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Towards a Methodology to Identify a Talent by Using Psychological Cognitive Prototyping

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Abstract: *Since education became an important aspect of society, teachers have a prelove for highly talented students. Especially young talented people relish profound attention of universities, firms, music ensembles, sports societies and artist groups. In higher education, students are encouraged to develop their unique strong point, named as talents. Around the globe, universities, institutes of higher and professional education provide students with programs for talent development and exploitation. Practitioners and educators complain on a regular basis that students rarely aware of what their talents are. It is experienced as difficult to identify them. This paper explores the possibility for mechanisms to identify, or recognize, a talent. Scholars and consultants developed many instrument on the development and exploitation of talents. But how can talents be identified? In this paper the fuzzy front end of talent recognition will be fostered. It is advocated that the psychological cognitive prototyping principles can be applied to identify the prototype of a talent.*

When debating on personal qualities, words that are emerging, can be put in categories of 'knowledge', 'skills', 'personal traits' and 'competences' (Gibb, 2002; Koopman, Hammer & Hakkert, 2013; QAA, 2012; Vloon, Hammer & Brahimi, 2013). Among scholars, there are no clear set boundaries between these categories. It can be advocated that scholars have similar perspectives on the development of the personal qualities. In literature, psychologists even constructed a list of 550 words to frame the personal traits (Anderson, 1968). Personal qualities are dynamic; they can develop over time and can be acquired by hard an intense training (Feldhusen, 1994). For this reason, we educate our children for more than a decade to prepare them for society; all more or less equal in the same

classroom (Bloom, 1956). Nevertheless, it is known that not all children have the same basic 'raw materials' or 'propositions' to start with; one is more 'gifted' then the other (Renzulli et al., 1976). As proposed by *Bloom and Sosniak* (1985), in this paper the focus in on this 'gifted thing', named 'talent', more then on the trained skills and knowledge. Talent is conceived as a multidimensional and multiplicative developmental phenomenon (Simonton, 1999). The word 'talent' is in many languages written or pronounced in the same way, off course Finnish, Hungarian and Asian languages are exceptions. This indicates that the word is old and commonly used. For example, the old Greek mentioned talent when rant about 'Weight or sum of money of that weight', later talent was defined as 'disposition' or 'gift of God' (Dale, 2009). Others speak about 'best and brightest' (Knegtmans, 2008).

Historical overview

In respect to the scope of this paper, the historical overview will not start with the old Greek, long before the birth of Christ. The conspectus will start at the beginning of the last century. After the industrial revolution the support of excellent personal characteristics, traits or qualities is described more regular in scientific literature and first it was not only on development of personal qualities or talents, there are clear statements of the detection or identification of talents (Abbott, Collins, Martindale & Sowerby, 2002). It was also the timeframe were the new Olympic Games emerged and grow rapidly (Buchanan & Mallon, 2001) and the timeframe were the World War I and World War II signed the world history. Before, during surely after these wars, nations and continents spend a considerable part of their GDP on competing to each other; not only on industrial and military aspects, also on sports (Buchanan & Mallon, 2001). Substantiated through the research of *Angela Abbott* and her colleagues (2002), it is known that academics studied personal qualities and talents within the context of sports. They assumed that there must be some characteristics what determine a good player from a perfect player. Throughout history Abbott and her colleagues (2002) identified and described three stages of research on personal qualities of talents, in respect to identification or detection. More or less the stages show congruencies with the development and innovation structures of industry. In the paragraphs below the three stages are discussed briefly:

1. *Physiological and Anthropometric Correlates of Success.* From the early 1920s, researchers were examining the potential of anthropometrical, and physiological measures as discriminating factors between athletes involved in different sporting events. In that time sports were an important symbol for both, society and military. As the development of the industry, the main approach of researchers was the key actors in the process, as visible from the outside. Predominantly research was based on the registration of observable characteristics, from where correlations to performance were obtained (Spearman, 1927). The list of variables considered for discriminating good and perfect was wide-ranging. Although

numerous studies have contrasted senior and junior athletes, there was no scientific evidence for success prediction.

