

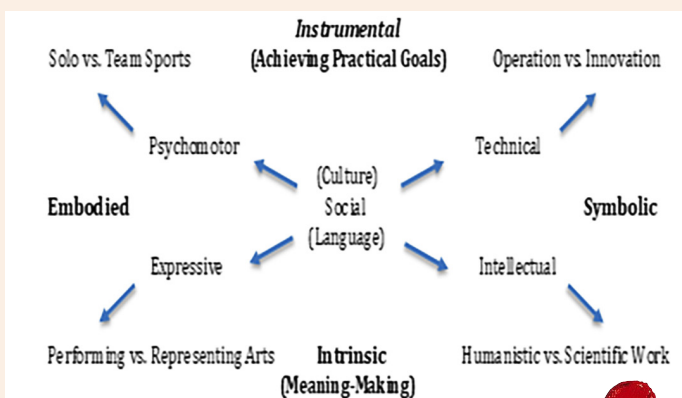
# How Talent Is Made, Not Born: ECT in a Nutshell

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Evolving Complexity Theory (ECT) of talent development was initially developed for practical purposes of guiding gifted and talented education as an alternative to “Gifted Child Paradigm” (Dai, 2011, 2017; Dai & Chen, 2013, 2014). It is more of a developmental systems theory rather than component or trait theory (Dai, 2019, 2020a, 2020b, 2021). As I have argued for many years, a more contextual, dynamic, developmental view of talent is a better alternative to a decontextualized, static trait view, simply because the “evolving complexity” involved in TD cannot be reduced to simple traits, or even genetics, albeit their distal contributions.

## Long Argument of Evolving Complexity Theory (ECT)

Think of an octopus with its multiple “arms” (tentacles) reaching out to interact with its environment. Human senses and sensibilities might work just like those arms of an octopus (it is not trivial to mention that about two thirds of an octopus’s neurons are located in the nerve cords of its arms!), with many aims (presumably serving different functions), each functioning as a distinct way of building its effectivity in response to certain affordances, to use the terminology of ecological psychology (Gibson, 1977). Those proverbial human tentacles constantly scan the surroundings to catch something of significance, sometimes visually pleasurable, other times intellectually exciting, still other times functionally useful (see Figure 1). ECT specifies five basic forms of human engagement, representation, cognitive modeling, resulting in some level of effectivity vis-à-vis their corresponding affordances: a) psychomotor, b) technical, c) social, d) expressive, and e) intellectual, all of which were manifested when “human modernity” was solidly established roughly fifty thousand years ago.



**Figure 1. The Octopus model of Unfolding Talent**

The most common form of human engagement, representation, modeling is probably social and co-operative in nature, enabled by empathy and sympathetic understanding, significantly enhanced by the invention of language (spoken and written). Psychomotor engagement,



modeling, and effectivity, probably the most ancient, can be seen in hunting and handcrafts as well as most modern sports, and can even be traced to brain anatomy (e.g., cerebellum for motor control). Technical engagement, modeling, and effectivity can be observed in tool making and innovated procedures in ancient and modern times. Apparently some symbolic representation and manipulation (e.g., some means-ends causal schemas) is involved even in chimps’ insight as to how to reach a dangling banana with a wooden box in Kohler’s experiment. Human effectivity in artistic expressiveness can be witnessed in cave paintings, ancient ritualistic dances, and many other instances. Fundamentals of expressiveness never change despite increasingly sophisticated forms and styles of expression. Lastly, intellectual engagement, modeling, and effectivity can be observed in early human history as myths and religions and in modern ages as natural science and disciplinary understandings of human nature and the human past. What drives intellectual engagement is a desire for deep understanding of the world, physical, social, artificial, as well as human.

Whenever we discuss talent, we should be aware of the distinction between more “natural” bio-ecological talent discussed above, and significantly nurtured talent, which takes much “enculturation.” According to ECT, the complexity of talent is determined by how many forms of effectivity are involved in developing excellence in a cultural domain. A talent can be considered “simple” in the sense it only involves the execution of simple performance components. Writing a play for theater is more complex than writing a poem simply because poetry only involves crafting expressive languages and images, whereas writing a play goes beyond expressiveness to involve the construction of a web of fictional characters and relationships that logically and temporally unfold over time. Being a lawyer involves exercising social, expressive, technical, and intellectual forms of effectivity, whereas being a golfer mainly involve psychomotor and technical maneuvers.

