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Research Article

Eternal Questions of Gifted Education from the Aspect of University Teachers

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Abstract

Almost every man has different conception about the meaning of talent. The situation is similarly complicated among the professionals: Talent has so many definitions that it needs to create different categories to organize them. Hence "talent" has no official unified definition, characteristics of talent gives a knotty question even to the professionals who care with the investigation of talent, not only for laymen. Is it coded into our genes? Is it a privilege just for some persons? Could it be measured objectively? Such and similar questions (seven) were integrated into the questionnaire of this research. The main goal was to explore the opinion of the university-teachers (N=273) who have experience about the cooperation with talented students. After a general investigation, I have compared the attitudes among different science-areas. After that, I have compared it with a miscellaneous (in the aspect of the science-area) control group which consisted from German professors (N=48). 3Due to the ANOVA-results, we can conclude that there was concordance among the scientists of the different areas about the eternal dilemmas: In the cases of six questions from the seven, there was no significant difference among the groups (science-areas). The only exception was the question about the appearing-time of the talent (early or late?).

Key Words:

talent-notion, academic-talent, characteristics of giftedness; scientists' attitude

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Introduction

Almost every man has different conception about the meaning of the talent. To determine "talent" is similarly complicated in the scientific literature: The talent has so much definition that it needs to create different categories to organize them (Mönks & Ypenburg, 2010). Hence the talent has no official unified definition, the attributes and characteristics of the talent give a more knotty question to the professionals. Model-conceptions (three-ring, Star-model, WICS, etc), 10.000 hours practicing, development of
an extensive action repertoire...all of these can be the starting-point of the talent. (Davidson, 2009)

In this research, I have investigated the university-teachers' attitudes toward the eternal questions about the manifestation and development of the talent. The novelty of this research appears in that idea that: it connects two important areas in the academic talent-management: the mentality of the scientists and the eternal questions of the gifted education. We can read a lot of literature about how the scientists' minds work and what kind of personality they have (Simonton, 2004; Roe, 1983; Root-Bernstein & Root-Bernstein, 2004). Scientific psychology's main goal is to explore how the scientific thinking works. This area's main goal is investigating the scientists' mind and their personality and mental background of scientific process (Feist, 2006). Furthermore, there are a lot of empirical and theoretical article about the talent's origin / manifestation possibilities / characteristics. Is it coded into our genes? Is it a privilege for only some persons? Can it be measured objectively?

At first, in the literature-background, I introduce the scientific-creativity, after that, I describe the seven eternal dilemmas which were used in the investigation. Thereafter, I introduce the sample and the method. Finally, I interpret the empirical results and deduct the conclusion.

Literature Review About The Seven Questions

Genetic vs. Environment (Nature vs. Nurture)

The specialists agree the giftedness have both genetic and environmental background. When I have written above, these questions are more pliable than an "OR – OR" question. In this case (gifted education/talent management) the ascendancy of the genetic and the environment very unsubstantiated, it split even the professionals. It is well proved by the percentages of the heritage which we can read in the scientific journals: These can be ranged from 30% to 80%. (Thompson & Oehlert, 2010) Sometimes, the giftedness is handled as high intelligence. The problem with this approach is that the giftedness not equal with the intelligence, moreover the measurement of the intelligence is just as unsure as the talent. Another reason why we should not identify the two concepts is that the heritage rate differs between the different domains of the intelligence.

Into the genetic VS environment debate the modern psychology enters with twin-studies and molecular-genetic researches. The twin-studies give an excellent starting-point, because by investigating the identical/monozygotic twins (100% genetic sameness) who have grown up in different family we can easily filter the role of environment (same genetic – different environment). The adoption studies are closely connected to the twin-studies: In this case the children's environment are

equalled, but then the genetic background diverges (own child – adopted child). The other way of investigating this question is the molecular genetic researches. This medical method searches the answer: on which genotypes are based the different fenotypes (external markers, behaviors, personal traits); namely which alleles code the attribute? Investigating the giftedness in this way is considerably hard, unless it is impossible: On the one part the multiple – on the other name: multi-factorial – skills (for example: intelligence, talent, creativity) are poligenetical, that means they are coded by more genes together. In addition they are continuously switching on and off during the development. Therefore there are some periods when they are noticeable, but sometimes are not. (Thompson & Oehlert, 2010) Therefore, it is not the same in which life-period take up the question about the genetic VS environment. Our inheritable attributes more and more underlined by going forward with the lifetime and they stabilize for adulthood. As well the genetic standpoint is supported by the argument, that the cognitive factors are stable during the lifetime. (Lyons et al., 2009) During the twin-studies and the adoption-studies it has emerged that in childhood the environment is more affecting for the behaviors than the genetic, but later, in young-adulthood the genetic factors exceed more and more. Partly that is the reason, why the identical twins resemble each other even in adulthood yet, but fraternal/dizygotic twins are not. (Wilson, 1983) The active gene-environment correlation meant that people always try for find the suitable environment by unconscious choices and decisions. For this reason the twin-studies make us think in not just about the two aspects in the title, but also give three option: genetic; common environment (where grow up the siblings together); unique environment. (Viding & Larsson, 2010)

In the aspect of the lifespan, the change of environment looks like that the more independent we become (separating from our family) the more opportunities we have to choose our environment (to shape our fate). (Scarr & McCartney, 1984) The flowchart (Figure 1) shows how affects the change of environment the manifestation of giftedness by the aspect of becoming independent.

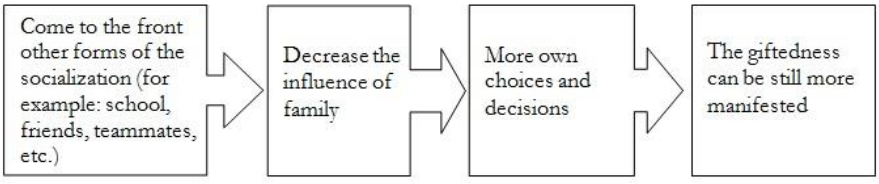

Figure 1.
How Changes the role of the Environment

The other importance of the environment is reflected by the talent-models which split into parts the environmental factors. For example: In case of Mönks-Renzulli Model (1992): family; school; peers. Or in Gagné's Model (1991): physically, social, macro-, and micro environment. So there are many factors which are important by supporting the talent, that is why should them to categorize. In this investigation I did not made it, because it had would need an extra research to unfold them refer to concrete the higher education (not enough generally). In this case I handle the

structure of higher education, the family, the friends, the peers, the previous school circumstances, previous developmental forms, the role models and many other factors as one side of the scale: environmental influences. The role of the environment is undisputed, but it is hard (even impossible) investigate it in chiseled form.

