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LEARNING TO BECOME A SCIENCE TALENT

A case study of the emergence of the knowing subject in a talent development program at the Mærsk McKinney Møller Science Centre in Denmark.

by Jesper Stilling Olesen

The article focuses on the concept of talent and its enactment in a science talent program. The article investigates how students become a particular kind of knowing subject through their participation in a science talent program at the Mærsk McKinney Science Centre in Denmark. Drawing on concepts from new materialist studies (Latour 1993; Blok & Ellgaard Jensen 2009; Fox & Alldred 2017) the article explores the relationship between the possibilities for distribution that are offered to the participants, and the ways in which the participants respond by centering and decentering within the talent network (Mialet 2008, 2012). The study contributes to our understanding of, how the increased focus on talent development in many national educational systems influences basic preconceptions of what a science student is and how the knowing subject in society should treat science, by looking into the micro-politics of talent development. The study is based on a small-scale ethnographic fieldwork at a science camp of three days. Since it is a case study the findings account only for enactments of science talent within the confines of this particular science camp.

Keywords: talent development, educational subjectivity, becoming, science education, new materialism.

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Introduction

In recent years, the term 'talent' has increasingly been used in relation to educational programmes for children and young people who are considered to have special abilities or a particular gift for certain subjects. The term originates from the worlds of sport and the arts, which both have a long-standing tradition of regarding students as 'talent', learning as 'talent development' and places of learning as 'talent-development environments'. Since the beginning of the new millennium, the concept of talent has expanded into the Danish school system; and Denmark now has well-established talent programmes in primary and secondary schools as well as youth-education colleges. This is particularly true of science, where there has been a widespread willingness to support the care of students with special abilities. In 2011, the Nordic Council of Ministers made a survey of the work of developing natural science talents in the Nordic countries (Daugbjerg et al. 2011). The survey showed that Denmark distinguished itself in two areas. Firstly, by obliging upper secondary schools to accommodate particularly skilled students with special offers in, among other things, natural sciences. Secondly, by establishing a permanent center for talent care in the natural sciences at Mærsk McKinney Møller's Science Centre in Sorø (hereafter Science Talents). Since then, the science-based talent management has become even more widespread and rooted in the National Center for Learning in Nature, Technology and Health under the name of Astra. Astra manages the overall Danish strategy to promote learning in science at all levels of education, including talent development under the auspices of Science Talents.

In connection with the survey in 2011, the Nordic Council of Ministers called for an overall discussion of what is meant by a science talent. Obviously, it was thought to be important in clarifying which students were the target audience for existing talent programs. But in the light of the fact that every time a new talent development program is created, there is made room for more science talent, the right question may not be who the talented students are, but how the programs provide new students with talent and what kind of talent do they produce? With the continued development of talent care in the natural sciences it is therefore, relevant to examine, what understandings of talent inform the programs, how they are transformed into practical pedagogical courses and what effects they have for the participants as knowledgeable subjects in the short and long term? This article makes a contribution to clarifying the talent concept by examining how science talent is enacted in a specific talent development program. Based on a case study of a talent development program held on Science Talents in 2012, I explore what it is like to become a science talent by assuming the position of the knowing subject offered by the talent program. I would like to understand why some students choose to inhabit the social position while others refuse to let themselves become the version of a science talent suggested by the programme. This research interest calls for processual studies of the interaction that takes place in talent development programs between students and the range of socio-material actors made available for the participants. This study draws on theoretical inspiration from new materialist studies, which states that any subjectivity including that of talent is an effect of various heterogeneous actors working together as an alternative to the more common assumption that a talent is an inherent quality of a gifted person (Mialet 2008 & 2012; Clark/Keefe 2014; Skrubbeltrang, Nielsen & Olesen 2016).

The investigation's theoretical approach to the study of talent

As the French philosopher Mialet states in her studies of scientific geniuses (Mialet 2008 &2012) the rationalist tradition builds on the assumption that the driving force of knowledge is inscribed in the subject. Therefore, new knowledge has for a long time been seen as the product of ideas, which derives from particular gifted individuals with a unique mental capacity. From this viewpoint, the main task of a talent developer is to identify the talent and separate these people from those with intelligence that is more ordinary. Over the recent decades, this viewpoint has been coupled with the idea that talent is something that can be acquired. Ericsson, a Swedish–American psychologist, is one of the strongest proponents of this perspective. In his theory of "deliberate practice", he argues that talent only becomes elite in their fields via early specialisation and many years of dedicated training (Ericsson, Krampe and Tesch-Römer 1993). A great deal of the recent international literature about talent development in schools is thus based on an understanding of talent as something that can be acquired. This literature focuses largely on which pedagogical initiatives are best when it comes to stimulating gifted children. Talent development is consistently treated as a question about didactic methods and developing teaching plans adapted to gifted children (e.g., Renzulli and Reis 1985; Renzulli 1994; Freeman 2004; Rasmussen 2010). This way of understanding talent and how to best develop it has a characteristic trait, which is that it is situated in an autonomous and self-reliant individual. Talent comes from inside a person and regards solely its cognitive capacities and engagement in developing these skills, but it can be encouraged and nurtured via initiatives that are usually called 'talent development'. This conception's lack of social contextualisation has been criticised by Rasmussen & Rasmussen (2015). On the basis of a Bourdieu-inspired case study, they develop a talent typology with four types of talent that are linked to the students' socioeconomic background. They argue that talent programs tend to recruit certain types of middle class talents, demonstrating the necessary form of social capital, thereby contributing to deepening social inequalities in the education system.

