Article

Rethinking Human Potential From a Talent Development Perspective*

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Abstract

Historically, the potential of a person has been perceived as fixed and primarily inherited, thus, different from achievement. Current thinking broadens our view of human potential, not as a fixed capacity, but as malleable and incremental, depending on multiple factors, exogenous as well as endogenous, facilitative or inhibitive. This conception opens the door for new ways of thinking about strategies and provisions of gifted education. In this theoretical analysis, I first critique the traditional trait conception of human potential undergirding gifted education practice. I then present an alternative, a process model of talent development, that views human potential as contextually and developmentally shaped, a result of dynamic interplay of endogenous and exogenous forces, revealing the power of nurture as well as nature. Finally, I discuss the policy and practical implications of this new conception of human potential for gifted education.

Keywords

human potential, talent development, evolving complexity, levels of analysis

> The idea that development could actually transform a person's gifts has not had much currency in the field to date, and the failure to embrace a more profound concept of development is at the heart of the current tension in the field as well as the key to its future.
>
> —David Henry Feldman (2003, p. 24)

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The concept of human potential is crucial for education: How confident we are that we can bring a person from the current state to a desired state and how likely a set goal can be achieved depend on a sound understanding of human potential. This article provides, in the context of talent development, a conception of human potential that can facilitate the cultivation of talent and creative productivity. For this purpose, I first critique the traditional trait approach to human potential. Then, I present an analytic framework based on my Evolving Complexity Theory (ECT) of talent development (Dai, 2017), which identifies human potential as developmentally unfolding, involving increasingly complex interactions with task and social environments. Finally, I discuss the policy and practical implications of the new conception of human potential in terms of a paradigm shift in gifted education.

What Is Problematic About Trait Conceptions of Human Potential

For the purpose of this article, *human potential* is defined as any latent qualities that can be realized or developed through experiences, leading to some objectively definable success and achievement. Although traditional conceptions of human potential vary in emphasis, they tend to be trait-level explanations. A trait is a stable individual characteristic that is functionally potent across a set of situations. For example, giftedness, however defined, is often considered a personal trait or something made of a constellation of traits. Ever since Terman (1925) used the Stanford-Binet intelligence test to identify the gifted, trait conceptions of giftedness and talent have been the mainstay and conceptual foundation of educational practice (e.g., placement strategy). Although Terman worked to identify children at the high end of the IQ spectrum, the gifted, Goddard worked to identify the "feeble-minded" (see Hall, 2003). Contemporary trait models of giftedness, from the popular Differentiated Model of Giftedness and Talent (DMGT; Gagné, 2005) to relatively new conceptualizations of giftedness based on brain research (e.g., Geake, 2008), have inherited this legacy.

Although personal traits can be a valid explanation of human potential to some degree, trait conceptions of human potential suffer from several limitations. First, trait models tend to perpetuate a fixed interpretation of human potential as static and capacity-like, as if one's potential to learn and grow is somehow capped by what trait measures or test scores indicate. Second, trait models have an individualistic bias in the sense that what one is potentially capable of doing and accomplishing is solely attributed to one's own characteristics such as gifts and talents, rather than learning experiences and active participation in socially organized activities, including formal education (see Plucker & Barab, 2005, for a critique). Third, trait models are prone to reification of psychological abstracts, turning constructs such as "gifts" and "talents" into "real entities" that hold an explanatory power, leading to tautological reasoning: A person acts intelligently because the person is intelligent or has high intelligence, or, more directly, a person is gifted or possesses giftedness if he or she shows "gifted" behavior; nothing is truly explained or explicated. An alternative view of ability is articulated by Bandura (1993), who argued that "ability is not a fixed attribute residing

in one's behavioral repertoire. Rather, it is a generative capability in which cognitive, social, motivational, and behavioral skills must be organized and effectively orchestrated to serve numerous purposes" (p. 118; see also Dai & Sternberg, 2004).