Domain General (Personality Based) vs. Domain Specific

The second important question pertained to generality/specificity of giftedness. It was marked on the questionnaire after the General option as help, that "It is based on creative personality which allows being polymaths". It refers that the creativity can be interpreted as a personality trait or a cognitive trait, which pervades the person's everyday life. It can be observed anywhere, because it affects the foundational way of thinking. In a similar way, when in the cartoons and stories are typified the stereotypical scatterbrained professors.

In the other side of the coin, in case of the area-specific option it was written the following text in bracket: ("everybody has his/her own area, where he/she is talented"). It works in a similar way, how Gardner (1999) has distinguished the eight form of the intelligence. But if I wanted to search a more extreme example, I would mention the autistic artists who have serious problems by managing their everyday-life, but at the same time, they can produce pictures/music/other artificial creations which trigger acknowledgement and wondering for anyone.

Feldman (2003) supposes an interesting approach in this question, because, according to him, both the specific and the general talents are important. Owing to the more synonyms of the talent in the English language (e.g. gifted, prodigy, genius, etc.), it is easier to make differences between these two conceptions. According to Feldman (2003), there are gifts, which mean a general knowledge (similar to the general intelligence), and there are talents which refer to the specific skills. The gifts can be widely applied, in a lot of area of life, and it is hard to influence them. They are natural capability, which are independent from the domains. For example: to carry out a scientific research. Opposite of this, the talents mean developed/learned specific skills, which can be influenced/developed. For example: to learn to play the guitar. These gifts and talents can be interwoven during the lifespan, and these interweaving depends on the domain and the cultural background. But it is sure that both (gifts and talents) are important at the manifestation of the giftedness/talent (Feldman, 2003). This conception – differences between gifts and talents – fits famously to the next dilemma (Developable VS Stationary).

Both two standpoints can be founded among also in the matrix contained 66 items in the first task of the used questionnaire as potential attributes of talent (more detailed about the questionnaire below, in chapter "Method and sample"). These sides of the second scale may trigger debates even among the experts of the topic (Plucker & Beghetto, 2004). Before the questionnaire for university teachers, that was a pilot study with 74 variables (which, of course, contained both the two standpoints of this scale). In this pilot study, the area specific creativity was ranked to the eighth place and the general (personality based) creativity to the 35th place.

At first time, let us investigate the arguments for the higher ranked standpoint; let us begin with the area specific creativity. Simonton (2004) describes the

professional discipline so term, like a disciplinary part-area to which belongs a given conception-set. For example: the medieval-world-history inside the history; health psychology inside the psychology; discrete mathematic inside the mathematic, etc. The discipline-field closely belongs to the notion of the professional discipline. This field means together the researchers and their scientific works and results. The researchers mainly use their own professional discipline's set of conceptions. But for nowadays, the interdisciplinary aspect has become very important, even essential, part in the science. For this reason, in case of lot of researchers, "neighbor"-fields also connect to their own fields which mainly have consisted of their own set of professional notions before. For example, in case of a health-psychological research, we can found also medical, sociological, demographical notions. The creative scientists try to use wider spectrum of the notions of different disciplines (Simonton, 2004). There are also different research-custom systems belonging to the discipline-fields (Koestler, 1998). And the different science fields have also different coverage. This means in the practice that it is hard to find any new result and finding in the fixed (already evolved) custom systems. So, in these fields, it must be more creative for the scientist than in a new and unsaturated field, if they want to innovate (Simonton, 2004).

According to Baer (2011) the creativity theories with one factor are too appealing and they are too simple to cover the whole creativity notion. Because of this, he supposes to use not only the domain specific creativity, but also the task-specific creativity. This means that the criteria of the creativity might differ even inside a discipline. For example, inside the literature, it needs another type of creativity to write poems than to write stories. Furthermore, owing to the development of the science, the more new areas appear the more of these areas taper. The development of the divergent thinking can work effectively only one given area; that is why the domain specific creativity development trainings are more efficient (Baer, 2011).

The domain specific creativity is one part of Amabile's (1996) three-factors-creativity-model: general skills and knowledge, domain specific skills and knowledge, and task motivation. It has been also integrated into the APT (Amusement Park Theoretical) model (Baer & Kaufman, 2005) which consists of the following parts:

- Initial Requirements (domain-general factors); which appear some degree in every area (e.g., intelligence);
- General Thematic Areas; which comprehensive a lot of domains, for example: interpersonal skills, science, problem solving;
- Domains; which are narrower parts of General Thematic Areas;
- Microdomains; which refer to the tasks.

The interesting-area also connects to the domain-specificity. It is very important, because the personal creativity can be developed only in that case, if the person finds such an area into which he/she has enough willingness to investigate lot of resources (time, work, money, etc.) in favor of the development (Rucano, 2004).

And now, let us investigate the other side of the scale: the general creativity. Sternberg (2012) argues for that it should not measure the occasional performance at the measuring the creativity, but also the creativity which pervades the everyday life. This is called as "little-c" in Kaufmann's and Beghetto's (2009) model (four type

of creativity: mini-c; little-c; pro-c; big-c). In this interpreting, the creativity is a life-attitude which bases on the summary of the routine-answers. The measurement of this notion is very hard because multiple choices tests and essays are not suitable. The person, who evaluates the works, takes account conform aspects even also unawares and because of this, he/she tries to evaluate prototypically the essays (Sternberg, 2012).

The "Investment-based" (Sternberg, 2012) approach is also bases on the general/everyday creativity: the talents carry on a worthless (not honored in their environment) idea and later they use it in another environment where there are needs for it. To achieve this, it needs some requirements: intellectual factors, knowledge, specific thinking-style, personality traits, motivation factors, suitable background of environment. The creative "investment-based" products are created from these factors (Sternberg, 2012).

