motor abilities largely depend on individuals' genetic determination, but their degree and level may vary depending on training. Individuals' sensory abilities refer to the degree of development and sensitivity of sense organs.

The contextual dimension (De4) includes factors of threat and opportunity from family, social, educational and professional environments.

De5 represents the effect of time, i.e., the temporal evolution of the gradation of each component of the explained and explanatory dimensions. The complex evolution of complex systems requires time for exogenous and endogenous influences to be integrated, and time itself acts as a modulator of the pace of progress, the limit of improvement and the probability of opportunities arising.

2.2.2 The Role of Chance

Chance (Gagné & Schader, 2005) plays an important role in impacting some of the model's dimensions, such as De1 or De4. It is unavoidable that fortuitous events like an accident, which modifies cognitive resources or natural disasters, economic conflicts, wars, etc., affect contextual conditions, are decisive in reconfiguring dimensions and steer the talent development trajectory. Chance is considered in the model to be a kind of mantle on which the other dimensions rest because it is an impossible factor to manage, but its effect is unavoidable. Therefore, the *Stochastic Substrate* is the base of the multidimensional space by encompassing conditioning factors and the 3D subspace that defines talent (Figure 2). In this way, it is acknowledged that the development process is not deterministic because the outcome of each phase does not result from or respond to the application of a formula in which the incorporation of components produces an identical result under identical conditions.

This means that talent evolution will not be the same even in the face of an apparently identical combination of cognitive and non cognitive abilities and environmental opportunities because slight differences in individuals' life experiences might modulate their emotional response and decision making. The accumulation of slight discrepancies in orientation, goals and decisions can produce different ramifications in trajectories by diverting individuals' paths and potentially ending in drastic changes in the talent stage achieved in the long term.

Pure randomness refers to the role of luck as pure chance, while deterministic chaos can be described as the randomness that derives from a complex system. Complex systems are characterized by wide variability in response to minor changes in boundary conditions: i.e. the factors that affect their evolution (Goldberger, 1996). Yet contrary to what Ziegler et al. (2012) suggest, who indicate that theorizing about the role of chance is a phenomenon that reflects insufficient understanding, both pure

randomness and deterministic chaos are manifested in practice as uncertainty (Taleb, 2007).

Thus stochastic substrate refers to the underlying basis of the inherent randomness in complex talent development systems, including both pure randomness and deterministic chaos. This stochastic substrate manifests itself in the impossibility of replicating talent trajectories between individuals in a perfectly planned way.

2.3 Non orthogonality

It is assumed that the considered dimensions are not independent (Dai, 2021; Preckel et al., 2020; Ziegler, 2005), and their study must be carried out dynamically and covariantly. For this purpose, and by representing the model as a multidimensional space, a mathematical concept from linear algebra is adopted: orthogonality (Castillo et al., 1999). Orthogonality indicates the perpendicularity in Euclidean geometry of two vectors, which implies that any element in that space can be obtained as a linear combination of the elements in that set.

This concept can be extrapolated to the theoretical model dimensions to indicate that they do not interact with or influence one another when they are orthogonal (the intersection of dimensions forms a 90° angle).

So the NOMT assumes that talent develops in a non orthogonal multidimensional space. This model's different explanatory and explained dimensions do not independently develop, but significantly feedback the other components' evolution. Moreover, talent does not result from the simple addition of influential factors (Simonton, 2001), but from a complex evolutionary process (Dai, 2021). Non orthogonality would act as a framework at three relation levels: among the explanatory dimensions, among the explained dimensions, and between the explained and explanatory dimensions.

2.3.1 Non orthogonality of the Explanatory Dimensions

The non orthogonality of the explanatory dimensions implies that the influence of different factors cannot be isolated because they covary with one another. To illustrate this, how developing psychosocial skills implies and attracts more, better and more suitable opportunities regardless of the influence of chance is focused on. Similarly, an appropriate and conducive environment can strengthen psychosocial skills by providing challenges that allow individuals to modulate their response to the environment. The same applies to the relation between cognitive components (De1) and context (De4), where the improvement of the former requires appropriate opportunities, and, in turn, higher levels of intellectual assets enable individuals to access better opportunities.