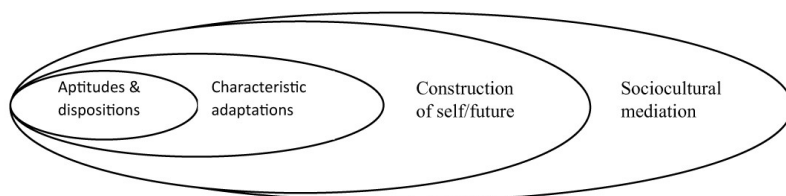
This complexity of talent and talent development have implications for developmental timing. For example, poets appear at much younger ages than playwrights, because developmentally more components need to develop and get self-organized for creative productivity (Simonton, 1999). Regardless of complexity, all culturally created talent as we know is not innate (i.e., genetically pre-programmed) but a new machine made of old parts, that is the five ancient forms of bio-ecological effectivity that can traced all the way to our ancestry or even our neural and physical anatomy. All new inventions of talent domains, F-1 car race, video game competition, E-business, or all works of Elon Musk involve various forms of human activity in the service of crafting a more powerful way to deal with new challenges and stretch human limits to a

new height.

## Main Drivers of Talent Development

Everything we do creates a subjective sensation that informs us of the significance of this encounter in terms of valence (i.e., positive or negative affect) and meaning (significant relationships with an object, person, or activity), which is retained in memory as such. This indicates an organismic principle: human beings function as a whole when dealing with their environments; thus, the five forms of effectivity are not modular in terms of impenetrable to central control (cf. multiple intelligences; Gardner, 1983). Here we are getting close to the heart of the matter: individuals are increasingly capable of self-direction and their behaviors become more purposive. Consequently, individual development follows a trajectory of being increasingly integrative (effectivities and personal goals more coordinated and coupled) and purposive (from playful engagement to serious work). In the meantime, the process of individual development is mediated by cultural selection through its value system, and cultural enhancement through resources and tools it provides to ensure chances of success. This indicates a cultural principle. Culture serves as a gatekeeper as well as an enabler (Dai, 2020a). The two principles (organismic and cultural) lead to two central concepts regarding the underlying regulatory forces that propel talent development: characteristic and maximal adaptation indicated in Figure 2.

### Characteristic Adaptation (developing individuals →)



### (← social-cultural mediation) Maximal Adaptation

**Figure 2. A multi-layered, onion-like evolving system of TD featuring CA and MA**

**Characteristic adaptation (CA).** As shown in Figure 2, CA indicates a developing person's tendency to seek an environment that enhances one's chance of surviving and thriving. To use a colloquial term, a variety of niche-picking behaviors reflect CA (the kind of books one is eager to read, the kind of persons one emulates, the kind of activities one is passionate about). Niche-picking behaviors may be initially spontaneous and sporadic but getting more purposive and systematic by which all five forms of effectivity are harnessed, developed, and integrated to achieve personal goals. For TD, CA is mainly indicated in three ways: (a) the ease of learning in specific contexts, and distinct representations of the world, (b) some affective-conative characteristics manifested *in situ*, such as selective affinity with a particular class of activities, and (c) some favorable social conditions such as opportunity structure that facilitate self-exploration, and

comparative advantages demonstrated among peer groups. The consequence of CA is the exploration and expansion of one's contextually bound Personal Action Space (skill set, personal projects, life themes, aspirations, etc.).

**Maximal Adaptation (MA).** Maximal adaptation implies dedicated effort and devoted strivings. The very notion of deliberate practice (Ericsson, 2006) suggests MA or maximal grip (Dai & Renzulli, 2008). As indicated in Figure 2, while CA is characterizing an individual trajectory of harnessing one's strengths and directions for effectivity, MA highlights the force of social-cultural mediation that cultivates and strengthens one's talent in the service of the common good (i.e., what is deemed as enhancing social vitality and cultural identity). Specific to talent development, MA is manifested in a variety of ways institutions (guilds, academies, universities, incubators, social networks) are established, and tools and technologies (symbol systems, equipment, training regiments) are invented, and resources (museums and libraries, field trips, science labs, makerspace) are developed to sharpen the mind and develop expertise in many valued areas of human activity. Without these social-cultural provisions, even "highly talented" individuals cannot go very far. Thus, MA is the only way of perfecting one's trade and surpassing oneself.

According to ECT, the transition from CA to MA involves several psychosocial conditions and milestone achievements that facilitate deep commitment to long-term development; they include a) increasingly challenging task demands (cognitive, sometimes social, such as high professional standards); b) strong identity as to what the person wants to be, suggested in Figure 2; and c) institutional recognitions (recognition of achievements, admissions to graduate schools, etc.). To explain this developmental process, ECT specifies three critical transitions from childhood to adulthood.