In this article, I will draw on a different understanding of the knowing subject based on concepts that derives from what has become known as the new materialist studies (Fox & Alldred 2017). Many of the early science studies that have inspired new materialism by e.g. Bruno Latour and James Woolgar showed that scientific knowledge is not simply a product of a rational individual's mental processes; rather, it is a fundamentally social and material process (Latour and Woolgar 1979; Latour 1987). These studies demonstrated that scientific practice does not differentiate itself from other practices; it is a socially, materially and historically situated form of life. Furthermore, the relationship between the individual, the social and material conditions is not expressed as a hierarchical relationship of subordination and superiority. On the contrary, the relationship is expressed using a principle of generalised symmetry between the actor and the network (Latour 1993). This means that human agency is not placed at the centre of the study of talent development (Blok and Ellgaard Jensen 2009).

Thus, when studying talent, one must investigate interactions between subjects and socio-material actors of all kinds: technology, materiality, discourses, bodies, feelings and so on. How talent comes into existence in a particular talent programme depends on the actors that are made available to participants, how the participants interact with them, and how this transforms all of them. In addition, in keeping with the principle of symmetry, talent should not be regarded as a stable and unambiguous phenomenon instead it should be studied as variable ontologies (Mol 1999); this means that talent is something that emerges in certain events wherein the knowing subject is assembled as talent. One might say that talent is something that comes into existence as it is being formed in relation to particular practices (Bruun Jensen 2010) i.e. a talent programme. Clark/Keefe considers in a study of college students' identity development precisely identity as a fluid entity, as a continuous becoming embedded in socio-material assemblages (Clark/Keefe 2014). She wants to get away from what she calls closure-seeking and normalizing discursive practices and instead inspired by Braidotti, she follows students in their nomadic movements through various assemblages (Braidotti 2011 Cit. In Clark/Keefe 2014). Parallel to her research interest in how it is to be in the process of becoming this investigation asks how it is to become a science talent by assuming a social position offered by a natural science talent programme.

Mialet, who has studied the emergence of geniuses, offers some useful concepts to understand talent as a gradual process of doing (Mialet 2008 and 2012). On the basis of two studies of researchers who are widely considered to be geniuses, she claims that their reputation is partially due to their capacity to build, maintain and navigate within a network in a specific manner, so that the network is centred around them. Mialet suggests that the knowing subject should be understood as being simultaneously distributed in a network and centred around an individual. The two geniuses she studied are both capable of occupying a distributed–centred position by exerting a strategic influence on the narratives, materialities and ways of acting that make up their networks. Taking centring into consideration is not the same as returning to a human-centred ontology, in which the self-sustained individual relates rationally to his/her surroundings. Rather, it is an opportunity to discern how, based on the principle of generalised symmetry, the participants relate within and to the ways that the talent programme operate through them. Unlike the geniuses of Mialet's studies, participants in a talent program may not feel comfortable with the way the network works through them. It is therefore necessary both to look into the extent to which participants choose to distribute themselves in the talent network and whether they occupy a centered or more peripheral position in relation to the program's offer of becoming a science talent. Using the approach outlined above, I analyse how the participants come into being as knowing subjects at Science Talents. I do so by focusing my attention on how a practice is established to create new connections between projects, participants and supporting actors, and how this invites participants to constitute themselves and their projects in a different way than they would at school. Throughout the analysis, I explore the relationship between the possibilities for distribution that are offered to the participants, and the ways in which the participants respond by centring and decentring within the talent network.

Presentation of the talent programme

Science Talents was established in 2009 as a science centre that provides a framework for developing the scientific talent of young people between the ages of 12 and 20. Talent development is carried out by providing courses and inspiration for teachers at upper- and lower-secondary schools, through teaching and camps for talented youths, by facilitating networks for talent and by encouraging dialogues and debates about talent management for young scientific talent. Every year Science Talents host part of the science-talent competition "Young Researchers", which is Denmark's largest science-talent competition for primary and secondary schools as well as youth-education colleges. The competition is organised by an association called Danish Science Communication, which is funded by several private companies as well as the Danish Ministry of Children and Education and the Ministry of Science, Innovation and Higher Education.