The phenomenon of the polymaths also supposes the existing of personality based creativity. The polymaths are persons who can create outstanding and considerable products at the same time in different (or just looks different) talent-areas, like being both a famous painter and a biologist. We can find polymaths both among the scientists and among the artists. The mindset of the scientists and the artist are not so far from each other's than we would think so. It is common in the attributes of the scientists and the artist that they have a very wide range of interests and they have similar profiles in the wide-spectrums psychological tests. They have also similar thinking processes. If anyone learns how to handle his/her thinking process inside in a given area, he/she can use it effectively in another area. So, the general creativity created in this. The polymaths of Renaissance and the Nobel-prize winners with very variable vocational qualification and hobbies are good examples to demonstrate this phenomenon.

Developable VS Stationary (Stable)

This question is rather philosophical than psychological. It does not exist a mental function which would not be able to be developable in some measure or it would not have any opportunity to compensate it. The question is in this case *how* the teachers think about the developability of the scientific talent. So it refers to their attitude. The question is philosophical because it pertains to the future (developable: it might get better later). We cannot predict the future, we can only suppose probability. This tendency is particularly true in case of the social sciences. Hence, every person is unique, it is absolute inconceivable to surely conclude about: Which will the person earn during his/her walk of life? How many disadvantages and shortcomings can he/she compensate? How will his/her skills increase? Only the finiteness of the human lifespan can confine this development (and those unconscious beliefs which surround the person, but these can be changed).

When we speak about the development, we must speak about the human life-stages and the biological limits. Of course, these factors might mean some restriction, but where can be found the end of these limits, it is impossible to predict. In general, during the human lifespan, the effectiveness of mental functions has been increasing till the young-adulthood age, after that it decreases. This is true in case of the physical conditions: When we get older, our body changes. But there are huge

differences among the talent areas which age is the most optimal to earn the top of performance. It is true not only in case of sports (for example: an optimal-age triathlon racer would be relatively old among the Olympic swimmers), but also in the science (Simonton, 2004). But this argument is another question's resort.

If we look at the personal factors (exceptional intellectual skills/intelligence, motivation, creativity) in the Mönks-Renzulli Model (1992), we can find out that all of them are developable. The intelligence is influenced by a lot of factors: the blood-lead level, the nutrition, the affects of the hormonal changes, and a lot of other inside and environmental factors. It is a good marker for the upgradeability that already a single vitamin and mineral supplement can result performance-increasing at the intelligence tests in case of starving children. And beside this, we can find lot of other factors which correlate with the performance at the intelligence tests (Neisser et al, 1999). The creativity also can be developed. Even if we think about the personal creativity (Rucano, 2004) and also in case of task-specificity (Baer, 2011). That is why there exists so much type of developmental program/training/workshop both for adults and children in wide-range of various areas (right-hemisphere drawing, creative writing, etc). "Can be woke up" or "can be redirected" are rather suitable words for the motivation as the "developable". The problem of the learning motivation in school is not that the children have lack of motivation, but also they are not motivated only for in actual form of the learning (Tóth, 2000). We can find a lot of case also among the adult talents, when the problem is not the lack of the motivation. They endeavored with a huge amount of stalwartness to become one of the best in their area/profession, but they failed in another sector of their life. They performed excellent in a given area (where they were really motivated), this motivation was not mirroring at their whole life. That is why, success people commit heavy ethical faults or even crimes; that is the reason that people with strong and stable character cannot command to their desires (Mischel, 2014). These examples show that in case of motivation, besides of the extent, the focus is also critically important which also can be changed or redirected. If a talent found an interesting area, he/she redirects his/her resources from other areas, he/she might become a maniac who invests his/her resources into an issue. Hence, the inside factors of the talent can be modified or developed also separately.

The talented students, who have any handicap, make this topic more complicated (for example: disadvantages from socio-economical background, learning disabilities, like dyslexia, ADHD). In their case, the compensation of these disadvantages is essential to their development. So, it might be such periods, when they have no any "visible" result of their development – at least comparing with others – but even it requires a huge amount of effort in personal level. The lot of long hours spending with learning might be testified only in a very little extent – or even not in the least - in their results. These disadvantages can be made the scientific talents' life more difficult: They have problems at the acquiring the learning materials, at acquiring the research-skills, at scientific communication (writing papers, especially in a foreign language). There is a case-study about a student with ADHD which demonstrates this phenomenon. After her embittered fight for long years to earn the minimal requirements, she has become a scientist-candidate, owing

to the compensation of her disadvantages. Hence, she had heavy shortcomings at writing skills, which are essential at the scientific communication, the developer teacher and the participants of a talent-developmental organization [3] had to continuously take care about to make fall into line with the university requirements (Hua, Shore & Makarova, 2012). Although, she was a talented student, which emerged just after years, this case takes up a theoretical question: Can we speak about talent-development? Or was it rather a disadvantage-compensation? It is hard to split these two. The development has a double meaning: the talent-management and the shortcoming-compensation.

Fortunately, the scientific literature refers to these students as twice exceptional students[4] (Harmatiné, Pataky & Nagy, 2014). They are in hard and frustrate situation: They have disadvantage not only due to their educational deficiency, but also they do not know whether it will be any results of their hard compensation work. Even the professionals cannot estimate the limits which can be earned by these double exceptional students. Moreover, it differs by personally. There is not any literature which contradict that the cognitive functions are developable. But it is an important question: How much time does it take to develop these skills to the suitable level? Whether is a human lifespan enough for it? Or a given life-period (the university-studies)? So, that is why, the issue discussed in this chapter is very intuitive, because we cannot base neither on the experiences (owing to the differences among persons), nor the scientific background (it is impossible to determinate the possibilities). These twice exceptional students are very well evidence of how relative notion the talent is, because it is not sure that the huge differences among the extents of developmental-rate appears in the suitable time. Sometimes later, just after years.

Measurable VS Abstract

The ponderability of the talent will be disputable issue forever, even so it is necessary to filter the talents to develop in some way. It is hard to find any measurable factor in a very complex "soft"[5] term, like the talent. Hence, it has a lot of definition; it contains a lot of sub-factors; it is influenced by a lot of factors.