The past two decades have witnessed changes in conceptions of human potential in general, particularly in giftedness and talent. In developmental psychology, a doctrine of genetic determinism is replaced by a view of human potential as interactively shaped at multiple levels (genetic, neural, behavioral, and environmental) through development in a probabilistic, bidirectional rather than unidirectional manner (Gottlieb, 1998, 2007). In educational psychology, Snow (1992) redefined *aptitude*, a term close in meaning to potential, as situational. For him, aptitudes are always relative to present opportunities and challenges, indicating the extent to which one can benefit from them (see also Lohman, 2005). Departing from the psychometric tradition even further, some scholars view intelligence as a shared accomplishment, distributed between the person, the task, and tools available, rather than solely attributed to the individual (Gresalfi et al., 2012) and gifted performance as fundamentally contextually situated and distributed (Barab & Plucker, 2002). In gifted education, Renzulli (1978, 1986) foretold a contextual and developmental view of giftedness. Although cognitive and noncognitive traits are stable and amenable to testing and reliable measurement, task commitment and creativity are developmentally and contextually shaped and, therefore, can only be assessed in situ. Feldman's (1986) study of child prodigies in art, chess, and mathematics led to a confluence model of talent development, which postulates the dynamic interplay of endogenous and exogenous factors as underlying the child prodigy phenomenon. Subotnik et al. (2011) pointed out the importance of the match between one's profile of characteristics, cognitive and noncognitive, and a domain in which the person is engaged. Ziegler's (2005) ecological theory (Actiotope Model) of giftedness stresses the primacy of human action (in context) in developing human potential. These theories and models have broadened our view of human potential.

General Tenets of Human Potential

To develop a sound understanding of human potential, it is important to distinguish between two kinds of intervening conditions for the realization of human potential: *facilitating* and *enabling. Facilitating conditions* are those that make the demonstration of latent potential possible. This is the kind of human potential facilitated by what Horowitz (2000) called minimal experience. Early literacy, musical sensitivity, or logical reasoning can be seen as cases in point. A hallmark of such human potentialities is that their development does not require formal instruction, and extensive experience, training, and practice. In comparison, *enabling conditions* are those that truly make capacity-building possible; that is, they enable individuals to develop new characteristics that are biologically secondary and, therefore, involve extensive educational experiences and training (Geary, 1995). For instance, most competences of academic or artistic nature are significantly "schooled." Vygotsky's (1978) notion of zone of proximal development (ZPD) alludes to enabling conditions. For him, more

competent others and cultural tools enable less capable individuals to surpass themselves through development. This is why expertise researchers highlight the importance of enabling conditions; they argue that, rather than capped by the genetic makeup, human potential can be augmented by deliberate practice along with education, training, and technology in a fundamental way (Ericsson, 2006). In short, facilitating conditions lead to various manifestations of individual differences in a wide range of cognitive, affective, and motivation variables, such as differential rates of learning and competences, differential levels of interest and persistence, and differential propensities or proclivities to seek certain environments. In contrast, enabling conditions mainly concern how far sociocultural forces (including more competent others) can go in helping individuals develop desirable characteristics and stretch their competence to new levels, which are otherwise unattainable. We can call the former perspective on human potential the "being" camp and the latter perspective the "doing" camp. Both perspectives are valid to some degree. However, the former without the latter tends to perpetuate a fixed view of individual differences (i.e., reductionist) explanation of human potential, whereas the latter without the former tends to perpetuate an infinite malleability perspective on human potential (see Dai, 2012). Therefore, integration of the "being" and "doing" accounts is necessary for creating a more balanced view of how human potential gets realized and further develops into a mature talent (see also Subotnik et al., 2011).

The dilemma of attempts to realize human potential through facilitative and enabling conditions reveals the paradoxical nature of human potential: Human beings are *adaptive* in a biological sense and *intentional* in a sociocultural sense (Dennett, 1987). Adaptive changes are often considered spontaneous, reflecting a natural tendency of the person to pick developmental niches that suit his or her needs and goals, and maximize the chance of biological and social success. In contrast, intentionally engendered changes reflect a more social, deliberate tendency to develop culturally desired and personally aspired competencies and characteristics. It is by this dual nature of human potential that developing individuals is the active *producer* (i.e., agent) as well as the *product* of individual development (Lerner, 2004). Because the development of human potential is always situated in specific functional contexts, which determine how an action is structured and supported to reach its goal, the adaptive and intentional dimensions of human action are often intertwined. In other words, human transactional experiences with the environments are adaptive from an individual development perspective (i.e., achieving goodness of fit regardless of one's intent) and intentional from a sociocultural perspective, that is, mediated by sociocultural values, norms, and belief systems (Gresalfi et al., 2012).

Because of the paradox discussed above, research evidence also goes both ways. There is compelling evidence for differential patterns of long-term talent development that can be best explained by differential aptitudes and dispositions, and distinct characteristic adaptations (i.e., the "being" account; Gagné, 2005; Lubinski & Benbow, 2006). However, there is equally compelling evidence for the enabling effects of sustained efforts to perfect the trade or find out the truth (i.e., the "doing" account;

Ericsson et al., 1993; Gruber, 1986), resulting in changes that can be deeply structural (e.g., changes in the brain anatomy of professional musicians; Schlaug, 2001) as well as functional (e.g., overcoming basic cognitive constraints such as memory capacity; Ericsson & Lehmann, 1996; see Dai, 2010, and Ullén et al., 2016, for reviews). How do we reconcile and integrate these seemingly competing accounts of human potential? I believe that a viable solution is taking a developmental approach.

