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Performing a Choice-Narrative: A qualitative study of the patterns in STEM students' higher education choices

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Students' science choices have long attracted attention in both public and research. Recently there has been a call for qualitative studies to explore how choices create a sense of fit for individual students. Therefore, this paper aims to study how science students' choices of higher education are performed and to uncover the patterns of students' construction of their choice-narratives. The paper is based on a qualitative study among 38 Danish upper secondary school students. The theoretical framework is narrative psychology combined with post-structural thinking. The study shows that constructing a choice-narrative is complicated identity-work. First, the students felt encouraged to identify their interests, not only the ones related to the subject matter, but also various interests that were equally negotiated in relation to each other. Second, the choice-narratives were personalised; on the one side articulated as not too predictable, and on the other side appearing realistic and adjusted to the students' sense of self. Third, the choice-narratives were informed, validated and adjusted in the students' social network providing the students with a repertoire of viable pathways. The study demonstrates how cultural discourses about how a proper choice is made set the scene for the students' choices. The study raises some concerns for science education. Improving students' interests in science alone might not lead to increased admission as several interests equally intervene. To attract more students to science, we must consider how to actively engage them in crafting their own education, as a way to support them in making personal sense.

Keywords: *School/univ; Qualitative research; Science choice; Post-secondary choice*

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Introduction

Students' post-secondary choices have long attracted attention from politicians and stakeholders, with an interest in controlling the supply of students to certain areas (Brown, 2010). Students' STEM (science, technology, engineering, mathematics) choices are such an example. Public debate on the issue has been dominated by a concern of a future shortage of engineers and scientists (European-Commission, 2004; Royal Academy of Engineering, 2012). This concern has been echoed in a body of research studies that have aimed to find the reasons for 'the leaking pipeline': that is, why few students choose to continue science or engineering in higher education (HE) (Jenkins & Nelson, 2005; Schreiner & Sjøberg, 2007). This discourse has recently been questioned (Osborne & Dillon, 2008; Smith, & Gorard, 2011). Instead of repeating the political discourse, researchers have proposed finding new ways to study the considerations of students' science choices, against the stereotypical image of the 'potential science student', committed to becoming a scientist from an early age (Cleaves, 2005). With the population of students growing increasingly diverse, there has been a call to move towards qualitative studies to explore how choices create a 'sense of fit' for individual students (Bergerson, 2009; Pike & Dunne, 2011). This study addressed this request.

In a series of recent papers, I have together with colleagues studied how students make meaning of their choices from a longitudinal qualitative approach. We documented how the choice of HE paths is a continuous and dynamic process, in which students' choices can change dramatically within a short time. Rather than being one single decision, we showed how students continuously negotiate and re-construct their choices (Holmegaard, Madsen, & Ulriksen, 2014a, 2014b; Holmegaard, Ulriksen, & Madsen, 2014; Holmegaard, Ulriksen, & Madsen, 2015). The aim of this paper was to unpack this process and the steps students take on their way, and hence analyse the patterns that appear in this process of choosing what to continue studying after upper secondary school.[1]

Background

Research into students' choices of HE paths can be divided into three categories which approach students' choices from different theoretical perspectives. One approach can be labelled 'rational choice'. The underlying presumption here is that people making various kinds of decisions share a common set of cognitive skills that are reflected in similar decision habits (Hastie & Dawes, 2010). 'Rational choice' assumes that students are capable of making informed choices based on their expected gains, and that they choose what to study to maximise their capital (Jæger, 2007). An example of research which has been inspired by this theoretical approach is that of Eccles and Wigfield (2002) who developed a complex model of elements that affect students' decisions. The model was constructed with the intention of capturing students' expectations of success, their ability, beliefs and values, and how these factors influence their choices. However, in the work of Eccles and Wigfield, values were also linked to identities and not only rational decision-making processes.

A second approach called 'social inclusion' directs attention towards the increasing uptake of a student population with a reinforced social distribution into HE. Focus has been on the extent to which HE institutions actually *include* students from various social backgrounds (Shavit, Arum, & Gamoran, 2007) or rather produce a new *diversion* in the sense of an increased hierarchical differentiation of the tertiary system (Ball, Maguire, & Macrae, 2000; Bathmaker & Thomas, 2009; Reay, Davies, David, & Ball, 2001). This research has primarily been inspired by the work of Pierre Bourdieu (see e.g. 1986), and how students with non-traditional backgrounds struggle to understand the rules of governing practices within academia (Watson, Nind, Humphris, & Borthwick, 2009). A similar approach has been shared in studies with a focus on the production of gender in governing academic practices, in particular the minority of female students within science and engineering (Brickhouse, Lowery, & Schultz, 2000; Sinnes & Løken, 2012; Tonso, 2006).

Finally, a third approach to students' HE paths tends to perceive choices as expressions of students' interests: that is, 'interest-based choice'. For example, Schreiner and Sjøberg (2007) linked young people's science interests to modern identity and the societal demand to realise themselves (Schreiner, 2006; Schreiner & Sjøberg, 2007). Another area of research has focused on students' interests, identities and choices inspired by post-structuralist ideas. Here, focus has been on how students construct and *perform* their identities and handle aspirations while drawing on culturally accepted ways of making choices. Archer et al. (2010) argued how a focus on complex identity processes offers a view of 'the deep-seated, often trenchant, resistance that many interventions, designed to increase engagement and uptake of science among young people, have encountered' (p. 21).