The early measurement of the talent began at the intelligence tests. These tests have a heavy shortcoming: they cannot measure in special areas, like literature, music, art, kinesthetic, etc. Beside this, they cannot handle those part-skillswhich are important at the manifestation of talent: For example: originality, endurance, concentration, etc. When the cognitive aspect got into foreground, the intellectual skills got into focus, as the indicators of the outstanding intelligence (Gyarmathy, 2002). Owing to this tendency, the mental speed and efficiency has become diagnostic tools, too. These factors were tested with simple (anyone can solve it) time-limited task or very complex task without time limit (Thorndike et al, 1927). In order to test his computational theory, Anderson (1998) investigated the minimal

[3] The talent developmental organization was a Community of Practice which is an American talent developmental form; based in workgroup; make the learning material deeper; the older participants help the newbies at their studies. Read more: Hua, Shore, Makarova, 2012

[4] Twice exceptional: who are talented and have any impedimental factor at the same time.

[5] Soft notion: the „soft" refers to those notions which are hard to definite. For example, intelligence, talent, personality.

bases of different cognitive performances, from which are the components of intellectual behavior. Owing to these measures, a tendency has been manifested: The performance of prominent persons might differ in various part-tasks. And we have arrived to the main critic of the intelligence tests: The differences among the different parts of the intelligence profile are much more in case of outstanding students than in average profiles (Gyarmathy, 2002).

In some cases, the parents or the teachers can choose more successfully the talented children, than the tests can (Renzulli, 1986). Owing to this, using of parental/teacher evaluating papers and questionnaires have begun to spread. These evaluating lists contain observable behaviors, activities, attributes and the filling-out-person has to mark / score those factors which describe the child to evaluate. This method mainly is suitable at the hard-measurable-attributes, like personality traits, motivations, attitudes, biographical data. The main critic of this method is the subjectivity. The question emerges even at the beginning: how are the viewpoints and the content of the lists corresponding with the realty? Beside this, there are a lot of factors which might distort the evaluating person's attitude: in-advance-preferences, the way of approach, stereotypes, etc.

The disadvantage of measuring in a given time-point is: Some types of talent might need much time to create an everlasting thing for the futurity. The AHA-experience might occur only after a huge amount of research-work and knowledge-collecting (Gyarmathy, 2002). The continuously observation in various situations (at home, at school, among the friends) can achieve so information which are not given in the lists and questionnaires. Owing to this observation it can be identified factors which are not revealed in the studying-environment, like interest, excitement, creativity (Renzulli, 1986). For example, a student, who is bored all at the whole morning at studying time, might wait for an additional afternoon-school-program with a huge amount of enthusiasm where he/she can feel the true Flow-experience.

In many cases, the process based talent diagnostic (or talent management) might achieve the best result (Wallace, 1983). So, if we ensure the suitable environment and enough time, talents can deploy their skills, even they are hidden. Because of this, Gyarmathy (2002) stated that the best talent diagnostic is the continuously talent management. This approach is especially effective in case of handicapped children, who have disadvantages owing to their cultural or socio-economical background, learning disorders, because they have no chance to show their skills in the traditional educational frame. It is very possible that an interfering factor covers their talent, their exceptional skills. That is why the diagnostic should be more careful in their case (Gyarmathy, 2002).

The scope makes the issue of measuring and diagnostic more complex: It is not the same what talent-diagnostic method we use in a given area. We must decide the goal before (Dávid, 2011). Just let us think about it that in how many areas the talent can be manifested. It is not all the same that we look for talents into an academic research group or for a national sport team.

For the most part, the mixed methods are applied (complex talent-diagnostic). Namely, all qualitative and quantitative aspects are considered. This tendency can be

observed in case of higher-education (Wolfensberger, 2015). The mostly used talent diagnostic tools in the education are ordered into the Table 1.

Table 1.
The Most Commonly Used Talent Diagnostic Tools in the Education

Quantitative Methods	Qualitative Methods
IQ measuring (e.g. Binet; Wechsler; WISC-IV; Raven)	Description by a teacher
Examination of attention	Opinion of a school-psychologist
Examination of memory	Description by parents
Personality-based creativity examinations	Description by class mates
Examination of vocabulary	Performance-based creativity examinations
Examination of learning style and orientation	
Questionnaire about the parent's attitude	
Examination of pedagogical profile	
Evaluating scale for teachers	

Given for Everybody VS Privilege of Individuals

A principle stands in one side of the scale which states that everybody is talented in a special area, just it needs to find where the person is talented. But if we think about the "above-average" attribute of the talent, it becomes clear that not everyone can be above the average. So, the talent marks a sharper domain. But this means not that we should not give the possibility to prove for everybody. How it was described at a lot of times, the talent is a very heterogeneous phenomenon which can be manifested in a lot of area. Despite of that anyone performs below the mean in a given area, he/she can reach outstanding results in another area.

During the history, the talent was handled also as a present for the God, in other time, it was looked as a curse or a mental disorder (Gyarmathy, 2002). The creativity was handled in similar way in the past: The creativity was a mystical phenomenon which was given only for few special people, and it exceeded the average people's skills (Dávid, 2011).

A conception was also emerged at the creativity researches which states: the creativity might be the final form of the personality development. So, if anyone steps to the way of personality development, she/he can reach it. But whether can anyone earn this state? A question was also emerged at the creativity investigations, whether the creative persons are born with this "present" or their development and way of life help them to earn this skill (Dávid, 2011).

We can answer this question probably never. So this scale also refers only to the attitude of the teachers. To solve this dilemma is not the task of the talent management. Its goal is: ensuring more and more opportunities for children, and as

at early age as possible. Hence, at the sooner age found anyone his/her talent-domain where he/she can imagine his/her whole life the easier task would be given for the talent-management professionals (Ranschburg, 1988).

Early Appearing VS Late Appearing

Certainly everybody has heard about infant prodigies: Marie Curie could speak foreign languages even at kindergarten-age; John van Neumann could manage operations in his mind at this age; Pablo Picasso had learnt to paint before than to speak. But maybe the most mentioned wunderkind of the literature is Wolfgang Amadeus Mozart. He could play the piano even at four-years-old age and he was eight years old when he had written his first symphony. They represent the most extreme point of one side of this scale (early appearing). The wunderkinds (infant prodigies) raise a lot of developmental psychological and philosophical questions. For example: They are such as any other people and they are better just in a given activity; or a fully unique mechanism has been created in their brain thanks to cooperation of a lot of random factors? (Read more about wunderkinds: Gyarmathy, 2002)

But whether do the wunderkinds step to the way of the productive[6] (practical) talents? Just in lucky cases: The biography of Williams Sidis serves a counter-examples, who has become a maniac tram-ticket-collector form a wunderkind. Despite of his early successful outstanding studies, they could not show up so investment which would become a milestone in any science-area. Gyarmathy (2002) writes about the equality sign between the wunderkinds and the notion of talent: "Never existed a child – neither wunderkind – who could create any basically new investment/milestone in a domain where man needs eminent level of the knowledge and the most productive (practical) talents were not wunderkind. We can meet wunderkinds mainly in those areas where a lot of concrete steps need for the success (e.g. mathematic, chess, music, etc). Where man needs for the deeper layers of personality – particularly human sciences – the infant prodigies cannot create everlasting things at extreme early age (Gyarmathy, 2002).