Although, in reality, what makes a facilitating versus enabling condition is not clear-cut, it is developmentally discernable. As a first approximation, we assume that individuals in their lifetime go through a progressive course of learning and talent development (Dai, 2017), in the order of informal learning experiences (e.g., those facilitated at home), followed by formal education or self-initiated systematic learning, advanced training, and, ultimately, cutting-edge work in particular domains (cf. Gagné, 2005). Because early phases of learning and development reflect more or less the dominance of endogenous forces (i.e., personally driven, adaptive) and later phases much heavier exogenous interventions (i.e., institutionally and socioculturally driven, intentionally promoted), we can roughly see the long-term developmental process as a transition from characteristic adaptations to maximal adaptations under various facilitating and enabling conditions (Dai, 2017).

To be sure, enabling conditions do exist in early phases of development (e.g., Headstart Programs as an early intervention), and individual differences do not disappear when engaged in maximal adaptations (e.g., Matthew Effect continues in formal training settings in various talent domains; Ceci & Papierno, 2005). However, as well established in both personality and educational psychology, in loosely structured environments as compared with highly regimented environments, individual differences are more likely to show through in their characteristic ways of adapting to a wide range of task conditions and social situations (Ackerman, 2013; Buss, 1989). For the early phases of talent development, key developmental considerations include (a) the kinds of aptitudes and dispositions in foundational domains (e.g., intellectual, technical, expressive, social, psychomotor) that children develop and demonstrate; (b) the timing of exposure and experiences children need to have to demonstrate specific aptitudes and dispositions (e.g., when exposure to music or mathematics is crucial for musical or mathematical development); (c) the kinds of characteristic adaptations and developmental niches suitable for short-term and long-term development; and (d) the opportunity structure and cultural incentives in society that shape characteristic adaptations (see Horowitz, 2009; Subotnik et al., 2011, 2019, for more detailed discussion). For more advanced phases of talent development, a different set of developmental considerations kicks in, such as (a) more intensive professional training (learning a set of specialized knowledge and skills); (b) deep engagement, affective as well as cognitive, in professional practice (e.g., sustained deliberate practice and problem solving in a domain); (c) mentorship at different levels; and (d) cutting-edge work and personal niche-picking (Dai et al., 2015; Subotnik et al., 2019; Subotnik & Jarvin, 2005). The integration of both being and doing accounts lays the groundwork for the ECT of talent development (Dai, 2017).

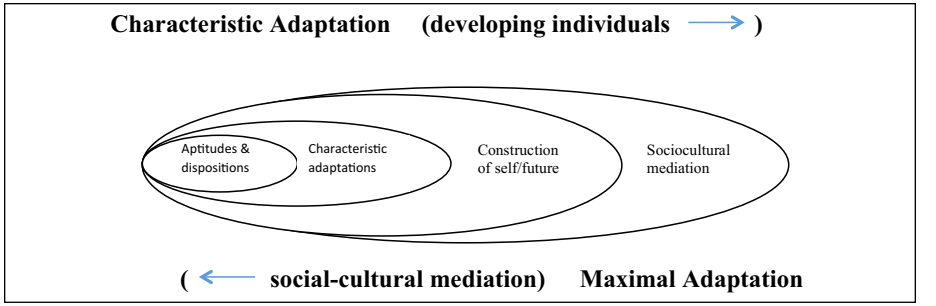

Figure 1. Endogenous and exogenous forces from a multilevel analytic point of view.
Source. Adapted from Dai (2010).

Understanding Human Potential at Different Levels of Evolving Complexity

Consider how we understand physical materials versus devices made of them. We can assume safely that physical properties of a piece of wood or metal do not have the level of organized complexity we see in plants, animals, or human-made devices. By the same token, we can consider human potential as consisting of some raw materials at one level, but of organized existence at another, reflecting some sort of biosocial design that is more complex in its organizational principles. Moreover, organisms have potential for growth in terms of making qualitative as well as quantitative changes. For example, an adult is more capable of exercising executive control than a child or adolescent, or an adolescent is more capable of mastering conceptual materials compared with a child. At a higher level, human actions become more purposive, driven, and regulated by intentional states such as self-related beliefs and desires and future aspirations, which constitute a new force to affect personal and environmental changes. It is, therefore, important to see human potential not as a fixed capacity but in the context of individual development.

Building on Dennett (1987), Newell (1990), and McAdams and Pals (2006), I have developed a multilevel analytic framework (Dai, 2005, 2010), which identifies four epistemic stances from the most simple and concrete to more abstract and complex: *physical* (material), *design, intentional*, and *contextual* levels, with each level holding some explanatory power regarding the sources of human potential (see Figure 1).