In 2012, when this study was conducted, more than 1,500 projects entered into the competition. A little less than 100 projects were accepted for three regional semi-finals, which were reduced to 24 senior projects that were selected by a jury for the final at Aarhus University on 30 April. The students whose projects were selected for the final were invited to attend an innovation camp at Science

Talents – a three-day residential programme held on 13–15 April 2012. Here, they had the opportunity to participate in various activities in order to develop their projects and prepare them for the final.

Methods

The study was conducted as a small-scale ethnographic fieldwork at the Innovation Camp which took place at the Mærsk McKinney Science Centre in Sorø. 31 students representing 22 projects took part in the event. Most of them were in their third year of upper secondary school either stx (the standard upper secondary choice) or htx (which offers a technical specialization). I chose the camp as the empirical field because numerous socio-material actors involved in assembling the science talent were present in this single site. In accordance with the program, the camp can be divided into a number of sub-events: lectures, consultations with experts, individual work with the projects, presentation of project development in plenary. I was present throughout the three days the camp lasted and I was granted access to all the activities by the organizers. Of course, it was necessary to ask each of the participants for access to their individual consultations with the experts. However, the students I asked all allowed me to sit in on these sessions. In view of the fact that I undertook the fieldwork as a single researcher it was impossible to cover all the activities that took place at the camp. In particular, during parallel sessions I had to make choices about which participants to follow. The empirical material I have produced consists largely of field notes from lectures (3), consultations with experts (8), informal conversations with participants (9) and plenary sessions (4). In addition to the field notes I have collected a small amount of written material (announcement of the event, program for the camp, list of participants, handouts etc.) and e-mail responses from nine students to a questionnaire I send out to the participants two weeks after the camp. In the fieldwork, priority has been given to the investigation of the connections that are drawn between the participants and the heterogeneous actors made available to them over the course of the camp. This has been achieved by following a few groups of participants through all stages of the program: when they listened to lectures, met with experts, did group work and told about the progression of their projects at the plenary sessions. This narrow focus on a few projects gave a valuable insight into what these particular group members encountered, how they interacted with other actors, whether they made new connections and eventually transformed their projects and was affected as knowing subjects. The themes of the five key projects were:

1) Generating energy from motion
2) Seaweed as a sunscreen agent in sun lotion
3) Organic light emitting diodes
4) Enzymatic synthesis of aspartame
5) Einstein's special theory of relativity

The first project turned out to be the key project of the study. I attended all their consultations, I met with them several times for informal talks, and two of the three group members responded to my e-mail questionnaire. I observed the other projects at one consultation each and had informal talks with all of them. Two of them answered my e-mail. Because of my methodological priority of following some participants through all stages of the program, the study does not claim to represent how all participants have been affected as science talents at the camp. All though they have all listened to the same lectures, which present particular images of how to become a science talent, they may interpret, negotiate and position themselves in various ways in the talent assemblage. Furthermore, the Innovation Camp that I chose as the empirical field for this study represents only some of the activities that takes place at Science Talents. The camp's strong orientation towards enterprise and innovation may not be as prominent at some of the other courses offered by the institution. Well aware that the knowing subject is likely to vary from talent program to talent program and from student to student, the present study offers an insight into the principles of how a science talent assembles and how particular assemblages affect how the knowing subject relates to knowledge, school and the wider community.

The analysis is divided into two parts: 1) An analysis of how talent is assembled discursively at the camp. 2) An analysis of how the participants enact natural science talent.

Part 1: Discursive assemblage of a natural science talent

The programme at the innovation camp was comprised of lectures, consultations with experts, group-work with a focus on the participants' own projects and presentations in plenum. In this section of the analysis, I focus on the lectures, which discursively created specific connections between the participants, their projects and scientific knowledge in a network of numerous other actors. The lectures constituted the participants and their projects in ways that were different from their schools. By following the three steps that were presented in the introductory lecture, I show how the participants were invited to consider themselves as either entrepreneurs or basic scientists, and their specialisation projects as something other and more than 'merely' a school exercise.

Three steps to become a science talent

The introductory lecture, titled "From idea to exit", was delivered by one of the organisers of the innovation camp, who presented himself as someone who could see the idea within the idea. According to him, a 'good' idea must contain at least the following two elements: it must be unique knowledge, and there must be a market for it. The latter means that the idea must solve a problem for a particular group of people, and that it can be converted into a marketable product. The development of an idea into a marketable product involves a number of other people, as well as the entrepreneur him/herself. Therefore, it is essential from the very beginning that the participant be able to describe his/her concept in order to convince others that it is a good idea. To do so, one must have a business plan that describes the idea and one's plans for developing it. Then one must realise the business plan; i.e., work on developing the idea to the point at which it may be handed over to other actors. The lecturer called this 'choosing a good exit for the project'.