There are differences among the talent-domains when the talented persons earn the top of their career. Simonton (2004) has split into four groups the ways of life by the criteria: When the creative products appear during the lifespan. By this partition, we can discern creative premature, not creative premature, creative backward, not creative backward. The performances of these groups are figured an overturned J letter which is illustrated on the figure 2 (Simonton, 2004).

[6] the "productive" term refers those talents who attain their talent in the practice, they create excellent works, they have acknowledged results; they are the opposite of the „potential" talents who are just outstanding in a given domain, they can show up „just" skills and opportunity

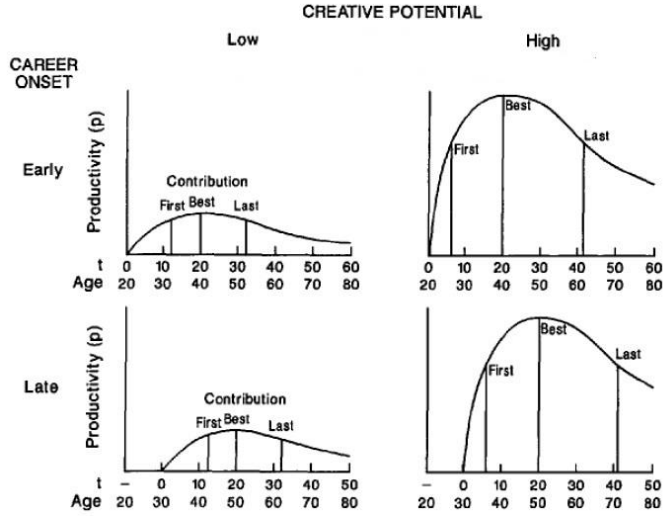

Figure 2

The Different Types of the Career-curves by Simonton

Figure 3 shows the productivity curves in arts, sciences, and humanities in the mirror of age. It shows when the scientists (natural sciences), the scholars (humanities) and artists reach their top performance during their lifespan.

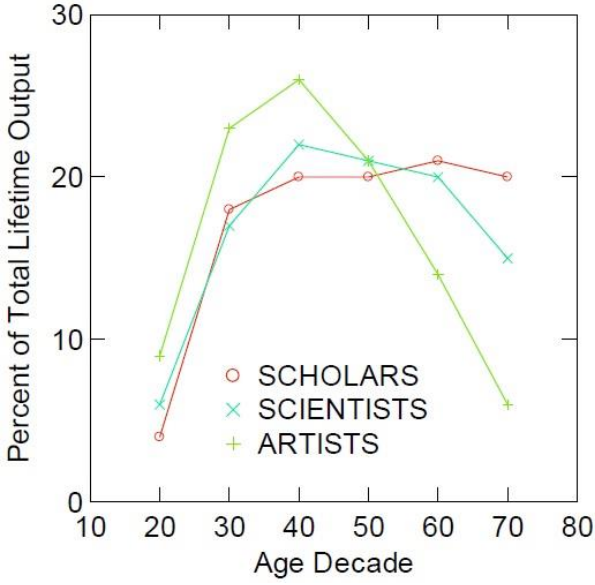

Figure 3.

Productivity Curves in the Mirror of Age

It is well shown that the artist's talent manifests at younger age. The scientists reach a later but continuously performance. It would be very interesting to investigate the productivity curve at sports, because the peak would be shifted probably to an earlier age than in cases of the three talent-areas shown on the

diagram. The science is especially highlighted in this dilemma, because the age, when the productivity culminates, differs among the different science-areas (Simonton, 2004), this is presented in Figure 4.

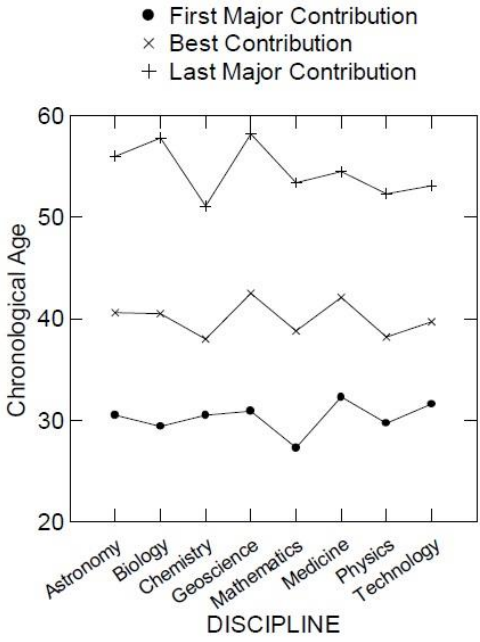

Figure 4.
The Productivity Curves of Different Science-area

That is why the results of the investigation of this eternal dilemma are interesting and give new information, because I compare every domain, not only the classical natural sciences. Of course, we get answer just in level of attitude, not about the real scientific performance; even so we can see the differences among various domains. It turns out where the scientists from various domains position the manifestation of talent during the lifespan.

Environmental Factors VS Inside Factors (Educational Opportunities VS Personal Responsibility)

This dilemma is the supplementation and continuation of the first. Merely it is specialized more for the life-period of higher-education, instead of the whole lifespan. A lot of teacher has also asked me whether this question is not the same as the first. The answer to this was: There are all of the (learnt and inherited) factors summarized in the right side of the scale what the person take with him/her into the higher education. The left side marks the opportunities of education. The dilemma is about how the manifestation of talent depends on the personal responsibility or the opportunities offered by the higher education and it concretely pertains to the higher-education study period. That is why I have changed later the name of the scale to the title in the bracket. This scale was necessary, because the external factors have got relatively low evaluation from the talent management professionals at the pilot-study (where the Hungarian talent management professionals had to evaluate

74 variables by importance) and they have not been got into the professors-questionnaire. There are a lot of arguments in both side of the scale. So, it should think neither in black and white way in case of this scale, but also the balance of the two sides, like in case in earlier mentioned scales.