2. *Fundamental Movement Skills*. Some decades later, after the World Wars, the approach as similar to the industry became more sophisticate. Scholars' digger deeper in to the separate elements of a specific sport. In industry, more automation of simple processes was innovated and long production lines established. The premise of talent identification, or detection was that: "*participation in sport and physical education requires individuals to perform an array of different movements. Many of these movements are complex, specialised skills used in specific physical activities (e.g., top slice in tennis or the spike in volleyball). However, the majority of these specialised movements are underpinned by common skills (e.g., running, jumping, throwing). For instance, to be successful at triple jump, an individual must be able to run, jump, hop, leap, and land. These basic movements, which are common to a range of activities, are known as fundamental motor abilities and are defined as: A general template for a movement. The template becomes the basis of a number of specific skills, for example ...an underarm throw is a movement pattern and bowling in rounders is a specific skill that develops from it*" (Abbott, Collins, Martindale & Sowerby, 2002:19). From this same period of time, the actual general education paradigms emerged. Based on a generalised template of learnable simple elements of knowledge and skills, more complex tasks and competences are learned on this principle throughout the society nowadays (Bloom, 1956; McGregor, 1960; Thurstone, 1936).

3. *Psychological Determinants of Excellence*. In the last decades of the former century, a last shift in approach of talent detection and identification noticed. Again in line with industry, the academic attention shifted to the psychological determents of success or excellence. In industry new professions as Human Resource Management entered the firms (Guest, 1987). Management science was focussing from the same psychological angle (Mintzberg, 1979). Since (Schumpeter, 1934), entrepreneurship research matured from this time period. Relations between venture success and psychological characteristics were studied widely; psychological and social science became a prominent domain of entrepreneurship research (Baumol, 1990; McGrath, 1999; Palich, 1995; Shapero & Sokol, 1982; Stewart, Watson, Carland & Carland, 1998). In sports science researchers got engaged with psychological characterisation in relation to elite athletic performance, driven by the quest for information on factors associated with high-level athletic success. An overview of the psychological determents of excellence is shown in table 1. In this timeframe the Talent Detection and Development (TDD) models were based on distinctions between elite and non-elite athletes (McCaffrey & Orlick, 1989).

Based on the above described insights of science, national sports organisations and societies developed motley of models to identify and develop talents. To the extent talents were gifted wen born, without an exception the models start with young children as object, from where routes for development are supplied. *"According to Darwinian models of talent development (TD), an individual's potential becomes actualised through evolutionary interaction of innate capacities and 'ecological niches' available in family, school and workplace"* (Simonton, 1999), meaning that experience and good practice opportunities should be compulsory parts of those models. Abbott and her colleagues (2002) wrote in their summaries that the development and approach of the talent detection and identification in sports was in line with those in arts (e.g. music and dance) and universities. They summarise from the studied models: *"It has been established that the aim of talent detection and identification is to provide an accurate prediction of those individuals who have the potential to compete successfully at world-class levels. Such talent detection and identification procedures tend to be employed with pre-pubescent or pubescent children so that selected children can complete the number of years practice which has been demonstrated as required to achieve excellence"* (Abbott, Collins, Martindale & Sowerby, 2002:25).

Table 1. Psychological determinants of excellence

Commitment
Quality Practice
Goal Setting
Imagery
Planning at all levels
Distraction control strategies
Perceptions of pressure
Performance evaluation

Source: Abbott, Collins, Martindale & Sowerby, 2002:23

In fact, the models and procedures are designed to select the gifted from the not gifted as early as possible in the development of a child; picking potential winners. Those scares, precious children who are gifted with talent, were put on special tracks in either sports, academic or art. Because talented children were kind of a synonym for wealth, parents were sometimes 'overactive' in practicing and stimulating their brood on those, weather the children liked it or not. Meanwhile *Radford* (1990) found out that children have to enjoy an activity before entering the deliberate practice; a forced development of skills rarely turns into a world class performance.

Theoretical framework

From the mid-nineties a shift in paradigm started whereas talent no longer was the domain of the gifted children and adults (Treffinger & Feldhusen, 1996). *Francoys Gagné* (1985; 1995; 2005) made a clear distinction between talented and giftedness. "*Giftedness designates the possession and use of outstanding natural abilities (called aptitudes or gifts), in at least one ability domain, to a degree that places an individual at least among the top 10 percent of age peers. Talented designates the outstanding mastery of systematically developed abilities (or skills) and knowledge in at least one field of human activity to a degree that places an individual at least among the top 10 percent of age peers who are or have been active in that field or fields*" (Gagné, 2005:99). *John Feldhusen* (1996) describes a talent as 'spending hours of time deeply engaged in an activity' (Feldhusen, 1996:65) which does not subtend Gagné's definition. Despite the intensive debating on these topics it seems to be hard to find consensus on the definitions. Nevertheless, it appears that on several aspects there is a broad agreement. Both, talented and giftedness (Sternberg, 2004).