As a result of the above literature review, I approached students' choices in this study with a framework which explores how students' identities act as a platform for students to perform their choices such that they create 'a sense of fit' for individual students (Bergerson, 2009; Pike & Dunne, 2011) and students' dynamic choice considerations (Cleaves, 2005). As such, I drew upon the post-structuralist inspired research that has been conducted in the third approach to students' HE paths. An appropriate framework for this task was the one suggested by Archer et al. (2010) that related students' choices to the dynamic performances of their identities.

Identities and Choices

In the previous section, I showed how the literature suggests approaching students' choices with an identity framework to explore how students make their choices meaningful. Therefore, this paper takes its theoretical point of departure from the field of narrative psychology influenced by post-structuralist theories. Here identities are perceived as fluent and unfixed because they are constructed and negotiated inter-subjectively in an ongoing fashion. Identities are something we *perform* (Butler, 1993; Davies & Harré, 1990). While identities are constructed, we do not just invent ourselves in a vacuum. We draw on ways of 'doing' identities that are embedded in culturally recognised practices and hence available discourses (Hasse, 2008; Holland, Lachicotte,

Skinner, & Cain, 1998). Our identities are constructed through power-laden processes that are mediated through both institutional configurations and our everyday practices (Foucault, 1997; Rose, 1999). As previously mentioned, students' post-secondary choices are highly politicised and also publicly debated—such choices are an interesting case of a phase in which young people not only need to define who they are in another cultural context than upper secondary school (Ecclestone, 2007), but at the same time are required to make themselves recognisable by displaying how 'a proper choice' is performed. The exact focus of this paper was to explore how young people at the end of upper secondary school perform their choices of HE. What do they highlight as important for their choice of education? Are they concerned with career opportunities? Do they perceive their interests to be most important or their expectation of the campus culture? In other words what are the discourses that young people draw upon when performing a choice-narrative? And how do they relate themselves to these proscriptions of making a proper and reasonable choice? To study these questions, narrative psychology was used as a framework.

Narrative psychology highlights how identities are culturally shaped (Smith & Sparkes, 2008) with emphasis on how individuals in their everyday life comprehend and make meaning of their lives as a *consistent* and *progressive* story, and each other and themselves as possessing a *coherent* self (Polkinghorne, 1988). This sets the scene for how flexibly and fluently the students' narratives can be performed (Bruner, 1990). Also important, students bring with them different resources and personal histories that may set the scene for their choices, not only in terms of their social background, gender or ethnicity, but also in their involvement with different people, engagement in different practices and lives in different circumstances (Crossley, 2000; Roth & Tobin, 2007). The students who are about to choose what to study therefore on the one hand are facing a turning point where they have the opportunity to reconstruct their narratives and position themselves differently. On the other hand they are required to appear consistent with their social relations, who will find it hard to recognise a drastic turning point overnight, for example, aspiring to be a hairdresser one day to a physicist on another (Holmegaard et al., 2015). Also they cannot make their choice in a non-cultural context and rid themselves of the cultural meanings of, for instance, gender. The concept of 'meaning-making' is central to narrative psychology, because the way we make meaning of the world reveals how we ourselves relate to it. Which incidents and experiences are highlighted and which are erased from our narratives have to do with how we construct the world and the way we position ourselves in it (Sarbin, 1986). As such, this paper sought to explore students' 'meaning-making', through narrative psychology, when choosing HE paths and analysing the construction and performance of what to choose to study (i.e. choice-narratives).

Aim

The aim of this study was to unpack the process of students' construction of their choices. How do students *perform* their post-secondary choices? Which discourses do they draw upon and how do they make individual sense of them? And how do

they understand themselves in relation to proscriptions of making a proper and reasonable choice?

The paper sought to understand the patterns in students' construction of their HE choice-narratives by drawing upon narrative psychology influenced by post-structuralist theories. The data consisted of narrative interviews with 38 students during the end of upper secondary school. The students were selected to represent various science aspirations and grades, while gender and social background were also taken into account. The data were approached by a narrative analysis combined with a thematic analysis. The key themes identified in the analysis structured the results section while the sub-themes guided each of the four sections. The final section in the results combined the themes in one student case to present the complexity and a thick description of the data material. Finally, the results and their implications were discussed by contrasting the findings with other studies.

Method

The Scandinavian Context

The Danish education system is an interesting case when studying students' HE choices in two respects: all study programmes are free of fees and all students receive government funding every month (about 800 euros). Access to certain HE study programmes however is regulated by requirements that students take certain subjects at specific levels (in particular within science and mathematics) during upper secondary school and obtain a particular Grade Point Average. In Denmark, 60% of the student population continues into HE (Ministry of Higher Education and Science, 2012).

However, students' choices have become a highly politicised concern in Scandinavia. Public discourses are dominated by many competing discourses about how proper choices should be performed. Danish students are encouraged to consider the consequences of their future studies and thereby choose a study path which grants access to future jobs that are profitable for society in general, like in science and engineering (Confedaration of Danish Industry, 2010). During primary school, Danish students are supported in making a *personalised* choice combined with their *abilities* and *interest* through career counselling (The Ministry of Children and Education, 2009). Furthermore, they are encouraged to continue studying after upper secondary school without spending too much time on gap years. As a result Grade Point Averages are raised if students apply for admission within two years after upper secondary school graduation (The Ministry of Children and Education, 2009). These discourses of how a proper choice of study is made set the scene for the students in this study.