Hence there is a law pertained to the higher education institutes, which prescribes that the opportunity of taking part in some talent-management form must be granted (2005/CXXXI §). So, we could suppose that every student shall be given the opportunity to supply his/her studies with some scientific research-work. Unfortunately, the situation is not so simple, because there are huge differences among the institutes. The opportunities of students depend from a lot of factors: number of students, financial resources, connections with other institutes/companies, etc. This tendency has been shown at the statistics of the OTDK XXXI[7]: More students earn place (1st/2nd/3rd) arrived from a larger university than from a smaller university. (source: http://otdt.hu/upload/files/31_otdk_eredmenyek.pdf)

Furthermore, there are differences among the institutes also in the aspect of the investigated topics: It is not granted that the interested topic by the student is cared about by any of professors. It is very hard to begin the scientific career without any professional help. So, there are a lot of external (connected to the higher educational environment) factors which influence the manifestation of talent.

We also must mention some word about the personal factors, because there are also huge differences among the students. There are a lot of opportunities in the most prestigious universities otiose, if the students are not use these. We can suppose a lot of reasons in the background: lack of motivation, lack of awareness/information, not suitable communication channels, too high educational requirements, lack of time, etc. This list can be infinite. Even so there is a mental factor (or accumulation of mental factors) which incites some students to probe themselves in the scientific work, but this factor is missing from the majority of students.

A huge amount of studies compare talented sample with normal sample as control group (Tekin & Tasgin, 2009; Harden, Turkheimer & Loehlin, 2007; Roznowsky & Hong, 2000; Raymond & Benbow, 1986; Sekowski & Lubianka, 2014). We can find less studies about the scientific work in adulthood, but fortunately there are some studies which investigate the scientists (Chambers, 1964; Sternberg, 1982; Roe, 1965). But the studies, which analyses the differences among talented and average university students are very rare (Sternberg, 2010; Szabó, 2015). There was a project in Hungary which tried to investigate which motivations stand in the background of the scientific work (advantages, disadvantages). 1024 doctoral and undergraduate students, who are interested in the scientific career, have taken part in this study. They said that they like in the scientific career that it gives possibility to earn acknowledge, they can increase their knowledge, they can build up connection-network, and it can be entertainer. They mentioned as disadvantage

[7] OTDK: Abbrevation of „Országos Tudományos Diákköri Konferencia" which means National Scientific Student-conference, the largest Hungarian conference and competition for students who are interested in the scientific work. It is organized every second year. The participants must qualify in the local round at their university/college.

that it is an underpaid job; lack of time; it needs too much endurance; it can result problems at the private life; it can cause addiction. But the most important results of this study in case of this eternal dilemma are the answers for the question: Which are the discriminating factors between the talents and others? Commitment, diligence, open-mind to the experiences: these factors contribute who chooses the scientific career (Harsányi et al., 2014).

So, it is clear that either the environment or the person is responsible in case of higher education. Both are essential at the manifestation of talent, so the balance of the two is interesting in this question.

Conceptual Framework of "Talent"

Besides describing the literature-background, it is also important to clarify what "talent" term means in this study. This notion is considerably complex. In lot of books, and many hundred publication is attempted to definite the talent. Therefore, we can read a lot of talent-definition but a universal definition, which can be used in all talent-areas, do not exist (Mönks, Mason, 1997). If we think about how variant skills need to manifestation the talent in different fields (for a football player, for a painter, for a programmer), we have to admit: It is impossible to define. This problem is shown very well by this interesting fact: Every member state of the USA has different definition referring to talent (Stephens, Karnes, 2000).

Talent in the higher education can be handled on the one hand as an excellent performance at studying (earning the best marks). For example, like in the Scandinavian area: There are rigorous filters for the applying students who want to take part in the university-studies (Wolfensberger, 2015). Despite of, on the other hand, there are universities where it is not enough to be a good-learner. Many universities in the BENELUX or Germany operate in this way. Like in the Hungarian system, too. Someone count as a talented student if he/she latches on to the scientific-research work, the good marks in themselves are not enough. We cannot take equality sign between the intelligence (or well-studying) and the giftedness. It is proved by not only many articles, but also books: the talent needs extracognitive aspect (Shavinina, Ferrari, 2004). Hence, I investigate the Hungarian talent-development system, I use the second option. I refer to the "talented students" as such students who take part in any additional opportunity besides the obligatory studies (to join a szakkollégium,[8] writing a TDK work, conducting own researches, join to a research group, etc). So, the students, whom to I refer as "talented" they have already made something scientific work.

Aim of Study

The primary goal of the research was to explore how the university teachers (the mentors of talented students) think about the talent in the context of eternal questions. Hence, being university teacher is a fulfillment form of scientific talent, I investigated how the talented people think about talent. The secondary goal was to compare if there is any difference among science areas like humanities, economics, medicine, etc. in the attitudes toward the talent. And finally, I investigated my sample in international context.

[8] a unique special group-based talent-management form in the Hungarian higher-education

Hypothesis of study

My purpose statement based on the zero-hypothesis of the ANOVA (analysis of variance). In the case of this statistical test, the zero-hypothesis is: there is no difference among the groups / they are equal. In context of my research: There is no difference among science areas (medicine, science, humanities, etc). This hypothesis was supported by that fact that the scientists' personality overlaps with the artists' personality in a great extent (Eiduson, 1963). Furthermore, the hobbies of the scientists often connect to human and artistic activities. Besides, a lot of awarded artists earned their degree in natural sciences or engineering studies (Root-Bernstein & Root-Bernstein, 2004). Finally, I would mention the argument underpinning this hypothesis: the scientific products go through similar processes (Root-Bernstein & Root-Bernstein, 2004). These tendencies presume a sort of scientist personality.