This model does not approach the explained dimensions as isolated components, but takes a systemic approach (Ziegler & Phillipson, 2012). According to the homeodynamics concept (Lloyd et al., 2001), the talent development process is assumed to be a dynamic system capable of self-organizing at certain bifurcation points in response to loss of stability and to balance the different dimensions that compose it.

Based on this premise, systems' behavior exhibits varied dynamics, including radical changes, seasonality and chaotic adaptation processes (Ziegler, 2005) over time. This leads to several ideas: (i) there is no single effective trajectory for talent development; (ii) it cannot be expected to be confined to the linear evolution of different phases; (iii) it does not solely result from applying systematic measures.

Hence this system can be understood as a complex and dynamic mechanism in which individuals place both cognitive and non cognitive abilities at the service of the self-regulation of the integral functioning of all aspects of life. This talent potential,

which addresses the system's self-regulation, involves effectively adapting, shaping and selecting environments, and is reminiscent of Sternberg's successful intelligence (2011).

This integrates with the interconnection of physiological and psychological processes to achieve a balanced and adaptive state of well-being, and one that ultimately involves all three talent dimensions.

First, homeodynamics on the social dimension would be a coherence mechanism in ethical principles by ensuring that individuals' actions align with those of a desired ethical environment. To strike this dynamic balance, continuous attention and adaptation to ethical dilemmas are necessary. Responsible behavior contributes to social harmony by fostering trust and cooperation, which is more conducive to the purpose of vital balance for oneself and the other social community members.

Second, homeodynamics on the domain dimension implies maintaining a dynamic balance that allows adapting to various learning approaches by balancing multiple disciplines and promoting interdisciplinary collaboration.

Third, the effect of this conceptualization on the personal dimension implies actively managing thoughts, emotions and behaviors by considering the dynamic and adaptive nature of maintaining psychological well-being.

2.3.2 Non orthogonality of the Explained Dimensions

On the explained dimensions, the NOMT postulates non orthogonal behavior for D1, D2 and D3, as well as the trajectories in different domains for one same individual. The underlying hypothesis is supported by Simonton's multiplicative conception (2001), which suggests that there may not be a sole genetic foundation for a specific talent domain. Simonton (1988) also states that versatility and a strong interest in disciplines outside one's specialty area are important for outstanding manifestations in the domain perspective.

Therefore, creativity and versatility, along with generating a unique personal knowledge matrix, allow simultaneous progress in different domains. This parallel progress can be made by the conscious and motivated advancement in one of them, or by deliberately practicing the necessary skills for solving complex life problems. The latter can be understood as non systematic training in a particular domain, but one that is cross-sectional to several domains.

It is not suggested that parallel progress in different domains produces trajectories with identical phases and evolution rates, but it should be considered that significant progress in one domain can give rise to unexpected qualitative leaps in domains for which there was no initial purpose.

This falls in line with Dai (2021), who proposes a model that centers on individuals with five abilities that are independent of the domain and transferable to one another.

2.3.1 Non orthogonality of the Explained and Explanatory Dimensions

Finally, the non orthogonality of the explained and explanatory dimensions can be stated as the dependence level of both, as indicated by Preckel et al. (2020) when they mention that the relative importance of predictors (explanatory dimensions) varies over time or according to the talent development level (explained dimensions).