Selection of Schools and Students

Six upper secondary school science classes were selected with students in their final year. Two schools were located in an urban area, two in a suburban area and two in

provincial towns. The schools were chosen to obtain variations in the student population:

- One school had a particularly multi-ethnic student population.
- One school recruited students from socially privileged families.
- One school recruited students from both socially privileged areas and areas of social housing.
- One school recruited students from both towns and rural areas.
- One school recruited students from a large city area.
- One school recruited students from a rural area with some students travelling up to one hour to get to school.

A questionnaire was handed out to the 6 classes (134 students). The questionnaire consisted of 31 questions spread over 5 themes: background (gender, social, ethnic origin, etc.), interests and courses in upper secondary school, upper secondary school experiences and grades, relation to and interest in STEM, and plans for and thoughts of the future. The questionnaire consisted of closed questions on a five-point Likert scale and four open questions. The questionnaire was used as a point of departure for selecting students to participate in the interviews. The students were selected using the criteria depicted in Table 1. As a result the respondents were categorised into five types of science aspirations:

(1) Some were not sure whether to continue studying STEM, but had a high level of interest in STEM.
(2) Some considered studying STEM and had a high level of interest.
(3) Some considered studying STEM without expressing a particular interest.
(4) Some did not want to study STEM, but had a high level of interest.
(5) Some did not consider choosing STEM and had no particular interest.

All groups except group 5 were identified as aspiring to STEM. Interview participants were selected from groups 1 to 3. A few interview participants were also selected from group 4 to capture their reflections on not choosing STEM even though they were interested. The students' science aspiration was the primary criterion for selection. Also, students' self-reported grades were used as a criterion to select high-, medium- and low-performing students (Table 1), while the students' gender and social background were also taken into account (see the selection of participants in Table 2). However, the interview participants were selected to obtain data as *diverse* as possible, as the criteria meant to reflect upper secondary school students' *various* ways of constructing and performing a choice-narrative (Flyvbjerg, 2011). As such, the point was not to select students to ensure representative results in a traditional manner but to study how various students make meaning of and *perform* their post-secondary school choices. The empirical set-up was approved by The Danish Data Protection Agency.

Table 1. Items from the questionnaire used to define the selection criteria of students' aspirations towards higher education STEM

Items in questionnaire	Selection criteria
What area of study do you consider pursuing?	The population was divided into students with STEM and non-STEM aspirations
If you do not know what area to choose, then please write the field of study if you have an idea about that Write the name of the institution if you know it (if you don't know it, please write the city in which it is located) If you consider choosing more than one area, write the three studies you consider the most. Please write them in order of priority If you are not sure about the name of the study programme, please ask one of the researchers visiting your class	
How interested are you in the following? (Five-point Likert scale)	The respondents were categorised into five groups:
Biology Mathematics Physics Chemistry Technology	High-level interest in STEM Interest in STEM Either/or No particular interest in STEM No interest in STEM

Conducting Narrative Interviews

Based on the information received from the questionnaire, two students from each class were invited to participate in a focus group interview. Each of these students was encouraged to bring an additional friend from the class, to make the setting as safe as possible and the students to feel comfortable about sharing their views in a group. Not all students brought a friend, but, in total, 19 students were interviewed in groups. Three students from each class were selected to participate in narrative interviews. In one class, an extra student was interviewed because only two students showed up to the focus group. Nineteen students were interviewed individually for a total of 38 students interviewed. As all students replied to the questionnaire, background information was obtained for both selected participants as well as their friends. Half of the 38 students were girls and 18 of the students came from non-academic backgrounds (Table 2).

Both the focus groups and the individual interviews were conducted using a semi-structured interview guide (Kvale, 1996) and carried out from a narrative interview approach. The interviews concentrated on the following two pivotal themes: Upper secondary school experiences in general and with science in particular and the students' considerations about their future. Under each theme sub-questions were

Table 2. The students interviewed in upper secondary school

Pseudonym	Social background	Sex	STEM aspiration[a]	Performance in STEM	Type of interview
Coya	Non-academic	F	2	Low	Individual
Cecilie	Non-academic	F	1	High	Individual
Cathrine	Academic	F	4	High	Group
Christian	Non-academic	M	2	Medium	Group
Casper	Non-academic	M	3	Low	Group
Christine	Academic	F	2	Medium	Individual
Barbara	Academic	F	1	High	Individual
Benjamin	Academic	M	1	High	Group
Bastian	Academic	M	2	High	Individual
Belal	Non-academic	M	3	Medium	Individual
Basma	Non-academic	F	5	Low	Group
Birgitte	Non-academic	F	1	Medium	Group
Erika	Non-academic	F	2	High	Group
Emily	Academic	F	2	Medium	Group
Emma	Academic	F	2	High	Individual
Ebbe	Non-academic	M	2	Medium	Individual
Emil	Non-academic	M	2	Medium	Individual
Elisabeth	Non-academic	F	1	High	Individual
Daniel	Non-academic	M	3	Medium	Individual
Dorte	Non-academic	F	1	Medium	Individual
Deniz	Non-academic	M	2	High	Group
David	Non-academic	M	2	Medium	Group
Dan	Academic	M	5	Medium	Group
Djemal	Non-academic	M	2	Medium	Individual
Frida	Non-academic	F	2	Medium	Individual
Fie	Academic	F	1	High	Individual
Frederikke	Academic	F	1	High	Individual
Freja	Academic	F	5	Medium	Group
Filip	Academic	M	2	High	Group
Frederik	Academic	M	2	High	Group
Amalie	Academic	F	2	High	Individual
Allan	Academic	M	4	High	Individual
Alberte	Academic	F	4	High	Group
Asger	Academic	M	4	High	Group
Adrian	Academic	M	2	Medium	Group
Aksel	Academic	M	5	High	Group
Louise	Non-academic	F	4	High	Individual
Besim	Non-academic	M	5	Low	Group

[a]1 – Some were not sure whether to continue studying STEM, but had a high level of interest in STEM. 2 – Some considered studying STEM and had a high level of interest. 3 – Some considered studying STEM without expressing a particular interest. 4 – Some did not want to study STEM, but had a high level of interest. 5 – Some did not consider choosing STEM and had no particular interest.

listed. Some were introduced during the interviews by the interviewer (e.g. 'please describe your experiences with science during upper secondary school') while others were addressed by the students themselves in the interview—for example, job opportunities as central for the students' choice considerations. All interviews were transcribed verbatim, and all information that could be traced back to the particular interview participant was anonymised including the student's name.