At the basic level are aptitudes and dispositions, which can be defined psychometrically as relatively universal dimensions (e.g., body shape, memory capacity, perfect pitch, openness to experience) along which individuals differ. In the context of ECT, aptitudes refer to the cognitive underpinnings of talent, and dispositions indicate the affective–conative part of talent, similar to intrapersonal catalysts in Gagné's (2005) DMGT model. These are endogenous factors that can be developmentally instigative (Bronfenbrenner, 1989, p. 219), namely, personal characteristics that tend to generate new experiences and prompt developmental changes through self-organization. We can

consider this dimension of human potential as biologically constitutional capacities of some sort, albeit developmentally calibrated. This level of human potential figures prominently in traditional models of giftedness (e.g., Gagné, 2005; Tannenbaum, 1983).

At the next level is characteristic adaptation (CA). Adaptations are "characteristic" because they reveal systematic individual differences in person–situation interaction. A focus on CA reflects an understanding that "human lives vary with respect to a wide range of motivational, social-cognitive, and developmental adaptations, contextualized in time, place, and/or social role" (McAdams & Pals, 2006, p. 208). Defined as such, CA is an organism-level, holistic construct and can be seen as consistent patterns or self-organization of abilities, interests, self-concepts, preferences, and personality characteristics in response to environmental opportunities and challenges (Ackerman, 2003; Lubinski, 2004). For example, CA is manifest when one child is highly tuned into the world of animals and another finds mechanical gadgets more fascinating. It represents the unfolding of distinct developmental niche potential and life trajectories. CA is a construct of human potential in the sense that it prompts certain choices and actions that are essential for engendering new competence and experience that enhance one's niche potential. Lubinski and Benbow (2006) captured CA at work when they found unique combinations of math, verbal, and spatial capabilities that differentially predict career interests and choices and ultimate domain accomplishments (e.g., Wai et al., 2009).

At the next higher level is what I called construction of self and future (Dai, 2010). It is at this level that purpose, such as personal strivings and commitment to a particular line of work, gain explanatory power as a construct of human potential for talent development (Gruber, 1986; Piirto, 1994; see Moran, this issue). Such an enduring purposive action is evident when a group of technologically talented adolescents sought out opportunities for learning and self-exploration across home, school, and community in a self-sustaining manner (Barron, 2006). Edelman (1995) emphasized the nonreductionist, contextually emergent nature of this developmental property: "By selfhood, I mean not just the individuality that emerges from genetics and immunology but personal individuality that emerges from developmental and social interactions" (p. 201). Without exception, those who made outstanding contributions to human civilization through their intellectual ideas, practical innovations, or different forms of artistry show a developmental pattern that can only be explained by evoking this level of explanation.

At the most inclusive level is the contextualized analysis of human action, whereby the issue of how specific aptitudes/dispositions, characteristic adaptations, and personal strivings are mediated by task conditions and sociocultural forces becomes clear. Sociocultural mediation, with its tools, resources, and support, does not merely facilitate the realization of human potential; it enables humans to function at a higher level (through development) that is otherwise not reachable (Barab & Plucker, 2002; Plucker & Barab, 2005). In this sense, the traditional view of human potential as endogenous (i.e., residing with the person) is problematic. A more appropriate view of human potential treats endogenous and exogenous forces as interactive and reciprocal (Subotnik et al., 2011), especially when one is deeply engaged in domain practice (Csikszentmihalyi, 1996; Subotnik et al., 2019).

Taken together, this multilevel analysis of human functioning and development calls for an understanding of human potential as developmentally emergent, and its nature is sensitive to social contexts as well as developmental levels and stages (Dai & Renzulli, 2008). The four levels of analysis reflect an embedded, multilayered biopsychosocial system, with higher level properties including the lower levels of components but are not reducible to the lower level explanations. Moreover, it is a two-way street: Individuals drive their development through characteristic adaptations, while the sociocultural forces often enhance their adaptive efforts through their enabling or augmenting power (resources, tools, support, and synergy). Together, these two forces (endogenous and exogenous; see Figure 1) help shape a person's developmental trajectory (i.e., where the person is heading and how far the person can go). Ultimately, it is the person who integrates these endogenous and exogenous forces through personal commitments and strivings (Fischer & Bidell, 2006).

Methodological consequences of this view are profound. When we view human potential in terms of aptitudes and dispositions, we take a nomothetic approach, assuming individuals vary along dimensions that are universal, thus, amenable to psychometric measurements. However, a talent or creative life tends to follow a nonuniversal developmental trajectory, to use Feldman's (1994, 2003) term. Consequently, more idiographic, person-centered accounts over time become more powerful than variable-centered accounts of talent and creativity development (e.g., Barron, 2006; Gardner, 1993; Gruber, 1986; see Laursen & Hoff, 2006, for a discussion of person-centered vs. variable-centered approaches).