Damasio (2003) opens the door to a certain stochastic nature in consciousness through individual complexity in the perception, analysis, assimilation of experiences and decision making mediated by the integration of feelings and reasoning. So it can be assumed that the influence of the explanatory dimensions may differ for each explained dimension, and this influence itself depends on complex factors, which might vary among individuals because they have a certain degree of intrinsic freedom, and also

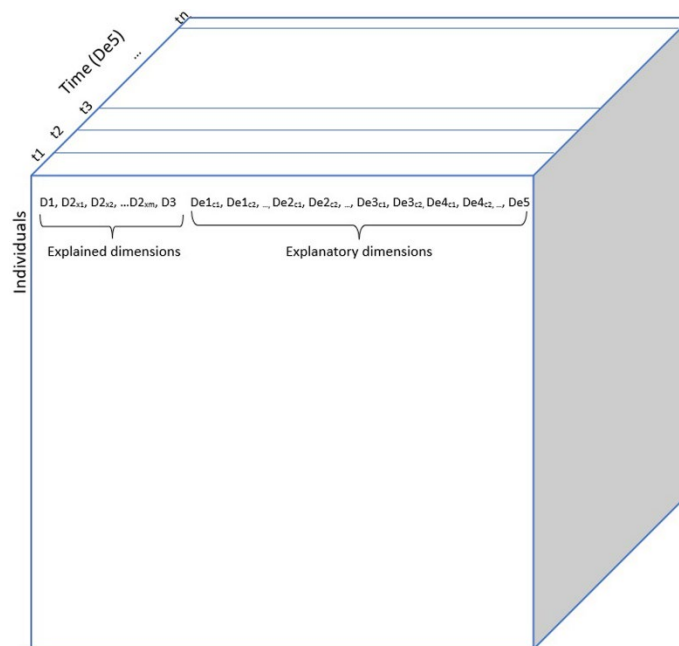
given their (dynamically variable) way of integrating exogenous and endogenous factors.

3. Empirical Implementation

In order to account for the model's empirical application possibilities, the matrix composition of a talent management system based on the NOMT is illustrated.

For each individual, the talent management system will consider the quantitative or qualitative approach of every component of the different dimensions. In this way, and for each moment in time t (De5), a matrix will be available with as many rows as individuals under study or being managed, and with as many columns as needed, to encompass all the information from both the explained and explanatory dimensions (Figure 3). Columns include the three explained dimensions (D1, D2x, D3) and as many corresponding to D2x for the x domains in development (for x from 1 to m). Columns also include the De1, De2, De3 and De4 components.

Figure 3. Matrix composition of a talent management system based on the NOMT.



For the explained dimensions, the value of variables depends on the degree of ethical sensitivity (D1), and also on the refinement and excellence of products, ideas and executions in the domain (D2x). For the psychological balance variable (D3), Cortés-Rodríguez et al. (2023) propose an approach in which individuals' perception of psychological well-being, as manifested in their response to the questionnaire, is taken as a whole based on the Compositional Data Analysis concepts and methods. Those authors define a general indicator of subjective psychological well-being: GISPW. In this way, the psychological balance corresponds to a GISPW value equaling 0, and positive or negative variations show imbalances to the central value. Thus for empirical applications, D3 can be represented by a GISPW value with a target value of 0, among other acceptable future measures or definitions. This means that individuals can exhibit a balanced condition of their different vital dimensions according to the components established by Riff (1989) and its consideration as a global measure (Cortés-Rodríguez et al., 2023).

The components to be included for the explanatory dimensions depend on the variables used to monitor them. For example with the De1 components, this depends on the instruments and subscales of the employed tests.

4. Discussion of the NOMT Implications

4.1 Theoretical Contributions

The talent concept is three-dimensional in this work. These different perspectives contribute to isolate moral judgments by neutralizing the definition of performance stages and incorporating the successful use of the potential in the development of life trajectories with a psychological balance.

First, the NOMT follows a person-centered approach and resembles other models, such as Gagné's (2005) Differentiated Model of Giftedness and Talent

(DMGT), Preckel's et al. (2020) Talent Development in Achievement Domains (TAD) model or Dai's (2021) Evolving Complexity Theory (ECT). Yet the NOMT model focuses more on individuals by considering not only their attributes and specific contributions to a domain at a given time and context, but also perspectives on the psychological balance and social impact as a holistic approach of the talent notion.