In a narrative interview, the focus was allowing the students to elaborate and share their narratives. The interviewer's interest was in investigating the students' meaning-making with follow-up questions in relation to the students' narrative. Hence the focus was on encouraging students to share their descriptions, whilst paying attention to how the students were prompted with questions, as the interviewer is perceived as a co-constructor of the interview (Andrews, Squire, & Tamboukou, 2008).

Analytic Approach

The data were analysed by applying a narrative analysis (Squire, 2013) and the six-step thematic analytical approach (Braun & Clarke, 2006). In narrative analysis, the researcher is interested in how the participants use culture to represent and interpret others' lives and their own life. The researcher strives to identify the discourses the participants draw upon to organise a recognisable script, in this case a choice-narrative (Andrews, Squire, & Tamboukou, 2013; Smith & Sparkes, 2008). The narrative analysis was approached with the analytic question 'Identify the patterns in the students' construction of their HE choice-narrative' as a tool to decipher the discourses the students drew upon when constructing choice-narratives in the interview. The key themes that were produced by applying the analytic question to the data in the narrative analysis was: Identifying and negotiating various interests, personalising the choice-narrative, trying the narrative out in social relations and challenging the narrative. The key themes guided the presentation of the results in the next section.

From the key themes found in the narrative analysis, an inductive thematic analysis took place. The first step; transcribing the data, was already carried out as part of the narrative analysis. The second step involved the construction of sub-themes appearing in the interviews under each of the four key themes, for example, under the key theme 'Identifying and negotiating various interests' the sub-themes academic interest, career interest and other interests were constructed. The third step involved a coding of the entire data set so that relevant quotes from each interview were gathered under each sub-theme. The fourth step involved situating the patterns within the sub-themes in a more comprehensive context of meaning. This part of the process was about recontextualising the meaning within the students' narratives by applying the theoretical framework to explain them. The fifth step was a review of the themes to check if themes and theoretical interpretations worked in relation with the entire data set. Finally the last step was where the final analysis was constructed. Here the aim was both to move across the data set and also to look deeper into some specific narratives. The quotes from students' narratives presented in this paper were selected

as illustrations of the various patterns found in the analysis of the sub-themes (for an extensive presentation of the analytic approach see Holmegaard et al., 2014b).

All student names used in this paper are pseudonyms. The students' relation to and considerations of whether or not to study science were not the primary focus of this paper, but served as background information (see Holmegaard et al., 2014b for a paper with such a focus). However, the discussion will return to how choosing STEM relates to the identified patterns.

Results: Performing a Choice-Narrative

Figure 1 sums up the patterns in the process of students' construction and negotiations of their HE choices. These patterns guide the presentation of the results.

Identifying and Negotiating Various Interests

This first section demonstrates how the identification of interests appeared as an important step in the students' narratives about their HE choices. The analysis