The lecturer addressed the participants as though they were already dedicated entrepreneurs with a shared ambition to start their own businesses and get rich from their inventions.[1] For most (but not all) of the participants, being the boss of their own company was according to the informal talks I had with the participants later at the camp still a distant idea. The lecturer introduced criteria for judging a 'good' idea that were radically different from the criteria associated with how knowledge is generally practiced at school. For instance, he did not say that the participants should have in-depth and thorough knowledge of a subject; rather, he said that they must have 'unique' knowledge.

The knowledge that is valuable at the camp is not the knowledge that is described in textbooks or scientific journals. On the contrary, valuable knowledge is that which no one else has access to, and which one may eventually be able to publish in a scientific article after one has patented his/her idea. In addition, the value of knowledge is not measured in terms of what it contributes to developing an academic discipline; instead, it is assessed based on what it is worth in the commercial marketplace. Therefore, one might have unique knowledge, but if there is no market for it, then in principle it is worthless. The point is that knowledge in and of itself is not worth anything. From the viewpoint of an entrepreneur, it must be linked to other actors, such as manufacturers, patents, investments, etc. From the viewpoint of a scientific researcher, knowledge must be linked to research colleagues, heads of research programmes, grants, etc.

The third assumption that the lecturer dispelled is that a good idea will disseminate itself. He repeatedly emphasised that it is important to practise explaining what one's idea is about. Through these explanations, a good idea becomes connected to the actors that are necessary for it to become a product, or for it to lead to a research career. This applies to both prospective entrepreneurs and scientific researchers: they must create a narrative about their ideas and be capable of relating this in a convincing manner. Thus, in the camp's introductory lecture, it is possible to identify three steps for becoming a science talent:

1) The should focus on what is unique about their project
2) The should become capable of explaining why the project is relevant and interesting
3) They should develop a narrative about the project to mobilise key external actors (whether in the marketplace or in the research field)

The first speaker did not present the three steps as a procedure as such but it was implied in the lecture and in the overall program for the camp that the participants could improve their projects by following those lines. In this sense, the first speaker encouraged the participants to take certain actions to improve their projects and the following speakers sketched out in details how to do it. If we use the concepts of distribution and centring to consider the three steps, the first step refer back to the participant him/herself; a centring, as the talent elucidates the value of the project and his/her own knowledge capital. The second and third steps point outwards, towards other actors: a distribution of the project to increase its value.

Unique knowledge is valuable knowledge

At this point the science talent appears as an entity assembled by the subject as 'entrepreneur' with a project with potential value for some body based on a unique knowledge.[2] This particular assemblage of the knowing subject is developed further in the lectures. These elaborations disclose how relations to external actors transform accordingly.

Several different actors helped the participants to identify the unique knowledge in their projects. The key actor in this process is a patent lawyer – the founder and administrative director of a patent bureau – who changed how participants saw their own projects. She explained that a patent is a means to protect the unique knowledge of a project by prohibiting others from producing, marketing, selling or using it during the patent period. This means that the participants must regard their projects as

1 The article could have embraced the issue of race and class, or taken an intersectional approach. I am aware that this would increase the value of the analysis, although due to limited space and despite the relevance of gender in the history of entrepreneurship, I have chosen not to examine these issues here.

2 The notions of 'entrepreneur' is not a predefined concepts with a specific ontological meaning. It should be understood as a notion of a particular kind of science talent that is about to unfold in the field. The notion is launched by the first speaker and further developed in some variety by the following speakers. For the participants 'the entrepreneur' comes to represents a subject position they are encouraged to enter and from where they can enact science talent properly.

unique knowledge as soon as they start to consider whether their ideas can be patented, whether there are existing patents in their subject area and how they should protect their ideas until they are granted a patent.

Other actors at the camp also emphasised the importance of protecting the projects' unique knowledge. Several times during the competition, I heard about how the winners of 'Young Researchers 2011' missed out on the opportunity to patent their idea. They had made a little gadget called 'bolt strips' that could be used to assemble flat-pack furniture (e.g., from IKEA) without using tools. They had the device on their stand so that the judges could see it. Afterwards, they learned that showcasing their idea at the competition was considered making it public – in principle, their idea became public property. As a result, they were unable to patent it and may have missed out on significant profits. One of the previous year's winners came to the camp one evening to share his experiences with the 2012 participants. He showed them pictures from the 2011 competition and confirmed the story about the unplanned disclosure. His story affected both the organisers and the participants, who did not want to repeat the same mistake.

The idea of unique knowledge (in this case, from a market perspective) contributes to how relationships form between the participants and the actors they hope to collaborate with in developing their projects. However, one problem is that companies they contact to find out whether they would be interested in producing the invention may steal their idea. The solution to this is to have a 'non-disclosure agreement', which was mentioned both in plenum and in the individual consultations. There is also a potential problem with regard to the relationship between participants and any consultants who are brought in to develop the idea. No matter how small their contribution, they become a stakeholder in the final product. The patent lawyer explained that the solution is to draft an agreement wherein the consultant will transfer all of his/her rights to the inventor.