Method

I used questionnaire-method to collect data – in Hungarian / German version. The questionnaire consisted of 3 parts (3 questions): (1) In the first part, the task was to choose 10 factors from a 66 matrix which would had been expected for a supervised student; so which attributes would be desirable for a dissertation writing student or a student who prepares to the TDK[9]. The analysis of this first part is readable in another article owing to the length of the study. (Szabó, under process) The second part (2) was the above mentioned interview part, where the participant teachers could supplement the 66-items matrix with some not-mentioned but important factors, and they can share their experiences about the cooperation with earlier supervised students. The third part (3) contained the seven scales about the eternal questions (dilemmas) of gifted-education which are described in the literature. In this part, participant teachers had to mark their opinion, where the scientific talent may be located in these scales. The two ends of the scales were two opposite standpoints from the scientific literature of the gifted education. For example: Genetic based – Determined by the environment; Measurable – Abstract. The names of these scales were the titles of the literature.

Hence, there are a lot of arguments on both sides of the dilemmas (pros and cons), it was necessary to create the attitude-scales so precisely expressible as possible: In the case of paper based questionnaires, I measured the stokes of the pen with millimeter-based preciseness. Owing to the 60 millimeter long lines on the paper, the semantic differential scales of the online questionnaire spread from 0 to 60. Besides, the middle standpoint (the 30 value/a pale line) was marked.

Sample

In my research, I asked to participate so university-teachers and professors who had any earlier experience about the cooperation with talented students. The base of this experience comes from two resources: First of all, the university teachers have own scientific career in their path of life. This is elemental requirement for being university teacher. So, they are also themselves talented and they can rely on their

[9] TDK: The local (university/college) version of the above mentioned OTDK which is national level.

own past, on their own career. The other source of the university teachers' experiences was the supervision activity, wherewith they helped to the students in the research-work: writing publications, preparing for conferences/OTDK, composing the dissertation, etc.

I ensured these two criteria in that way that I looked up just so teachers who passed on these two criteria: First they had to work at least professor assistant rank in the involved universities (University of Pécs; University of Szeged; Budapest University of Technology and Economics). The second criterion was to be supervisor of a student who has taken part in the TDK in season 2016/2017. The online version of the questionnaire was filled out by 245 teachers. The questionnaire was created on website of Questionpro.com. Besides I looked up 28 teachers personally (with interview intention) who filled out it in paper-based way. In total, 273 professors and assistant professors have taken part in this investigation (N=273).

The extent of the groups was different among the science areas. The figure 5 shows the distribution of the seven science areas.

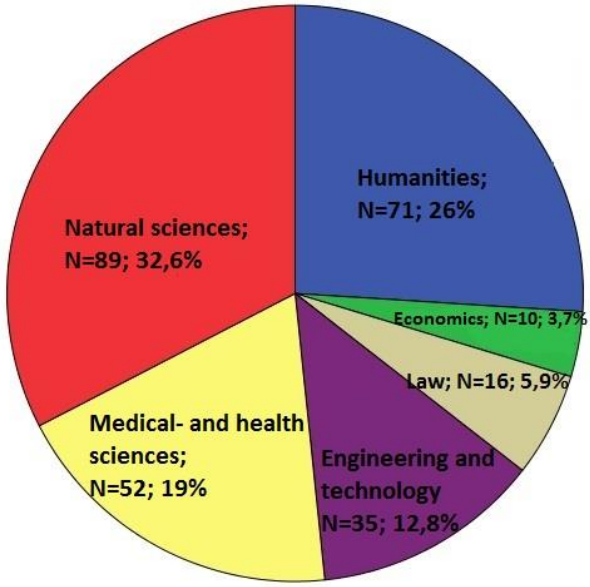

Figure 5.
The Distribution of Different Science-areas

In Germany, I collected sample from the Stiftung Universität Hildesheim. In this case, I asked only professors, because I could be sure only this way that the participants have supervisor-experiences (as a supervisor of a doctoral student) besides their own earlier scientific career (Not every lower ranked university teacher has own supervised PhD student or undergraduate student). The German questionnaire was passed to the teachers in personally. Inasmuch as, the German higher-education institutes have an absolutely different faculty structure, as the Hungarians; therefore, the German sample was a miscellaneous sample in the aspect

of science-areas. Therefore, the German sample can serve as supplementary information or control-condition in this investigation, it is unsuitable for systematically comparing.

Data Tools and Analysis

To analyze the data, I used SPSS 19. Firstly, I began the analysis with the descriptive statistics, namely, I compared the means of different science-areas. After then, I executed seven Levene-tests (for the seven questions) to see whether the variances are equal or not. It was necessary, because the numbers of the participant were fairly various among the different sciences-areas.

The hypothesis of this study was tested with ANOVA-test which compares means of different groups. This test showed if there is any difference among the science areas (groups) in the means of scales.

Finally, I compared my sample with a German sample. For this analysis, I use two-sample T tests in case of every question.

Results and Discussion

The only one capital information in the descriptive statistics is the means of the seven questions. I set the means of the answers in the online questionnaire surface to make the results more spectacular (Hence, I used semantic differential scales). It can be seen on Figure 6.

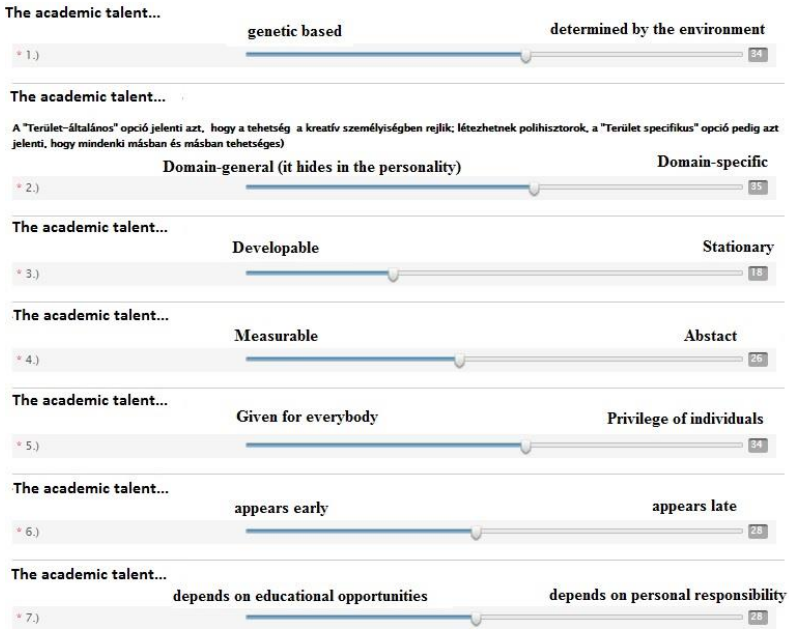

Figure 6.