The Role of Adaptive Effort in Developing Human Potential

In the previous section, I presented an argument that human potential can be subjected to different levels of analysis, and each level reflects distinctive sources of human potential, and, thus, holds some explanatory power for human accomplishments. However, the analytic framework does not say much as to how human potential is realized in action at different levels, and how this framework can support a coherent theory of talent development. ECT is meant to address this question by stressing the primacy of human activity as the basis for the dynamic interplay of endogenous and exogenous forces every step of the way in shaping talent expressions and trajectories (see also Ziegler, 2005). Figure 2 is a schematic representation of ECT.

As shown in Figure 2, the large arrow represents the developing person with all their endogenous forces interacting with two kinds of exogenous factors: environmental opportunities and challenges on one hand, and sociocultural mediation of human action (present resources, tools, and values) on the other. That ECT starts with environmental press rather than with a talent or gift distinguishes itself from many other talent theories (e.g., Gagné, 2005). Environmental press (Murray, 1938) refers to a situation that evokes a need within the organism that has adaptive consequences. To use the language of ecological psychology, it affords certain opportunities to learn, to develop, to control, to enjoy, to fulfill needs, but at the same time sets constraints and

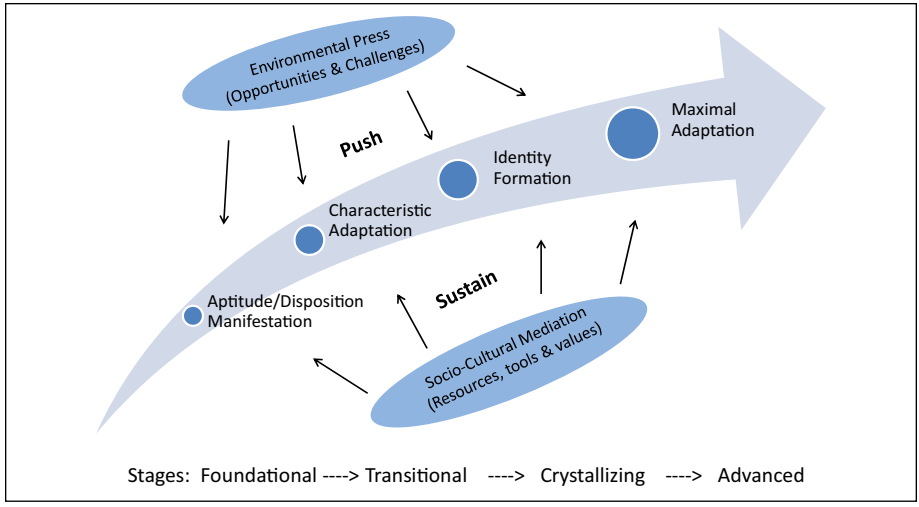

Figure 2. A schematic representation of Evolving Complexity Theory (ECT).

conditions (i.e., challenges) to materialize the affordances in question. The nature of such person–environmental transaction determines, first and foremost, that a talent is not innate but the result of self-organized and self-directed adaptive responses to environmental opportunities and challenges. Aptitudes and dispositions, which presumably are in part genetically based, are developed and harnessed to build effectivities in foundational domains of human functioning (intellectual, expressive, technical, social, and psychomotor; see Dai, 2017) to fulfill needs and achieve desired goals. I use the "push" metaphor to denote this need-evoking and need-fulfilling process.

In addition, Figure 2 also shows sociocultural mediation of human action as the other side of exogenous forces, mainly through resources, tools, and values that are important for helping the developing person achieve evoked needs and goals. This part is equivalent to environmental catalysts in Gagné's (2005) DMGT model, except that supporting mechanisms in ECT are specific to the nature of transactional experiences. Different from Gagné in his emphasis of giftedness as "natural endowment," distinguishable from developed talent, I argue that even some basic aptitudes (musical sensitivity) and dispositions (e.g., curiosity) are socioculturally mediated or facilitated (e.g., artistic and intellectual stimulation; see Glaveanu et al., 2019, for a broad conceptualization). I use the "sustain" metaphor to denote this indispensible support function (see Barab & Plucker, 2002, for a similar account of giftedness). Taken together, the dynamic interplay of push and sustain is the main mechanism for talent development.