## Critical Transitions in Reaching High-Level Excellence

Figure 2 suggests that personal agency takes several forms, mediated by social-cultural forces. The three critical transitions indicate the emergence of new forms of personal agency and momentum for TD.

1. Transition from spontaneous play to CA in terms of active seeking developmental opportunities and environments for achieving personal aspirations.
2. Transition from CA to MA in terms of more dedicated efforts and strivings toward a high standard of excellence.
3. Transition from mastery and high-level technical proficiency to the carving out of a personal niche for major contributions to a field of human endeavor.

Likely, the first transition occurs during adolescence, the

second during young adulthood, and the third during mid-adulthood. Developmental timing of these transitions will vary from domain to domain, from individual to individual. What is more important is the kind of environmental affordances, opportunities, and support that support each of these transitions. To facilitate the first transition, ECT emphasizes timely exposure to enriched environments (Renzulli & Reis, 1997), typically in preschool and early school years for playful engagement of self-initiated or adult-structured activities that involve various combinations of the five domains of effectivity stipulated by ECT (see Figure 1). To facilitate the second transition, ECT stipulates the timely offerings of serious learning activities (e.g., project-based learning, makerspace) that engender deep experience and task commitment (Barron, 2006; Dai et al., 2015). As for the third transition, ECT postulates timely opportunities for cutting-edge work and mentorship that facilitate intrinsic meaning-driven personal enterprises (Dai & Li, 2020, 2023) rather than merely trying to get ahead (i.e., being competitive).

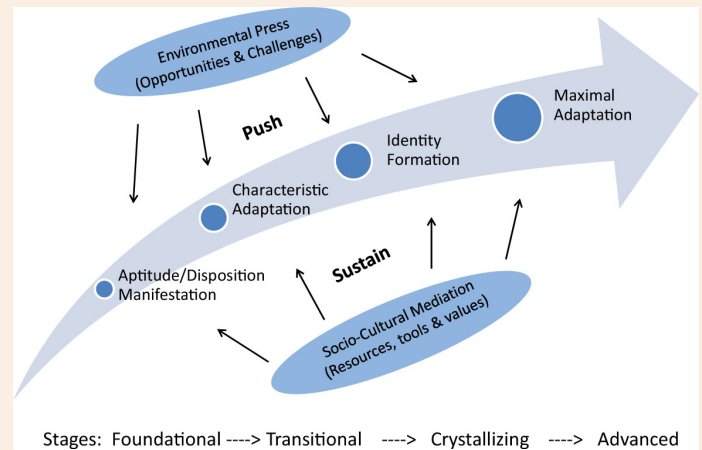
For school-age children and adolescents, we can think of the first two transitions as more relevant. Then, as educators and parents, the following talent milestone events or achievements can be used to track one's talent development:

- Early playful activities and interests (e.g., readings, playing gadgets) in formative years
- Early achievement (e.g., performing, carrying out projects, presenting a report)
- Recognized talent (in any of the five forms of effectivity) in childhood and adolescence
- Recognized achievement by parents and teachers in middle or high school
- High aspirations revealed as teenagers
- Distinct strengths in arts, sports, and academics in and outside of school
- Recognized talent in professional or leisure endeavors (game playing, cooking, etc.)

### Nested Layers of Human Agency Unfolding Over Time: Evolving Complexity Explained and Enacted

As shown in Figure 2, as children and adolescents engage the world extensively, aptitudes and dispositions toward the five forms of engagement will manifest themselves, and eventually show distinct self-organization through differentiation and integration, which is CA for excellence. With further development, the issue of the self and future

will come to the forefront of one's consciousness, in terms of what kind of person one wants to be, and what is worth dedicated work and striving, leading to a more purposive talent pathway. Thus, the multi-layers of talent development truly resemble that of an onion (see Figure 2), with many layers of agency developing over time in forming a distinct trajectory and pathway. Represented in a more dynamic way, ECT also proposes a push-sustain process that helps sustain the TD momentum (see Figure 3).



**Figure 3. A schematic illustration of a push-sustain dynamic in talent development.**

Figure 3 can be viewed as a relational developmental system wherein the person as an endogenous agent reciprocates with its environment in terms of information and energy in an adaptive way. The milestone events and transition points indicated in this figure serve as important landmarks that guide educational and intervention strategies. In this sense, the educational and cultural provisions are part an integral part of the TD process, in terms of how our decisions and provisions help shape the trajectories and courses of TD for children and adolescents under our charge. My hope is that this introduction to ECT can provoke new ideas not only about how we explain TD, but also how we improve our educational practices.

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