So, when the camp participants begin to view their specialisation projects as unique knowledge in this way, their relationships to external actors become problematic. In order to anticipate problems that may arise in the future, they are forced to think strategically before entering into such relationships. As a pedagogical worst-case scenario, the story about the previous year's winners was useful, as it demonstrated what can happen if one does not exercise due diligence. Unique knowledge, patents, non-disclosure agreement forms, agreements about transferring ownership rights and stories about losing rights are some of the actors that are made available to participants at the camp. They can be understood as symbolic and legal actors that help form relationships between the participants and the external actors, but they also contribute to forming the participants' self-perceptions and the ways in which they view their own projects. When these actors are linked to a school specialisation project, the relationship between the student and knowledge thus transforms into a proprietary relationship. The knowledge produced is transformed from being a representation of the students' learning and viewpoint to being the student's property and intellectual capital. Rather than being something a teacher can use to guide and evaluate a student, it becomes something the student him/herself can use to start a business or promote him/herself as scientific-research talent; thus, the capacity to act shifts from the teacher to the student. However, not all of the camp participants considered the allocation of the capacity to act that result from centring in this assemblage to be something positive. I examine this more closely in Part 2 of the analysis.

Presentation techniques

The second step presented in the introductory lecture focused on how to communicate 'the good idea'. This was followed up on the third day of the camp with a lecture by a theatrical director who discussed how to present ideas and make contact with one's audience; her lecture had a significant influence on how the participants viewed their own projects. First, she drew a diagram of three concentric circles: in the innermost circle, she wrote "why"; in the middle circle, she wrote "how"; and in the outermost, "what". In order to make contact with the target audience, she explained, participants must get into the central circle and describe why they are doing their projects. The director said that most people make the mistake of thinking that an audience is only interested in what they are doing. But in fact, why they are doing it is even more interesting. But talking about "why" means talking about yourself: "You will give them a piece of who you are," she said. Her main message was that the participants should consider why they were investing time and energy into their projects, rather than simply presenting facts about them.

When the director's message was brought into a forum comprised of upper-secondary school students, it created a distinction between science student and science talent. All of the participants' projects were based on a topic with which they had worked at school; in other words, they were embedded in the curriculum that is traditionally used for scientific disciplines. Even though certain themes sparked their interest, it had not been necessary for them to explain why they became personally interested in the topics they chose: the school context does not require a student to consider the "why". On the other hand, at the camp, there was a clear expectation that the participants should be able to explain their choice of topic. Here, their task was to convince others that their project was both interesting and relevant, as well as being well-thought-out and well-executed. In other words, they had to assume their role as either an entrepreneur or a scientific researcher.

Learning presentation techniques introduces an emphasis on science as something that is conducted in a communicative context. Here, the project – in addition to referring to academic scientific competences – also has a sender and a receiver. Whereas the participants originally focused on their projects' reference to academic material, at this point in the camp, they were becoming

aware of its communicative function: they must inspire external actors' interest in the project, and these receivers must perceive the sender to be full of talent. Therefore, when presenting a project, they were told, it is important to improve the impression made by the sender.

Along with the participants' awareness of their unique knowledge, learning these presentation techniques helped to transform their subjectivity and equip them with the capacity to act. First, they became aware of themselves as senders of a professional message. For example, in the following quote, one participant described how the theatrical director helped to improve the participant's oral presentation: "Suddenly, I became aware of how I was standing while I was making my presentation." In general, the participants became aware of themselves as embodied carriers of their own unique knowledge and 'the good idea'. They also realised that the way they stand and how they dress makes a difference in terms of establishing a positive relationship with the judges. Additionally, they became aware of the affective element; specifically, that they had to convince the judges (and other actors) of their projects' excellence by displaying enthusiasm. The participants were explicitly urged to invest and perform enthusiasm in their projects in order to win. One of the participants made a distinction between the expectations of them at HTX (technical colleges) and at the camp: "HTX is academic; here, it's about performing. […] At HTX, the students aren't asked 'why' – that's irrelevant at HTX." Thus, presentation techniques produce certain affects both in terms of certain preferred emotions and in terms of placing the participant in the centre of a knowledge producing and communicating network.

Part 2: Enactments of a natural science talent

The second part of the programme offered the participant the opportunity to consult various experts with their science projects. This allowed them to enact science talent in accordance with the assemblage sketched out in the lectures. The consultations can be seen as actual extensions of the students' science projects. In these sessions they are offered the opportunity to distribute their projects in a wider assemblage while assuming the centre position as science talent themselves. I followed the same project group, which had three members, through several consultations. The group was trying to generate energy from motion, wherein the deformation of small crystals generates energy. Their project attempted to exploit these properties in laptop computers, for example, so that the battery would be recharged while a person was typing. The group had worked on the theoretical aspects of the crystals' properties in their school specialisation project.