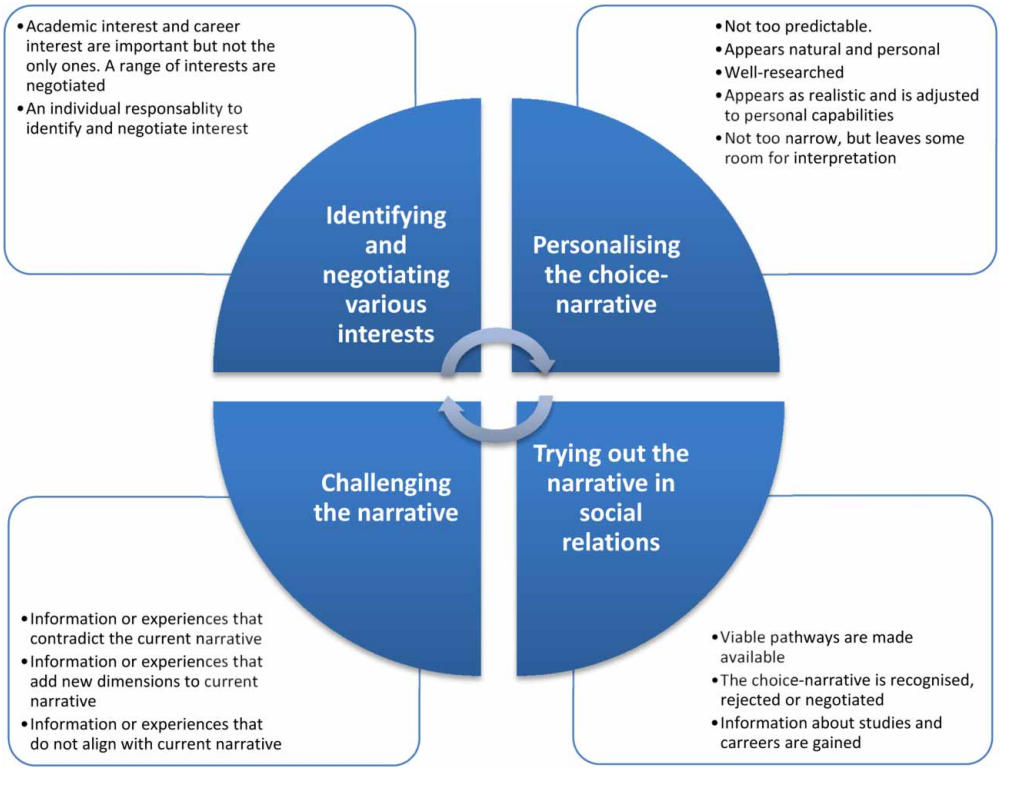

Figure 1. Performing a choice-narrative: Key patterns and sub-themes in the construction and negotiations of upper secondary school students' choice-narratives. (The patterns are the results of an analysis and as such they do not reflect a chronology.)

showed how the students articulated different interests in their narratives, and how these equally contributed to their construction of a choice.

In general, the interviewed students at the end of upper secondary school struggled to find a clear future pathway to suit their perceptions of themselves and who they wished to become. Most of the students described the process of choosing what to study using words such as 'difficult' and 'frustrating', yet it was furthermore articulated as a space in which they were to decide for the first time what they wanted to do with their lives. The experience of frustration was often linked to the conflict of having to decide between different kinds of pathways and the students' narratives revealed how they struggled to resolve various interests. To some students this was a question of various academic interests, as, for example, Daniel who explained how he really was interested in both mathematics and history:

> Both mathematics and history have kind of taken a hold in me. And I am torn, because mathematics and history are two quite different subjects which are quite difficult to combine in one study programme. So I am kind of stuck in terms of what to choose to study.

In his narrative, Daniel constructed different potential solutions in terms of handling this dilemma of having diverse interests. He considered choosing a study programme either related to mathematics *or* to history, which included the urge to choose one interest over the other. But he also struggled to make a meaningful combination of the two. He considered economics as a possible way to go as he found aspects of both history and mathematics embedded within it.

But academic interests were far from the only interests that were reflected in and competed in the students' narratives. Another important interest was attractive career perspectives, and the task of choosing something one would find interesting for the rest of one's life, for instance, as expressed by Allan:

> It is not enough to find a study programme that is really interesting if I end up becoming something I can't see myself doing for the rest of my life.

The students strived to identify which future pathway seemed most attractive, and here conflicting interests also appeared. Some students expressed an interest in a study programme but were unsure if it would result in a future job. An example was Cecilie who considered studying to become a dentist, but was unsure of how she would feel being required to put her fingers into 'the mouths of strangers' each day. Other students struggled with seeing a job perspective at all. This in particular was the case for students considering research-based study programmes like science. Across the students' narratives their interests were negotiated in terms of job perspectives, like Barbara, for example:

> I gave up on the idea of becoming an architect. You have to be really, really good to get a job. And it depends on—well now we have these financial crises and stuff. They are kind of in the front row as the market for selling and buying houses is stuck—and then a lot of architects are getting fired. They might gain a job again when the crisis is over, but they can't really be sure. I do not find it appealing to think about. Rather I prefer to be on safe ground.

Career perspectives were highlighted by the students as important to consider. First, they were concerned about getting any job at all, but second they had various requirements as to how the future job must be: interesting, possible to combine with a future family, working in groups with other colleagues rather than isolated by oneself, offered varied tasks to engage in, meaningful, well-paid, secure, etc. Some students struggled to understand the job market and combine their perceptions of it with a study programme: like Anna who wanted to become a medical doctor but thought studying medicine would be 'hopelessly boring'. She also considered studying literature, but expected teaching to be the primary job perspective, which she did not find interesting at all. Other students had a clear idea of what kind of job they expected to get.

These choice considerations were influenced by fragments of information from various sources such as the internet, members of their families who had experience from particular jobs, the media and so on. But more importantly, the students combined these fragments of information in their own ways. An example was Allan, who chose not to study engineering even though he expressed that engineering was what he found most interesting in upper secondary school:

> I cannot picture myself working as an engineer. It would be hopelessly boring to be in your office by yourself with your calculator and getting numbers out. I don't find it interesting at all, and I cannot see that you make any difference doing that.

Allan's way of making meaning of engineering was primarily based on information from the engineering union's homepage. This might not correspond with the engineering union's intentions. However, young people relate and ascribe meaning to this information from their own perspective and furthermore they base their choices on it.

Although academic interests and interest in an attractive career were the major themes the students related their narratives to, a range of other interests were equally negotiated in the students' narratives: an appealing study culture, an attractive campus, a high-profile university, studying in an attractive city, staying close to family and friends, applying at the same university as one's partner, a study that is prestigious and so on. The point here is that these interests competed equally in the students' narratives, as expressed by interviewee Coya:

> It is mandatory for me to stay in Copenhagen … .Also the study culture needs to be attractive and I don't want a place that is old and boring—then you don't feel like studying. I looked at some pictures, to find a place with a nice appearance. But most important are the other students and teachers.

None of the interviewed students considered a choice of study where they did not articulate an interest in the subject matter. The analysis showed that in undertaking a proper choice, academic interest was crucial in one's narrative. Nevertheless the students often described more than one academic interest, which also appeared to be interwoven and negotiated in relation to many other kinds of interests that were equally considered in the students' narratives. This quote by participant Fie sums up the results quite well:

> Interests are of course obvious. I don't want to choose something that I do not feel for. But also the desire of what kind of life one wants to live. How are wages when getting out on the other side? What is the probability of getting a job and such things? Society also has a role to play. On the one hand: what kind of society do you exit into? It is stupid to educate oneself in a profession that is dying out. But also: what kind of possibilities are there? Are you for example going to be employed in the public or private sector?