Second, most talent development models are domain-specific. This model proposes studying multidisciplinary in certain individuals through the non orthogonal talent trajectories in different domains. Dai's (2021) dynamic conceptualization allows us to not only resize the adaptation process stage in which individuals are located, but to also represent the synergies and co-evolution of trajectories. This approach aligns with the idea that the whole is more than the sum of its parts (Maker et al., 2023). What this emphasizes is that the talent development process cannot be addressed by isolating domains and analyzing individual domain trajectories and components, especially with today's multidisciplinary knowledge evolution.

Third, it is important to note that this model follows a systems approach (Ziegler & Phillipson, 2012), which considers the interrelation and dependent functioning of components, unlike component-based models (endogenous and exogenous) that do not explain their covariation (e.g., Tannenbaum, 1983). This is reflected in the non orthogonality of dimensions and the application of homeodynamic processes to the three defined talent dimensions to interconnect and balance them, which gives rise to possible non systematic evolution.

4.1.1 Discussion of Similarities with Dabrowski's Theory of Positive Disintegration

In line with this, there is a certain parallelism between the NOMT and Dabrowski's Theory of Positive Disintegration (1994). The latter emphasizes internal

development by addressing emotional tensions and conflicts to achieve higher psychological functioning levels (Mendaglio et al., 2019).

Dabrowski sets a theoretical benchmark to explain the evolution of human functioning from the worst to the best of humanity (Mendaglio et al., 2019). That functioning is characterized by changing life motivations from needs and drives to universal positive values.

The above-cited theory proposes five different stages of personality development. For advanced development, specific psychological features are needed: (i) special talent skills, (ii) the possession of all five overexcitabilities and (iii) strong autonomous drive to achieve individuality (Mendaglio & Tillier, 2006).

In people with high intelligence, overexcitabilities contribute to inner conflict by increasing the perception of humanitarian and existential dilemmas. Despite controversy about the OEs questionnaire (Mendaglio et al., 2019), Vuyk et al., (2016) report evidence to suggest Openness to Experience, one of the Big Five factors of personality that encompasses and explains overexcitabilities, and also in gifted students (Botella et al., 2015).

In summary, three levels of parallelism between the NOMT and Dabrowski's Theory of Positive Disintegration are highlighted. The NOMT is a holistic model that includes two aspects: first what Dabrowski conceives as development, which considers progress in personal and social dimensions as the three factors that condition development, considered on the endogenous explanatory dimensions; second the positive disintegration process produces evolution to higher developmental stages, which describes homeodynamics as resolving internal conflicts and resulting in reorganization toward a new balance.

The main difference lies in interpreting the focus of Dabrowski's theory, which apparently centers on the personal psychological dimension. However in both the NOMT and Dabrowski's theory the pursuit, it is assumed that a greater evolved, and more comprehensive balance, of individuals can be achieved by confronting the internal tensions that may stem from both endogenous and exogenous challenges, and may lead to parallel advancement in different talent trajectories.

Balancing cognitive and non cognitive resources would be essential for this process. All the above aligns with the fundamental ideas of the NOMT: (i) with homeodynamics and not necessarily systematic advancement in trajectories; (ii) with the non orthogonality of the three talent dimensions because each dimension is nourished by the challenges within itself and on the other dimensions; (iii) it reinforces the idea of a stochastic substrate by highlighting the unpredictability of events, which may pose an individual challenge and lead to a non systematic leap in trajectories.

With this approach, the maximum expression of talent as the pinnacle of individuals' personal-spiritual development is proposed. Drawing from Damasio (2003), given the idea that the spiritual is an index of the organizational scheme behind a well-balanced, well-tempered and well-intentioned life, the spiritual state can reflect the culmination of harmonious development on the three talent dimensions by aligning with Dabrowski's positive disintegration concept, where internal tensions are overcome to reach a higher state of well-being and understanding.

4.1.2 Giftedness in the NOMT

Although the purpose is not identification, with the NOMT giftedness would be a dynamic concept by considering a complex and optimal combination of explanatory dimensions for the transition to an upper talent development stage on any of the explained dimensions.