They started by speaking to a materials expert. He asked if they knew how much electricity the crystals generated; they knew that the crystals generated around 10 volts. He pointed out that they should also find out how many amperes they could generate. The group was told that the next step in their work was to carry out a 'proof of concept'. This meant that they should measure how much electricity would be generated by deforming the crystals. This information was necessary to assess which kinds of devices they could supply with electricity. In other words, they had to work out whether their idea would be capable of solving the problem of powering a laptop computer. Alternatively, they should consider which problems it would actually be able to solve. For example, was it more realistic to talk about extending the life of the battery, or should they apply their idea to devices that require less electricity?

Throughout the consultation, the expert identified knowledge that the group was lacking, and indicated specific ways for them to obtain this knowledge – either by conducting their own experiments, or by contacting actors who possess the knowledge they lack. They were also referred to two of the other consultants at the camp who could help them clarify a patent issue and determine how the idea could be turned into a business at some point in the future. In other words the group was advised on how to extend the assemblage and distribute their project to more experts with complementary competencies to the materials expert.

The materials expert addressed the group as carriers of an idea with limited but nevertheless unique knowledge about the energy in crystals, and they were given suggestions for how to develop their unique knowledge with the aim of determining whether or not the idea could be transformed into an actual product. In other words, the conversation was based on the premise that knowledge is not just something one has, but something that should be used to solve an existing problem.

The group's next consultation was with an expert in project management. The group members were clearly surprised that this expert was not interested in hearing about the scientific content of their project. Rather, he immediately asked about the group's division of labour: "Who was able to make decisions if the group was not together in one place? Who was responsible for communication? Who was the secretary, compiling an overview of resources and a diary to develop their shared experience?" The group members found it hard to recognise themselves in the way he addressed them. They protested: "This just started off as a school project." The expert replied: "Take your own work seriously." The group responded: "We're the only second-year [of upper-secondary school, which is a total of three years] students here, and things are already heating up. A lot more business talk is being used." Despite the group's protests, the expert stuck to his message that it was important for them to learn to manage their own resources, and to set both short- and long-term goals. "It's a matter of becoming an adult and a professional," he said. Furthermore, he thought that the group should use their project

to achieve a more exciting university career. Their project was an opportunity to make contact with relevant researchers, he said, adding that most school specialisation projects are a waste of time. Apparently, if the project was to be anything other than a 'waste of time', it should be extended with actors from a project management assemblage in order to become a resource to establish a business or make strategic contacts in the research field. In this consultation, it became clear that the group's project was considered a resource that the group members could use strategically to realise their short- and long-term goals.

Not all of the groups felt as provoked by the project-management expert's advice about professionalising their projects. Many of the participants saw themselves as being closer to assuming the role of project managers of a natural science business. This group's consultation with this expert did however create a clear distinction between how knowledge should be handled in the contexts of school and talent program as he established becoming adult and professional as the desired alternative to the subject position they in his eyes were stuck.

Negotiating subjectivities as natural science talent

I talked to the group I followed after their first two consultations. They were surprised that their project was being treated as a product that should be patented and that they should start their own company. It had started out as a school project that their teacher had said was so good that it should be sent in to 'Young Researchers 2012'. One of them said, "It would be fun, and there were some great prizes. And suddenly, here we are!"

Their statements show that, at that point, they were not willing to sever the ties to their original school network. Instead, they were trying to extend the school network with the 'competition' actor without necessarily having to transform the project into a product or a business; to that end, they were able to use the guidance of the materials expert. They explained that he gave them concrete advice about i.e. how they could develop their idea in order to do well in the competition. At this point in the group's narrative, they distinguished between the competition and the idea of starting their own business; this is in contrast to the narrative that placed the business as a long-term goal that was an extension of the competition, which was a short-term goal.

Consequently, they categorised the project-management expert, along with several of the other consultants, as relevant to participants with projects that were at the final stages of development. In other words, the group members were building an assemblage, which, according to Latour (2005), should be understood as a dynamic union of heterogeneous actors, consisting of the competition 'Young Researchers 2012', plus the materials expert and other consultants who could improve their performance in the final; an assemblage in which they are involved as 'students' and their project as 'a good school project'. On Saturday evening during the presentations in plenum, the group members confirmed this assemblage when they explained that, earlier that day, they had clarified the relationship between theory and the application of their idea, and they had decided to focus on the theoretical dimensions of their project in the final. Thus, by making a distinction between the theoretical and practical aspects of their project, they separated themselves from the business component and the impending subjectivities of entrepreneur and self-employed business owner. However, the group members did not object to the market logic by indicating that the marketplace is just one possible network among many others that were not mentioned at the camp, and thereby made visible as conditions of possibility for an alternative way of developing their project and the formation of themselves as a different kind of knowing subject.