The Teachers' Answers are Set in the Online Formula

In general, we can see a dominant moderate standpoint in the sample by the stances of the sliders. The slider of the development-opportunities (developable – stationary) is shifted from the center (marked with "30" value) to the direction of

"developable" option (18). The specified details about these means can be found in the Table 3.

I had to begin the mathematical statistical analysis with Levene-tests, because the numbers of the participant were fairly various among the different sciences-areas (show Figure 4). This test shows whether the variances are equal or not. The variances among the groups (science areas) were equal, except in the case of question "domain-general – domain specific". Therefore, I have used Welch-test at the second analysis of this question. The Table 2 shows the results of the seven Levene-tests.

Table 2

Testing the Equality of the Variances with Levene-Tests

Question/Dilemma	**Levene Test**	**F**	**Sig**
Genetic VS Environment	1,359	267	p>0,05
General (personality based) VS Area/domain specific	2,583	267	p<0,05
Developable VS Stationary	0,588	267	p>0,05
Measurable VS Abstract	0,287	267	p>0,05
Given for everybody VS Privilege of individuals	0,631	267	p>0,05
Early appearing VS Late appearing	0,618	267	p>0,05
Environmental factors VS Inside factors (Educational opportunities VS Personal responsibility)	0,706	267	p>0,05

After that, I tested my hypothesis with ANOVA (seven ANOVA to every question). The results of the ANOVA-tests are represented in Table 3.

Table 3.

The Results of the ANOVA Tests

Question/Dilemma	**Mean**	**F**	**df**	**Sig**
Genetic VS Environment	33,6	2,089	272	p>0,05
General (personality based) VS Area/domain specific	35,4	1,137 (Welch)	57	p>0,05
Developable VS Stationary	18,4	0,396	272	p>0,05
Measurable VS Abstract	25,6	1,343	272	p>0,05

Given for everybody VS Privilege of individuals	33,6	1,238	272	p>0,05
Early appearing VS Late appearing	27,6	3,165	272	p<0,05
Environmental factors VS Inside factors (Educational opportunities VS Personal responsibility)	27,8	0,829	272	p>0,05

It can be seen in Table 3 that there is only one statistically significant difference among the groups: in the case of the sixth question (Early appearing VS Late appearing) (F=3,165; df=57; p<0,05). The difference was between the representatives of humanities and the medicine-scientist. The humanity-scholars significantly thought the appearing of the giftedness to an earlier time than the medicine-scientists thought (Tukey test; Sidak test; Bonferroni test: 8,28).

If we compare this sample with a German control-group, we can find significant difference between the two groups in case of the first two questions: Genetic VS Environment; General (personality based) VS Area/domain specific. I used two-sample T tests to compare the two groups. The results of the T-tests are represented on Table 4.

Table 4.

The Sample Compared with the German Control-Group

Question/Dilemma	**mean of exp. group**	**mean of control group**	**T**	**F**	**Sig**
Genetic VS Environment	33,6	39,6	-3,139	319	p<0,05
General (personality based) – Area/domain specific	35,4	28,65	2,837	319	p<0,05
Developable VS Stationary	18,4	14,35	1,714	319	p>0,05
Measurable VS Abstract	25,6	27,33	-0,712	319	p>0,05
Given for everybody VS Privilege of individuals	33,6	32,27	0,557	319	p>0,05
Early appearing VS Late appearing	27,6	28,19	-0,276	319	p<0,05
Environmental factors VS Inside factors (Educational opportunities VS Personal responsibility)	27,8	29,25	0,812	319	p>0,05

The discrepancy between the experimental group and the control group is revealed by the tendency: the variances were equal only in two cases from the seven

questions. I tested this equality with Levene-tests after the two-sample T tests. It can be seen in Table 5. The two significant equalities are marked with * symbol.

Table 5.
Testing the Equality Between Experimental and Control-group

Question/Dilemma	**Levene Test**	**Sig**
Genetic VS Environment *	1,026	p>0,05
General – Area/domain specific	10,863	p<0,05
Developable VS Stationary	14,555	p<0,05
Measurable VS Abstract *	0,359	p>0,05
Given for everybody VS Privilege of individuals	9,107	p<0,05
Early appearing VS Late appearing	7,042	p<0,05
Environmental factors VS Inside factors (Educational opportunities VS Personal responsibility)	5,645	p<0,05

Conclusion

We can deduct the conclusion by the results of the ANOVA tests: there is concordance among the representatives of different science-areas about the eternal dilemmas of the giftedness. At least, this was proved true in six cases from seven questions. The exception is the appearing-time of the talent (early or late). According to the post-hoc tests, there is difference between only two groups: between the humanities and the medicine- and health sciences. Hence, the last has a very strong natural-scientific base, this result fits to the tendency described in the literature (in chapter "Early appearing VS Late appearing"): The peak of the career can be found around the age of sixty in case of humanities, but this peak is around the age of forty in case of natural-sciences (Simonton, 2004).

It is important to highlight: the standpoint of the scientist. How I described in the "Statistical analysis" chapter, the professors have a moderate point of view about the questions. Only the scale of the developmental opportunities shifted a little bit extent from the value 30 (middle point) to the direction of "developable". So, this research did not help to let us approximate to the solution of the dilemmas (if it is possible at all), but also it made the situation more complicated, because themselves the talents (scientist/professors) stand also in the middle of the dilemmas.

Hence, the research was been created to the professors, the eternal questions pertains to the academic/scientific talent. It would have been interesting to investigate also an other control-group from laymen. But even an other nation's control-group showed the tendency that there is agreement among the science-areas.

Far from sure, the academic talent would have really so attributes like in this research, because we have spoken about only attitudes. But these attitudes have been formed; thanks to the more-less-years routine. Although, the opinion is unified among the science areas, we cannot generalize these results to the talent. We would get probably other results in other domains of the talent – for example: in case of the sport or the arts.

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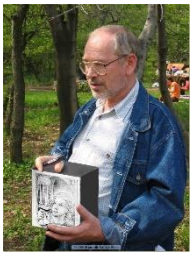

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