Nevertheless, talents were mainly identified with scales and checklists as *Renzulli's "ten scales for rating the behavioural characteristics of superior students*" (Renzulli et al., 1976). Later, auditions (e.g. in performing arts) and portfolio's (e.g. graphic art) were used. According to Feldhusen (1994), "*talents emerge from general ability as a confluence of genetic dispositions, home and school experiences, and students' unique interests and learning styles*" (Feldhusen, 1994:10). Gagné (1985) delineated a general pattern of talent development in youth. From the cognitive theories, it is about the perception of the observer, were "something" out there is to be noticed. This is called 'object' or 'pattern recognition' (Matlin, 2002). Based on these theories, in entrepreneurship new insight emerged (Baron, 2006; Baron & Ward, 2004) when using future-analyses or recognition-by-components model (Biederman, 1995). Baron concluded that the prototype models were the most accepted and suitable for more complex patterns and objects as business opportunity (Baron & Ward, 2004:228). A cognitive-psychological prototype is based on, and to present, the mode or most frequently experienced combination of attributes associated with an object or pattern (Solso & Raynis, 1979). *Baron and Ensley* (2006) identified the prototypical dimensions or meaningful patterns of a business opportunity. They made use of the cognitive psychological approach of the prototype phenomena. Research indicate that the understanding of the entrepreneurial opportunity-prototype, is positive correlated to a higher level of identification of these entrepreneurial opportunities (Costa, Santos, & Caetano, 2013). Congruent with a business opportunity, a talent can be seen as a combination of attributes which can be associated with objects or patterns, as indicated by Gagné (1985). Therefore, this paper endeavours to travel the same road to identify a prototype of a talent. In the first part the preliminary prototype of a talent will be identified, were after the effect on under-graduate business students was tested.

Methodology

The introduction and the theoretical framework suggest that a fourth development stage in talent detection or recognition emerged; the cognitive approach. The purpose of this paper is to explore the possibilities of the cognitive psychological prototyping technique in the field of talent recognition. As scientific paradigm the author choose a design methodology as advocated by *Andrew van de Ven* (2007), whose work derives from the same paradigm as *Herbert Simon* (1996). Van de Ven emphasis on the fact that society has to express their commitment to the research and play an important part in it; Society and researcher need to engage (van de Ven, 2007). The explorative dimension of the research generates data by open-ended interviews which are voluminous and complex (Baron & Ensley, 2006). Therefor data reduction procedures were applied similar to those used in the research on prototypes and pattern recognition to determine the prototype of opportunity recognition (e.g. Ward, Smith & Vaid, 1997; Solso, 1999; Bartel & Wiesenfeld, 2012). The process used of prototype identification is shown in figure 1. The figure is a simplified version of the complex process of prototype identification and the design of it is inspired by the work of Costa et al. (2013).

Figure 1. Simplified process of prototype identification. The process of prototyping
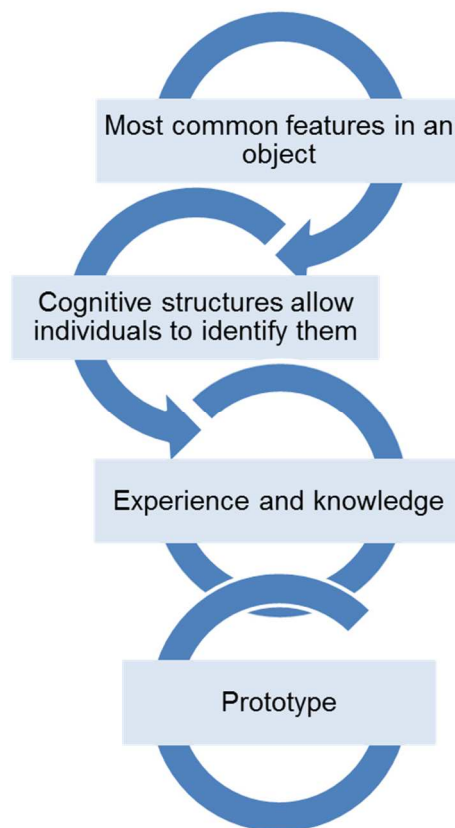
Whilst applying a design methodology, there is the obligation to validate the prototype identified (Aken & Andriessen, 2011). For the validation a group of under-graduate business students were asked pré- and post assigned on talents, as described in stage 5 of the research. With this fifth validation stage, the data collection, reduction and validation process applied is described below in more detail:

1. For the source of data, highly talented people as well as privileged witnesses of talented people were interviewed. These people were medal-winner sportsman, successful entrepreneurs, mentors of high talent classes and senior HRM managers who have their speciality in High-Potentials-Search contracts in several professional areas. They were asked to reply to two questions: "Describe what you think when you think on a highly talented person (as yourself may be one of them)?" and "How do you recognise a highly talented person?" The answers were written down by the researcher or the respondent. By hand, important words and word groups were registered.

2. The data from the first stage was discussed among a panel of two trained researchers on methods of content analyses (General Accouning Office, 1989) as method to reduce the voluminous and complex data and the use of the Delphi discussion technique. The panel members were only confronted with blinded data; i.e. personal and meta-data were extracted. The panel distinguished a list of seven cognitive structures. These two steps represent the first step in the model above, were the most common features are identified.

3. For the identification of the key attributes and patterns, the result of the stage 2 was used to have small group discussions with representatives of the group of talented persons of the privileged witnesses of talented persons from stage one. In total three group discussions were held applying the Delphi technique. The groups were assigned to pick the 'not to be missed' attributes for the recognition of a talent. Over the four groups, there was a clear consensus over three most important and not to omit attributes. This stage represents the second step from the model above.

4. In the additional fourth stage, the panel members of the third step were asked to rank the three identified attributes. Also two groups, with the size of three members, of successful entrepreneurs were confronted with the three attributes and were asked to rank them. The panels were asked to rank among the level of importance and, if possible, in a chronological way. The reframing of the task to the groups and the addition of the two entrepreneur groups, represent the third step of the model above. The ranking of the sequence of the attributes represents the fourth step of the model mentioned above.

5. The fifth validating stage, three groups of under graduate students were asked to volunteer in a research project. The students were originating from the business, economic and social science faculties and had enrolled for a workshop on talent identification and development during an international week at the Saxion University of Applied Sciences in two cities (Enschede and Deventer) in the

eastern part of the Netherlands. At the very beginning of the workshop, before one slide was shown, the student got their first assignment; and had to write-down their talents on a pre-printed form where there was no option to put on their name or any other individual recognition mark. To be sure the list will not be adopted during the workshop, because some talents could pop-up or made more specific, the students had to count the number of talents and wrote that number down at the bottom of the pre-printed form. The answers should be copied in their Individual Development Plan (IDP). In the workshop they were learned to focus on the attributes of the prototype identified. Just before the end of the workshop of two academic hours (100 minutes), the students were then again asked to write down their talents again, on the back site of the pre-printed form, marked as 'page 2' and anew copy them in their IDP. Again the number of talents had to be counted and written down at the bottom of the paper. Finally, they were assigned to hand in the pre-printed form. A team of two IDP-experienced senior lectures examined the pre- and post-lists of talents on two aspects: the number of talents and how detailed they were written down. For the latter the team was asked to judge what development there was in the talent described: more, less or equal in maturity. A mature described talent is put in a context, specified, and operationalised. This fifth stage represents the validation of the prototype identified.

Results

From the first stage of the research a list of 52 words and word groups show up. These word and word groups were then in the second stage presented to the panel. The presentation was in two shifts because in a trail session with colleague scholars, a list of 52 items appeared too long for a proper discussion. The list of 52 words and word groups was split in two lists by systematic contingency; every second word on the list was transferred to list number two. After the discussion on the first list, ten words or word groups were selected or combined to new words or word groups. The same procedure was applied on the second list, directly after the first. Also ten words or word groups were selected. After a short break and energising exercises, the two lists of ten were discussed until there was agreement on the most important features was found. This was a list of seven attributes as is shown in table 2.

In the third step, the discussions in the three groups tended to be unstructured. From the point of view of the observer it was the interference of the strong characters of the participants. A lot of examples of talented people were used to elucidate several perspectives of the participants. At the end of the session, when there was consensus of three attributes, in random order. In the fourth step, from the attributes identified, a sort of logical order of importance or time sequence was asked to discuss. All five groups put the attributes in the same order, as shown in table 3.