After the competition's final, I had contact with this group again when they responded to a mail that I sent to all of the camp participants. In this mail, I asked them, among other things, what would happen with their project in the future. This group responded: "When we have finished our exams and so on, and we start the third year, we have talked about further developing the project. We see no reason not to. We will look more closely at the possible applications of the knowledge we have gained in relation to the project." By this stage of the process, the group members had become more willing to work on applying their theoretical knowledge. Even though, during the camp, they resisted being enrolled into an assemblage that would turn their project into a potential business and themselves into entrepreneurs, this no longer seemed to be threatening. This may be because they are now willing to market their knowledge, or because they have found ways of making their knowledge available to non-capitalist stakeholders. However, in their response to my questions, there were several indications that their project is being transformed according to the steps that were presented at the camp. For example, one of them wrote, " ...The project has become much more important, and I am much more passionate about it now than I was at the beginning when it was just an idea. The whole process – from the idea to the practical execution – was really exciting." They also wrote, "What started as a specialisation project quickly became much more serious." They obviously now consider their project to be something other and more (serious) than an academic exercise, and they have adopted aspects of the terminology used by the project-management expert when he encouraged them to take themselves and their project seriously. The group members have apparently begun to transform their project from a school project to an innovation project in which they can assume a central position as professional entrepreneurs as they learned at Science Talents.

Assuming central or peripheral positions in the Science Talent network

The members of the group I followed are not the only ones who had issues with the talent network that was outlined at the camp. All of the participants encountered different types of challenges and had different considerations about what is involved in becoming a science talent.

For some of them, it was relatively easy. This was the case for two participants who were working together on a project to use seaweed as a sunscreen agent in sun-lotions. In their response to the questions I mailed them, they articulated their own development by saying that they had become better at presenting their project. They also felt as though they were being taken seriously, which inspired them to work on their project even more. They thought that the consultants seemed genuinely interested in helping them, and that they worked with them in a different way than their teachers at HTX; the consultants helped them to visualise the alternative possibilities for their project. In contrast to the group described above, this group had no problem with transcending the student role by talking about themselves as entrepreneurs and using the discursive actors they encountered at the camp. Furthermore, they said that one of the consultants, a patent lawyer at a university, had offered to get them in contact with another lawyer who could help them to protect their project. He could get them an hour of consultation for 1,000 Danish kroner (about 175 US dollars or 135 Euros). This was now a matter of distribution by investing real money into the project – not just the points they had used to bid for time with the consultants at the camp. In this way, the project's status had changed from being a school project, where the most important thing was what they learned in the process, to becoming an innovative project that they could invest in to make a future profit.

Another group, who was working with organic LED lights, had also accepted an offer to transform their idea from a school project into an innovation project. Their specialisation project was originally an exercise in Design and Production. It had changed in the respect that they had added something personal in order to consider the "why" (i.e., why they had become interested in the idea), which they said had not been relevant at HTX. In other words, their project that originally was entangled in a school assemblage was brought into contact with certain emotions of enthusiasm and dedication. They emphasised that the consultants at the camp had treated them professionally and that they were serious about their project. The words 'professional' and 'serious' can be seen as markers for the position that they expect to assume at the centre of the talent network. The enrolment of these new actors placed themselves in a position as science talents who personally vouched for the projects relevance and value as investment object.

There were also participants who refused to enact science talent in the way it was assembled at the camp as a market-oriented entrepreneur or an authoritative basic researcher. This was the case for one participant who was working on a new way to make artificial sweeteners. He said that his project had not moved forward, so for him, the premise remained unchanged and he focused only on the 'Young Researchers 2012' competition element. What he gained from the camp was that he had been able to repeat his aspartame experiment in one of the laboratories at Science Talents. It was not difficult to spot the unique aspects of his project (i.e., a new and easier way to produce aspartame), but he did not make it the object of strategic consideration – perhaps because he had not identified the "why" of his project. During the semi-finals, one of the judges called him a "great craftsman" in the laboratory. By the end of the camp it had not changed. Apparently, he preferred to remain in a peripheral position of the talent network promoted at the camp.

Another participant found herself marginalized in the talent network offered at the camp. This was the case for a participant who was working on Einstein's special theory of relativity. She found it difficult to develop her project in connection with the actors that were available at the camp, because she was working with a scientific theme that utilised a perspective based on the history of science. With her project, she aimed to understand why it was Albert Einstein who had a breakthrough with his theory, despite the fact that another scientist had already proven the same things in a different way. She felt that her project was on the periphery of the camp's definition of 'science' as an actor that is relevant in the marketplace; she felt that this definition, to a great extent, was orientated towards products and industry. She was not interested in gaining a profit from her project, and she felt it was difficult to make it more technical. She was not using theories from the natural sciences, but rather those from philosophy of science and history. She did in fact enact science talent by speaking with two consultants at the camp: one helped her improve her presentation, and the other put her in touch with a well-known science historian, several of whose books she had read.