Scientific evidence is based on the idea that there is a neurological substrate with structurally and functionally different bases. Nonetheless, observation and research (Geake, 2009; Mrazik & Dombrowski, 2010) show that the individuals who reach intermediate, and even high, talent development stages do not necessarily have the highest initial potential. Instead high talent development stages result from the combination of multiple endogenous and exogenous factors in time and manner terms, which leads to a specific, unique potential development trajectory. So although it should be noted that the existence of a different neurological substrate may impact the psychological balance dimension because these individuals face particular challenges from adaptation and co-existence in a social and educational system where they are a minority (Silverman, 2017), the expression of talent cannot be considered a nature vs. nurture dichotomy. As proposed, it is part of a complex non linear and non orthogonal system.

Based on this consideration, the starting point or the initial stage of all individual trajectories has been termed *genesis*, which replaces the term potential used by Preckel et al. (2020). In the NOMT systemic conception, the talent potential would be dynamic and contained on the endogenous dimensions. In the multidimensional space, the potential gives rise to its manifestation of talent in the 3D subspace. In this way, the talent potential can exist, but its manifestation may lie in elementary performance stages.

4.2 Practical Implications: Educational and Legal Aspects

4.2.1 Designing Educational Programs and Monitoring Talent Development

The proposed model contributes to the existing literature by increasing its empirical application using matrix mathematical notation. This notation, coupled with the idea of simultaneously monitoring individuals' evolution in different talent domains, as well as

the evolution of their psychological well-being and the development of ethical sensitivity, lays the foundation to design talent management tools and the future analysis of data collected by advanced techniques.

By considering three talent dimensions, this model distinguishes the talent potential from its use and social valuation for identification purposes. Hence three talent dimensions are proposed through which individuals can manifest their endowed intellectual and non intellectual resources. According to the NOMT, early identification should neutrally assess the talent potential.

When included in the talent development stages, individuals' psychological balance has relevant implications for designing educational and specialization strategies. It requires motivating and monitoring the program's psychological effects. The social dimension also plays an important role.

Consequently, not all learning or training strategies would be valid for advancing in the talent development trajectory. Progress is traditionally conditioned to improve skills, abilities and products. However in the NOMT, optimal talent development is also conditioned by ensuring individuals' balance and well-being, and by strengthening their ethical and humanitarian sensitivity.

It is crucial to emphasize that this is not an identification model, but a model to guide educational attention for all students and to assess the comprehensive development of individuals' talent in academic, professional and optimal life adaptation contexts.

Thus by considering talent dimensions that are not tied to domains, as well as the synergy between domains and the emergence of talent through a complex evolutionary process, the door opens for the latter to be, albeit demanding, non systematic. In the words of Simonton (2001, p. 3), "there are as many ways to initiate

talent development as there are components contributing to acquisition and performance." This lays the groundwork for more flexible dynamic education to allow the recovery of individuals' talent potential, and to provide opportunities in any development stage or at any age. This aligns with Sustainable Development Goal 4: "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (United Nations, 2015).

Defining three indivisible perspectives as integral parts of the educational model implies that the education system must: (i) enable the refinement of skills and abilities by favoring their complex evolution (domain perspective); (ii) instill responsibility, compassion and ethical sense in using these skills (social perspective); (iii) understand individuals' holistic development by considering how enhancing their abilities would contribute to their psychological well-being (personal perspective).

Yurkevich (2011) states that one general belief is that the more knowledge and competencies a gifted child has developed, the better prepared the child is for future activities. Nonetheless, it is apparently impossible to directly form a person's personality, goals, values and motives because they finally direct action. According to this idea, mentoring appears as one of the main strategies for individuals to engage with set goals, and to direct their learning and talent trajectory.