Most of the students explained how a good choice was the one based on what you found to be *personally* interesting, why it was considered to be an individual responsibility. A proper choice was thus made alone. Struggling with balancing the complexity of interests made choosing what to study difficult. Gaining information about getting a job in the public or private sector and the prospects of the job market were quite challenging, in particular for an upper secondary school student. One consequence was that students made their own meaning of the complexity—a meaning that was not always in correspondence with the public discourse. Another consequence of the high complexity in the upper secondary school students' balance of interests was the difficulty of managing them in a way that allowed for a clear choice. Rather, the process was dominated by ongoing negations.

The results of this section showed how a proper choice was articulated as a match for different kinds of interest, and therefore that academic interest was not the only interest that students based their choice-narrative on. The students found that identifying and penetrating their interests were necessary for making a perfect choice. However, the results showed that it was not easy to combine and integrate all interests into a one choice-narrative, and hence why the interests often competed.

Personalising the Choice-narrative

Another pattern in the students' narratives of making a proper choice was the construction of *personal* narratives, in which their choice was performed as appearing suitably aligned with their perceptions of themselves (Figure 1). First, the choice had to appear as not too predictable. However, it had to appear appropriate and natural to the person choosing and also emerge as well-researched—as such the choice needed to fit the person choosing it in various ways. Second, it needed to appear as realistic and adjusted to the students' capabilities and profiles acquired from upper secondary school. Finally, the choice-narrative must not be too narrow, as there was a risk in being constrained within that particular choice-narrative. This was not always an easy task.

An example was Frederikke who considered opting for Medicine. She was informed about the study programme by her sister who studies medicine, and the profession from her father who is a medical doctor, and she carefully described what kind of job the study of medicine would lead her to. But even though she strived to be able to study medicine, she struggled with relating herself to it:

> It just seems so cliché to opt for medicine, so 'by the book'. It's just because it's more special to study something a bit different.

Frederikke struggled with positioning herself as one who could make an independent choice while at the same time choosing the same trajectory as her family. The same problem was shared by a group of students who in various ways strived to relate themselves to a choice that was too predictable. Some of the students solved this by considering something else. Other students tried to negotiate and include other aspects of their narrative that would make it different from that of their parents, like Amalie who considered spending some semesters abroad to make her study of biomedicine different from her parents' biochemistry studies.

Another example of personalising the choice was Bastian who through his high achievement in mathematics had participated in mathematics competitions and was a member of the mathematics students' union. But his network with both students and teachers at the local university made mathematics too predictable a choice for him, and hence he considered studying computer science instead. Through the students' narratives a discourse appeared of making a well-researched choice, that is, why the predicable and expected choices were negotiated to appear as well-reasoned and reflected. The most likely choice was not perceived as proper individualised work.

A final tendency revealed in the data showed how personalising and relating oneself to a choice operated in several dimensions at the same time, and went beyond students striving to show how they belonged to a certain study programme. An example was Louise who explained how part of her considerations for opting for business had to do with her imagining herself fitting well with the image of a women in business: wearing a business suit, leading meetings and living a city life in a nice apartment. She found this idea of how she perceived herself attractive, but the construction and the personalisation of the choice-narrative were required to be realistic. Aspirations of what to wear and how to look in one's choice-narrative might risk being considered a poor reasoned choice. At the end of upper secondary school HE was no longer a fluffy dream somewhere in the future. Emma, for example, explained that the character of the choice had changed drastically in upper secondary school:

> When you were a kid you were allowed to reply with something like 'policeman', 'fire fighter', 'vet', 'physician'—all those dreams you had in your mind. Now you kind of realise that you do not have the grades to gain admission to some study programmes, and you have to decide which one to choose. What do I want, and what am I capable of? And then try to get the pieces to fit together. I think it is kind of difficult.

In this course of constructing a narrative about how a choice is suitable to one's identity, there was a risk in sharing the narrative and hence constraining oneself in a narrow position. This was the case for Aksel who explained that his reply to family members who asked him about what he wanted to do after finishing upper secondary school was that 'he didn't know'. He did this to avoid family and friends and retain the choice-narrative already constructed, but also, he explained, to avoid 'getting stuck on a particular idea'. Sharing choice-narratives implies that the student was ready to be positioned within that particular narrative.

Trying out the Narrative in Social Relations

A third pattern in the students' constructions of their choice-narrative was how the choice was not only a personal and individual decision, but an ongoing negotiation with the students' social relations. Even though most of the students ascribed meaning to the choice as a solely individual task (that only they themselves could make), the data were filled with descriptions of how it was negotiated and informed by their societal networks. First, information about both study programmes and career tracks were collected in the students' network; second, the narratives were validated and adjusted in the network and third the network provided the students with a repertoire of viable pathways.

An example of how one's network provided information and a repertoire of viable pathways was mentioned in the previous section in the example of Frederikke, who, through her dad and sister, gained explicit access to information about what studying medicine and working as a medical doctor would be like. Another example was Walid, who expressed an interest in astronomy. He explained how he faced a dilemma: he could not see any career paths following from the study of astronomy except for conducting research, which he was not sure he was capable of doing. His family and parents found engineering to be related to high status, which Walid explained was due to their Middle Eastern background. As a result, Walid decided to study engineering and design, as it seemed too hard for him to construct a narrative in astronomy that he himself could see the outcome of, and that his parents would also have recognised.