The difficulties this participant encountered in relation to establishing a new assemblage with her project were not linked to her refusing the premise that she should centre herself in an assemblage and create new strategic connections. Rather, it was because the professional framework at the camp was too narrow to encompass her project, although one might say that making contact with the science historian could help her improve her position in a relevant domain.

However, the irony is that this participant experienced the turn of events as a tragedy. She was fascinated by science's use of deductive methods, which she considers beautiful, but the nature of her project took her away from these methods and into the realm of the history of science. Her example shows how the projects themselves become actors in the networks, they can either take participants in a direction they want to go or lead them astray towards unwanted becomings: hard core scientific researcher vs. humanist science historian.

The micro-politics of science talent programs

One of the things the talent concept draws from the world of sport into the field of education is the popular notion that talent is a simple question of a particularly high level of competence within a given field. In view of this understanding, a talent program constitutes a neutral continuation of the teaching taking place in the general school system. In talent programs, it is assumed that scholarly subjects are taught only at a higher level and it is often phrased as if talent programs simply address students who have the ability and desire to learn more. The Danish sociologist Inge Kryger showed in connection with a study of women in elite sports already in 1999 that athletes belonging to the elite have a completely different practice in training and competitions than those at the levels below (Kryger Pedersen 1999). They do not just do the same. They do it differently. This study of the innovation camp on Science Talents shows, in continuation of Kryger's point, that talent programs do not just build a level on top of the school's learning. The study shows that they rather establish a parallel social practice with other criteria to assess and use knowledge (Latour & Woolgar 1979; Knorr-Cetina 1981).

At the camp, the students participated in a social practice where they should take certain actions to become a science talent. They should find the unique knowledge in their projects and explain why they found the projects interesting and incorporate these insights into the way they approached other actors; and the answers to why they found their projects relevant should ideally be accommodated within the market logic. By entering into this particular social practice, some of the participants gradually transformed their student subjectivity into a subjectivity as market-oriented entrepreneur. The analysis has shown that the special version of talent they enacted at the camp meant that the participants personally vouched for their projects as they learned to associate some particular feelings of enthusiasm and commitment, and seriousness and professionalism. During the innovation camp, the participants' school projects transformed to a valuable commodity they had to protect and treat strategically when they met with actors in the community. In turn, these actors became either associates or competitors in the market place. The knowledgeable subject became a strategically thinking subject, aware of how they can use and make knowledge profitable.

The networks that sustain the geniuses described by Mialet (2008, 2012) are primarily different from the networks that constitute Science Talent in their degree of branching and stability. In a number of ways, the geniuses' networks function as well-oiled machines or "black boxes" (Latour 1987) that fade into the background and allow them to appear as autonomous subjects who think, speak, give lectures and write books (Mialet 2012). These networks are tailored to the geniuses' professional and personal needs. In contrast, at the camp, there is a wide gap between the individual participants and the network. At the camp, generally the participants are the ones who have to adapt to the network. The study also showed that not all participants are willing to do so. Like Clark/Keefe (2014) points out in her study about how college students experience their own becoming the participants' considerations concerned in different ways what it would imply for them to become a science talent. They asked themselves if this was the kind of talent they would like to be? Did they feel comfortable in the role of the entrepreneur who was starting up his/her own business? Was that what they wanted to do with their projects? Where would this knowledge practice bring them and their projects? Most participants found the offer attractive and centered themselves in the network, and some, was positioned or positioned themselves more marginally in the talent network, such as the good craftsman or the misplaced science historian.

Even though most participants seemingly thrived at the camp it is striking that among a group of students with shared interest in natural science, some students become marginalized due to the way talent is assembled at the camp. Marginalization has a decisive influence on these participants' benefit from the talent program, as they can (or will) only use a limited part of the learning offer that is compatible with how they want to enact science talent and what their projects afford. Since the camp is only on for three days the consequences of this marginalization probably does not pose at big problem for those participants who are unable or unwilling to center themselves in the network. Nevertheless, the case tells us that it is important to keep in mind that the practiced talent subjectivities do not become too narrow when the national education systems continue the expansion of talent programs. It is important that the expansion is based on relatively spacious talent definitions or that it expands with a variety of different programs that allow more types of talent to gain existence.

In view of the special position that Science Talents have achieved in the Danish as well as in the Nordic context of science education, as the only permanent place for science talent management, it is important that Science Talents speak to a diversity of understandings of what a natural science talent can be and how it can be developed. On a more general level, it must be noted that it is not sufficient to assess national talent programs on whether there are qualified offers for the particularly skilled students. This study shows that one must also take into consideration the micro-politics of talent programs. This means that we must look to how they contribute to a subtle transformation of students' understandings of what knowledge is, what is considered valuable knowledge in society, how it should be handled and how students come to understand their own role as knowing subjects in society.

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