Mentoring is one of the most effective pedagogical resources available for gifted students' instruction and guidance. Ziegler et al. (2017) include mentoring in social educational capital and didactic educational capital. Subotnik et al. (2021) indicate that the role of mentors for gifted students varies depending on the development level and the domain because they differ in the timing of milestones. Nevertheless, by considering the three components that Jacobi (1991) identifies in the mentoring relationship (emotional and psychological support, direct assistance in career

and professional development, and role model), it is possible to intuit that the impact of this educational resource transcends the domain dimension by directly impacting the three talent dimensions.

This model also proposes the non orthogonality of domains by suggesting that progress in the trajectory of one domain can be cross-sectional to other domains. Therefore, one of the potential intellectual resources to consider and enhance would be the ability to extrapolate knowledge and to achieve synergies between domains.

4.2.1 Inclusive and Equitable Quality Education

The NOMT model neither forces talent development by requiring any initial potential to be composed of exceptional natural abilities (Gagné, 2005), nor solely aspires to explain the evolution and development of the trajectories that culminate in excellent achievements in academic and professional domains.

In this way, education strategies do not necessarily involve the selection and access to specific systematic training programs (Gagné, 2005). Systematic trajectories and the convergence of independent factors cannot explain some of the greatest genius expressions in history. These cross-domain expressions of superior excellence seem to stem from individuals' developmental process, which transcends their academic and professional training by employing a unique combination of cognitive and non cognitive factors in a specific context that leads to qualitative leaps in their talent development trajectory (Piechowski, 1975).

The non orthogonality of the explanatory dimensions highlights that inequality in the development of talent trajectories exists and increases. Not only should the system propose adjustments and measures that provide opportunities for talent development, but it must also be aware that access to these opportunities implies providing more possibilities for future access by, thus, generating a spiral of inequality

in which the refinement of trajectories exponentially distances some individuals' prospects and possibilities of success on the domain dimension. This increases the value and responsibility of the education system and educational policies because they should contribute equitably to ensure all students' talent development.

This conception also opens the door to value as manifestations of exceptional talent not only contributions to art, technique and knowledge, but also other generous tasks like caregiving or spirituality, or ensuring social balance and well-being (Silverman, 1992). By considering three dimensions on which individuals can develop their talent potential, the goal of talent education should be to provide the appropriate substrate for individuals to develop their potential, regardless of whether potential contributions to domains differ between them. Education must ensure the advancement of humanity both individually and collectively.

The previous ideas, together with contemplating that the evolutionary process might not be non systematic, and the unexpected emergence of outstanding talent manifestations may be found, lead to an equitable approach, and one which considers that all students can benefit from specific talent development educational strategies, which helps Sustainable Development Goal 4 to be fulfilled.

Hence the NOMT is more inclusive, especially when considering that believing in one's success capacity (e.g., self-efficacy beliefs; Bandura et al., 1996) increases chances of success (Sternberg et al., 2001). This is further facilitated by extending the conceptualization of what success entails by contemplating alternative talent dimensions beyond domains.

5. Conclusions

Since Terman (1925), results that date back decades have been drawn on to illustrate that a one-dimensional view of the human potential (intelligence quotient) is limited for

explaining the evolutionary process of talent and its maximum manifestation being achieved by some individuals. New longitudinal studies that benefit from the available data management and analysis tools are needed. These studies must be aligned with a multidimensional view of the factors that affect the evolution of potential, but also with a multidimensional view of its possible manifestations.

The NOMT presents three perspectives (social, domain, personal) to examine the manifestation of excellence. In this way, the psychological approach is added apart from the traditional educational one. The theory holistically centers on individuals and explicitly considers the possibility of multidisciplinary profiles through the non orthogonality of domains.

The theory can also be considered more equitable because its approach is transferable to different cultural conceptions of talent and success. Likewise, understanding the evolution of talent trajectories as a homeodynamic process considers the non systematic development of the talent potential by better explaining non linear trajectories and contributing to more equal opportunities in different stages and at various ages. Finally as a novelty, a matrix conceptualization of the theory by allowing empirical implementation for research and talent management systems is presented.

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