To stress the evolving complexity tenet, ECT postulates that the "Push-and-Sustain" dynamics evolve and change over time with development, revealing the nature of interactive endogenous and exogenous forces at various developmental junctures. For example, CAs become prevalent when the person reaches adolescence and gains increasing autonomy, which allows the person to actively seek or select their environments (e.g., books,

friends, places, social media). Demonstrating musical aptitude (Foundational Phase) is one thing, pursuing a musical interest (Transitional Phase) is another, and becoming a musician (Crystallizing Phase) or exploring a new form of style of musical expression (Advanced Phase) is even more of a different matter. The game changes, so to speak, as the person moves to later phases of talent development. The theory postulates several points of developmental transition; however, of central importance is the transition from CA to maximal adaptation (MA). In essence, ECT is a two-stage model, with the Foundational Phase as preparation for extended CA, and Crystallizing Phase as preparation for extended MA.

To fully spell out the Push-Sustain Mechanisms, ECT postulates the interplay of three essential components of endogenous and exogenous forces, cognitive, affective, and social, as facilitating the transition from CA to MA. Push-and-Sustain at the cognitive level is the increasing cognitive demands and challenges as talent develops. For any talent domain, the learning curve gets steeper over time, and CA for even the talented can reach a point of plateau or diminishing returns. Bamberger (1986) studied the crisis of those musically talented teenagers whose intuitive approach to music (i.e., CA) has to be replaced by a more analytical mode of processing. In my current study of early college entrants who later became distinguished science, technology, engineering, and mathematics (STEM) researchers (Dai & Li, 2020), their college experiences are marked by a distinct, sometimes difficult, transition from being a good student (i.e., CA) to being an aspiring research scientist (i.e., MA). In her treatise on "beyond modularity," Karmiloff-Smith (1992) argued that mental representation of experience and knowledge ultimately has to go beyond an implicit process to reach a consciously and technically controlled level of mastery. In other words, it takes MA to measure up to any high-level challenges that one encounters. Thus, the cognitive demand or push creates a need to intensify and sustain the effort that helps the person reach a new level of competence.

The endogenous process that helps sustain talent development efforts is also affective in nature. Although Gottfried et al. (2005) found the continuity of intrinsic academic motivation that maintains the academically talented adolescents' effort during the Transitional Phase, it is not sufficient unless the circumstances prompt a firm commitment to a specific line of work. I label this process of making commitment a Crystallizing Phase, following the pervasive findings of crystallizing experiences among eminent scientists and artists reported by Walters and Gardner (1986, p. 306; see also Freeman, 1999).

For a complete account of Push-and-Sustain mechanisms for the transition from CA to MA, ECT argues that the cognitive demands and the affective process of Cope-and-Grow are internal processes embedded and triggered by serious participation in a domain of professional practice, often involving a community of like-minded individuals (Csikszentmihalyi, 1996). Such social participation provides both pushing and sustaining power. It pushes participants to work on the edge of competence given the norms and expectation of a learning or professional community (Bereiter & Scardamalia, 1993). In the meantime, sociocultural mediation, through its pedagogical and technical support as well as the modeling of values and

attitudes (e.g., through mentorship), provides cognitively enabling conditions as well as affective support and inspiration (Grassinger et al., 2010). In short, ECT postulates the reciprocation of social, affective, and cognitive processes that move the talent development to the Advanced Phase, characterized by engagement in cutting-edge creative work.

To illustrate how the Push-and-Sustain mechanism works to facilitate the transition from CA to MA, I briefly discuss my research program on multiple cohorts of early college entrants in a STEM program in China. This early college entrance program admits a highly selective group of academically talented students with an average age of 15 years. The first study (Dai et al., 2015) focused on a cohort of students who entered and graduated from the program in the first decade of this century, and the second study (Dai & Li, 2020) obtained a targeted sample of early college entrants from different cohorts of the program who later became professors at first-tier research universities in the United States. We found that, across cohorts of the program, these early college entrants unanimously reported that they were cognitively challenged despite the fact they were top students in secondary school. Characteristic adaptation was not sufficient to sustain their academic progress. Many of them were operating in a coping mode. However, what we also found is that, with coping, there was also an undercurrent of growing (hence, the Cope-and-Grow Model of affective development; Dai et al., 2015): Rather than being discouraged, many of these students geared up their effort and built up their commitment to academic excellence. This transition, however, cannot be fully understood without placing these cognitive and affective processes in the context of the Push-and-Sustain social dynamics. These early entrants reported social-evaluative pressure, particularly the big-fish-little-pond effect (BFLPE; see Marsh & Hau, 2003), as well as peer support and mutual intellectual stimulation and validation that helped sustain their effort (Dai et al., 2015). Not the least were great teachers in the classroom and supportive mentors in the lab, who not only pushed them to be their best but sustain their effort by personally motivating them and intellectually supporting them. The following quote epitomizes how early entrants went through the transition:

> From the freshmen year up to the lab work, what we had learned from physics classes is sheer knowledge. I didn't understand until I got the lab experience that what kind of ability I need to possess, not just what I know, but what [problems] I have to deal with. In previous years I had no clue what research looks like, the process of problem finding and problem solving, which you cannot get from physics lessons. I gradually learned this. Then my attitude toward learning and methods of study [changed], and I was more and more interested in physics, more and more appreciative of its beauty. At the beginning, what you see are formulas and theorems, but gradually you found the logic behind, the process that led to their discovery, which was fascinating. Then you approached the knowledge from this angle, not just treating it as fixed formulas, but taking it as a whole, and see what's behind. (Dai et al., 2015, p. 83)

Thus, there was not only cognitive impetus for transitioning to a more advanced level of cognitive effort, but also affective growth that facilitates the transition. Furthermore,

there are sociocultural forces that sustain as well as push these internal processes, leading to the developmental transition from CA to MA. How does this developmental process illuminate the nature of human potential? It means that the developmental process matters, and related adaptive effort matters. In this sense, doing significantly contributes to what we call talent, or enhanced human functioning in specific domains. In this context especially relevant is MA, which is exercised fundamentally to stretch human limits and surpass oneself (Bereiter & Scardamalia, 1993). Whereas previous research and theoretical work (e.g., Csikszentmihalyi, 1996; Csikszentmihalyi & Robinson, 1986; Tannenbaum, 1983) has stressed the leverage of sociocultural forces in talent development, ECT further specifies where and when it becomes crucial and how it sustains adaptive effort in talent development.

Policy and Practical Implications: Beyond Giftedness

In sum, a talent development explanation of human potential does not credit success solely to the endogenous factors involved. Rather, a person's potential is enhanced and augmented through acting upon or interacting with specific task and social environments. Contributors to human potential include exogenous as well as endogenous forces at the four levels of analysis presented earlier, involving a prolonged process with developmental transitions and milestone events. From this perspective, the following features of human potential should be highlighted:

- Human potential is adaptive and contextual in nature, depending on how life circumstances shape its expression, development, and realization. Talent development involves cultural selection, in the sense that culture tends to value and promote certain personal qualities as more essential than others (Portin, 2015). Thus, one cannot estimate human potential without a functional social–cultural context (the contextual tenet).
- Human potential is dynamically shaped through developmental interaction of endogenous and exogenous forces, leading to adaptive changes at structural as well as functional levels; these changes involve affective–conative as well as cognitive factors, such as interest and purpose. It is not a fixed capacity genetically preordained, albeit some important individual differences in developmental potential vis-à-vis a particular line of work (the dynamism tenet) are involved.
- Human potential in the form of manifest talent is increasingly differentiated and calibrated, that is, more and more fine-tuned to specific niches and domains; it is also hierarchically integrated across the four levels of analysis (see Figure 1) over time. Competence so developed is increasingly domain-specific. Thus, undifferentiated, generic gifted potential (e.g., some brain power) is an underdefined quality from a developmental point of view. Based on the stages or phases of talent development, as delineated by ECT, potential to be unleashed, identified, and developed takes different conditions and processes at different critical points in development (the developmental tenet).

- Human potential sometimes boils down to a decision. With biological, cognitive, and social maturity, the person becomes increasingly capable of intentionally effecting changes in oneself as well as the world through self-directed effort. Although it is conceivable that one's competence can plateau (i.e., hitting an asymptotic point), oftentimes, culturally defined success is not determined by whether a person has the necessary potential or capacity but, simply, whether the person has the determination to make a positive, enduring difference in the world (Moran, this issue; Sternberg, 2017). Indeed, dedicated effort makes maximal adaptation possible (Ericsson, 2006; the intentionality tenet).
- Due to developmental and cultural diversity and variability, human potential is fundamentally pluralistic; in other words, human excellence is manifested in a dazzling array of achievements and accomplishments realized through a variety of developmental trajectories and pathways (Feldman, 2003). In this sense, individual talent development is intrinsically robust yet highly sensitive to environmental conditions. Human potential cannot be understood without looking at an increasingly distinct individuality. Quantifying human potential psychometrically on an ordinal or interval scale overlooks the varied and many ways one can accomplish marvelous feats, and, thus, can be practically limiting (the diversity tenet).