An example of how narratives were validated and adjusted based on how the students' social network received the choice-narrative was Emil, who explained how everybody, including his parents, advised him to base his choice on interest. However, when presenting to them the idea of studying law, they did not seem to be so thrilled, and their reply was that 'lawyers are just swindlers, the kind of people who cheat'. As a result he reconsidered his choice of study, opting towards biochemistry instead, which in particular his mother who worked as a laboratory technician approved. He explained how there were some similarities between biochemistry and law, as biochemistry is about the laws in nature. In Emil's case, his parents' questioning of his choice made him consider something else. Other examples showed how the students negotiated their choice of study to fit with the expectations coming from their social networks.

Social background turned out to be significant in the students' choices in terms of access to, awareness and information about study programmes as well as subsequent career paths. Students from well-educated families seemed to have more resources to draw on. But in terms of how the network met and recognised the students' narratives, it seemed as though some students, such as Walid, who came from a less-educated family, paid more attention to the prestige and status that a certain kind of study programme would lead to, rather than to the character of the study programme in itself. A similar point was made by Erika who explained how she was considering doing a Ph.D. in applied chemistry:

> It's kind of like if I tell my parents: 'I want this', they say 'ok' because they know nothing about science and what I am doing … .They just think that I should choose whatever I want … .But my family is kind of snobbish. If I say, 'I would like to become an engineer and maybe gain a PhD', then it is fine. That's the thing about the PhD, that I will get some kind of status, a title.

On the contrary, students from families with well-educated backgrounds explained how their parents in particular expected them to study certain HE study programmes, such as Fie who explained that her dad questioned her about studying public health, as many of the courses are similar to medicine (which he found to be a better way to go). She stated:

> Such things really mean something. What are the norms in society in general and in the settings you live in, in particular? And of course you need to complete [higher] education: at least in the environment in which I live.

Challenging the Narrative

Finally the choice-narrative was renegotiated in an ongoing basis as awareness of new information and experiences grew. This could either be information or experiences which contradicted the current narratives (e.g. when they met somebody or gained some information that disconfirmed their choice-narrative), or added new dimensions to it. One example was Celia, who considered studying as a candidate in journalism: by searching on the internet she found out how only a limited number of students each year were admitted to the study. As a result she negotiated her narrative to strive to study Danish instead.

In the students' choice-narratives, the information they drew upon to revise the narratives was not always accurate. In the data, there were several examples of students who had based their choices on what could be perceived as uncertain information. An example was Celia, mentioned above. There were in fact no admission restrictions in studying journalism at the university she was interested in. Thus, young people relate and ascribe meaning to information from their own perspectives.

Moreover, the choice-narrative can be revised as the students' lives, and hence their identities, change: this leads to the construction of their choices changing too. One example from the study was Christine who in upper secondary school considered studying engineering. During summer she moved in together with her boyfriend. As attending the engineering university meant four hours of transportation a day, and as a school for teacher training was nearby, she found it more convenient to balance such a choice with her private life.

Gaining new information or experiences either add to the choice-narratives with new facets that lead to negotiations and revisions. Or new information or experience might be so dramatic that alignment with the narrative is impossible: not only requiring adjustment, but an entirely new narrative. Thus, the steps in the process of choosing what to study (see Figure 1) were a continuous process of adjusting, negotiating and reconstructing choice-narratives.

Performing a Choice-narrative, the Case of Fie

Figure 1 illustrates the patterns in performing a choice-narrative. However, the patterns were neither chronological nor static. Rather they were continuously negotiated and overlapping. To unfold the complexity of the process, one student narrative will be presented to ensure a thick presentation of the results. Fie was quoted earlier in this paper explaining which interests she found interacting with her decision about what to study. She explained how various interests influenced her decision such as interest in the content, in the job market, the wage and the kind of life the choice of study would give her access to. She explained how she talks a lot about future study possibilities with her friends both from school and in the handball club. Her parents have advised her to base her choice on what interests her most, and she explained how they do not have any demands on her choice of study. However she explained:

> They say most importantly are to do something you are interested in because you have to do it for the rest of your life. The thing is that 'the rest of my life' is a perspective I really can't relate to (…) When I mentioned public health as an opportunity, my dad found it foolish as I then just as well could study medicine. It is the same study but medicine gives you the opportunity of becoming a doctor. Of course it matters to me. What are the norms in society and the groups you are in?

Fie explained how her father is a medical doctor, and that she found his research on diabetes really interesting. Also she explained how her mother who is a health worker might have supported her interest in peoples' health. But she explained how she wants to study something different from her parents: 'It's interesting, but I can't imagine using my entire life on it. You don't study medicine for fun. It's far too hard and time-consuming'.

Fie planned to take a gap year after finishing upper secondary school to travel and work as a teacher assistant at the local primary school. She had several ideas of what to continue studying. Besides talking about public health as an opportunity for a future study, she also talked about sports science which she thought sounded really interesting but probably would lead towards a position as sports teacher which she found to be unattractive. Political science was also highlighted but it might be a bit too career oriented. She also considered something more creative such as a jewel designer or architect. But even though she was attracted to the creativity, she expected such studies to lead to an insecure job market:

> I don't know how to become a designer at all. It's like … I also would like to become a tv-reporter. To travel to all kind of places in the world. But again, it's not realistic. It's must be really funny, but there is one out of three million adult Danes who get a position like that.