Table 2. Seven important attributes of talent

Deep focused
Better than others, acknowledged by peers
Vastly joyful when applying
Spending all (spare) time to
Demonstrate professional attitude
Show pride
Applying without discernible effort

Table 3. Prototype of a talent

Vastly joyful when applying
Applying without discernible effort
Better than others, acknowledged by peers

According to the findings of Baron and Ensley (2006), attributes of a psychological cognitive prototype can be learned. Based on the prototype identified, senior lectures designed a workshop where the attributes could be trained to students. The students were voluntary selected by let them apply for a workshop on talent development and identification. It was one workshop out of 35 to choose from during the international week. Although it was compulsory to attend at least five workshops in two days, the students selected their own topics. To be sure all students attend five workshops, at the end the teacher provided the students with a token. As a side effect this system ensured a 100% response of the attendees because the teacher only provided a token when the pre-printed form was handed in. From the quality of the data, i.e. the text filled in or the text missed, it can be derived that the compulsory character of the students attending and participation biased the data in some respect. During the international week, all classes are taught in the English language. Students from partner universities in Europe and Asia were attending as well. In three sessions on two locations, 108 students attended the workshop. Before the examination of the documents, the researcher cleaned the data. The criteria for clean-up are: "document not completed and inappropriate response'. From 20 documents only one side was filled in. Nine more documents had no or a wrong number of talents on the bottom of the first or showed inappropriate text. In table 4 the results of the assignment are presented. Next to the absolute numbers of response between brackets the percentage of the total is presented. Rounded brackets were used for the change in number (columns) and square brackets were used for the change in maturity [rows].

Table 4. Results of the validation

Change of maturity of the talent	Change in number of talents pre- and post-testing			Count
	More talents(x)	Equal talents (x)	Less talents (x)	
More mature [x]	10 (29%) [40%]	6 (24%) [24%]	9 (47%) [36%]	25 (32%) [100%]
Equal mature [x]	25 (71%) [47%]	18 (72%) [34%]	10 (53%) [19%]	53 (67%) [100%]
Less mature[x]	0 (0%) [0%]	1 (4%) [100%]	0 (0%) [0%]	1 (1%) [100%]
Count	35 (100%) [44%]	25 (100%) [32%]	19 (100%) [24%]	79 (100%) [100%]

The most of the 79 valid documents, show that the in the post-test a higher number of talents [44%]. 25 documents show an equal number of talents, where the most showed exact the same talents [32%]. In seven documents in the post-test there was only written that the talents were the same, sometimes in big letters. The author doubted to remove these documents from the result, however since they did not meet the cleaning criteria, it was decided to keep them in the sample. The last 19 documents show that fewer talents were identified in the post-test, in comparison with the pre-test [24%]. When counting the increase or decrease of maturity, the majority of the responses (67%) showed not a change, whereas only 1% showed a decrease. 32 % showed an increase of maturity of talents. Having a closer look on the distribution of the maturity within the three groups of the development of the number of talents, some interesting results. From the group of increasing number of talents, far the most responses (71%) stay equal with the maturity of the talent. This the same for the group with an equal number of talents (72%). Contradicting from the group with an decrease on the number of talents, about the half (53%) stay equal with the maturity. The other half (47%) have an increase of maturity of the talents. Comparing to the maturity of the group with an absence of growth of the number of talents (24%), the group with a decrease of talents have relatively more maturation in their talents (29%).

Conclusions and recommendations

The results show that from a long list of patterns and attributes, there was a high level of propinquity among the peer-group discussions. This suggests that a cognitive psychological prototype of a talent is identified. From the validation of the prototype among under graduate students it can be derived that the attributes of the prototype are learnable. In most of the situations the number of the talents identified increase, whereas the maturity remains or even increase as well. Where there was an decrease of the number of talents, there is a relatively high level of increase of the maturity of the talents remain. With these conclusions it need to be addressed that there are some important limitations. First of all, the process of prototype identification was applied on a minimum of participants. It is advisable to extent the identification process. The

prototype was single validated. It is recommended to apply more validations on the prototype. Furthermore it is recommended to apply the prototyping of talents in other then an entrepreneurial context. The results show also the possibility that undergraduate students can be helped identifying their talents. It is advised to improve the training material to raise the maturity of the talents from the students. Furthermore it is recommended to investigate if this approach has effect in other universities and if the learning can be implemented in general curricula.

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