ECT is a constructivist account of talent development as a process of creating a personal action space or developmental niche (be it intellectual, practical, or artistic in nature) uniquely fitted to make contributions to relevant areas of human endeavor (Super & Harkness, 1986). According to this view, talent is not innate but is dynamically shaped by self-organized responses to environmental challenges and opportunities, serving adaptive functions vis-à-vis task and domain constraints (i.e., CA) and related augmenting social conditions, and further developed through self-directed, dedicated efforts over an extended period of time (i.e., MA). Therefore, ECT explains talent and creativity in terms of both CA (e.g., the person-task fit, comparative advantages, and selective affinity) and MA (e.g., deep learning experiences, long-term commitment to a line of work, mentorship, and pedagogical and technological support). In light of this theory, the potential of a person is not a constant, but depends on a dynamic interplay of endogenous and exogenous forces that helps shape specific talent developmental trajectories and pathways over time. Feldman (2003) urged educators and researchers in the field to take development more seriously in our conception of giftedness, talent, and creativity. ECT represents an effort in this direction.

What message can educators and counselors take away from a talent development perspective in general and ECT in particular? First, practitioners need to take a functional view of gifts and talents rather than a structural one, that is, gifts and talents as manifestations of human potential are not "things" or entities residing in the head to be discovered, but indicative of how the person characteristically responds and measures up to certain environmental opportunities and challenges. For that matter, knowledge and understanding of the context in which individuals find themselves is crucial. Rather than a fixed capacity, human potential is dynamic and changing, adaptive to

environmental challenges and opportunities. With enabling or augmented conditions, such as technological support as well as synergistic power of people working together, individuals can stretch their limits and accomplish things they otherwise cannot.

Second, as a corollary, what we consider as potential or aptitude (as Snow, 1992, defined it; see also Lohman, 2005) is sensitive to the tasks involved. Developmental potential demonstrated in the Foundational Phase is not the same as that in the Transitional Phase, so on and so forth. As Feldman (2003) put it, "processes of development in person, domain, and culture will have to move to center stage, organize the conversation, and become the most important criteria for assessment of the strength of talents and gifts" (p. 21).

Third, if development of human potential fundamentally relies on a dynamic, reciprocal interplay of endogenous and exogenous forces, then identifying facilitating and enabling conditions for intervention purposes every step of the way is just as important as identifying endogenous resources (Barab & Plucker, 2002; Plucker & Barab, 2005).

Fourth, the ultimate goal of gifted education is to promote optimal development by providing a range of opportunities and services to proactively promote or reactively accommodate to a variety of talent trajectories and pathways. Therefore, going beyond giftedness to embrace a broader psychosocial basis for talent development is imperative. In other words, a paradigm shift is in order (Dai, 2016; Feldman, 1992; Treffinger & Feldhusen, 1996).

More specific to ECT-based guidelines, timely identification of aptitude/dispositions through testing and performance measures at the Foundational Phase can surely give us useful information about the gifts and talents of a child; however, it is more important to observe how the person as a whole selectively responds to and acts upon specific learning opportunities, formally as well as informally, as such observation will provide critical information (Renzulli, 1977, would call it action information) about developmental niche-picking and characteristic adaptation demonstrated by particular students.

As gifted and talented identification is always done in the hopes of unleashing and fulfilling developmental potential, how to create an optimal interplay of endogenous and exogenous resources at different phases of talent development is a central task that can be ECT-inspired. For example, based on ECT, the main concern is how to promote and facilitate transition from CA to MA when one's talent trajectory becomes clear. It should be noted that a talent trajectory based on CAs is necessarily a personal one, and, therefore, may or may not fit the conventional boundaries of domains and fields. As ECT is an explicit developmental theory with specification of the Push-and-Sustain reciprocal interplay of cognitive, affective, and social processes discussed above, more proactive programming is made possible.

Conclusion

A century ago, under the influence of evolutionary theory in general and Galton's (1869) genetic inheritance theory in particular, high human potential (i.e., genius or giftedness) was considered a natural endowment, which we just have to identify and bring into full play as much as we can. This thinking led to the inception of gifted

education (Terman, 1925). Although this tradition still has value in terms of recognizing individual differences in intellectual potential, it represents a narrow vision of what constitutes human potential, and, thus, can lead to problematic practices as well as ethical and social consequences (e.g., IQ-based bifurcation of the gifted and non-gifted). It is important, therefore, to embrace a broader psychosocial basis of human potential, and recognize the multifaceted, developmentally complex nature of how gifts and talents develop. Most importantly for educational and psychological practitioners, a conception of human potential should be empowering rather than limiting, and, for that matter, inclusive rather than exclusive. For that purpose, ECT provides an alternative approach, which not only recognizes the contributions of both nature and nurture, but also specifies proximal processes (interactions of cognitive, affective, and social conditions in specific social contexts and at specific developmental junctures) involved in developmental changes and transitions, and identifies facilitating and enabling conditions every step of the way toward unleashing human potential and promoting optimal development.

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