In Fie's narrative about what to choose to study after upper secondary school the illustrated process is demonstrated in Figure 1. First, she balanced various and also conflicting interests as given in the quote in Section "Identifying and Negotiating Various Interests". These interests were also what troubled her, when she explained how she on the one hand was interested in working with public heath, but probably not

enough to study it. She was attracted to design and architecture, but probably not enough to risk entering an unsecure labour market. Sports science would be interesting, but she did not want to become a teacher, and political science might be hard to balance with a family life. These negotiations of interests were ongoing, and she explained how she tried them out and negotiated her choice-narrative at home and when together with friends. Through her social network, she also heard about study programmes she was not aware existed: 'you kind of get another insight than when going to the internet or to the counselor and stuff'. Still she wanted to make her own choice and could not imagine her own life in a career like her parents. All these elements of negotiation interests, personalising the choice, negotiating it with social relations and gaining new information were present in the case of Fie taking place in her narrative at the same time. She had constructed parallel choice-narratives that co-existed when she shared her narrative about the future. Namely, when explaining about her desire for design, she had constructed one narrative about how that related to her, how it fit with her interests, what kind of life it would lead her to, etc.

In that sense Fie's choice was not yet settled, and she was one of the few students with such an open choice where several choice-narratives unfolded in the interview. However, what was characteristic for Fie and the rest of the interview participants was that the performance of a choice-narrative involved demanding identity negotiations of: Who I am, what do my social relations expect from me, what do I want to do, what am I interested in, what kind of life do I want to live and how can I combine all these components in a choice-narrative?

Discussion and Conclusion

This study presented an analysis of STEM students' choices of HE. The aim was to explore how students *perform* their post-secondary choices, what discourses they draw upon and how they made individual sense of them. The results showed how performing a choice-narrative was a complex process of negotiating interest, personalising the choice-narrative, trying it out and adjusting it based on how it is recognised by one's social relations and finally renegotiating and revising the narrative if new experiences or information challenge the current choice-narrative. The results and their implications are discussed below.

Performing a Choice-narrative

In constructing a choice-narrative students were required to work on their identities to find a balance between their sense of self, their social relations' sense of who they are and their desire of who to become. As such the results suggest that making a choice is far from being a matter of student preferences and the sole responsibility of the students' engagement in gaining information, as suggested by Yorke and Longden (2008). The exact discourse of making a proper choice is a matter of investment of engagement, but also reproduced among the students themselves in this study, and they conceive of post-secondary choices to be a matter of own personal effort. In

contrast, this study, using the framework of narrative psychology and post-structuralist thinking, offers another point of view. It shows how choosing what to study is embedded within various social and cultural processes of how a proper choice should be performed. This is the centre of this discussion.

Moving beyond Academic Interest

In constructing a choice-narrative a strong discourse was how interest in academic content was mandatory for making a proper choice. However, the study showed that the students in constructing their choice made a match of various interests that equally competed in their narrative, for example interest in the study culture, studying at a high-profile university, studying in an attractive city, staying close to family and friends, gaining an attractive job, getting a work–life balance, etc.

This finding extends our existing knowledge in a field in which academic interests have been perceived as significant for students' choices (Mikkonen, Heikkilä, Ruohoniemi, & Lindblom-Ylänne, 2009). In particular, there has been a tendency to perceive interests in and attitudes to science as a key predictor of students' choices of whether or not to pursue a future in science (Osborne, Simon, & Collins, 2003; Schreiner, 2006). This study did not disconfirm that students' interests in science were crucial for their choices of HE paths. Rather, the results showed how science interest was far from the *only* aspiration students based their choice-narratives on. Instead, a combination of different interests were adjusted and negotiated in relation to each other.

The results correspond with recent research from the University of Oslo, who found that the support of academic interests were one of several that interacted with students' science choices. Also self-realization, personal beliefs, and strategic utility reasons interacted with their choices (Bøe, 2012). Therefore, improving students' interests in science alone may not lead to an increase in admissions to HE science programmes. The results of this study highlighted that it was important for future studies to address the complexity and the interaction of interests as a whole rather than solely aiming at identifying students' science interests as a predictor of HE choices. This section showed how the identification, balancing and negotiation of sometimes *conflicting and diverse interests* seemed to be important steps in students' choices of what to engage in after upper secondary school.

Finally, the results showed how the students in constructing their choice-narrative pointed towards an attractive career as crucial for their sense of the sustainability of the choice. This is interesting in relation to science education. HE science study programmes appear at first glance as containing a well-defined focus that leads students to a clear career path (Hooley, Hutchinson, & Neary, 2012) with no fear of unemployment (Basle, Dubois, & Dubois, 2013). Therefore, students' job possibilities and transition to work life have been of little interest in science education. But at second glance, it turns out that upper secondary school students find it hard to see what kind of jobs a study in science eventually leads to (Holmegaard et al., 2014b).

However, it is not enough to provide the students with a wide range of career paths. More importantly, these career paths must be clearly related to science study programmes, so it is not up to the students themselves to imagine a future in science.

Personalising the Choice

The results showed how the students carefully articulated not only their interests, but also how they worked on relating their choices to themselves in a way that was both culturally and socially accepted. The choice-narrative had to appear as not too predictable, as natural and suitable to the person choosing, realistic and adjusted to personal capabilities and not too narrow to leave some room for interpretation. The students internalised the discourses of what it takes to make a well-reasoned choice and they recognised them as individual necessities rather than external societal requirements. The results showed how the students found a proper choice, to be one they personally constructed without interference from others. This had some consequences for the students. One was that the students struggled themselves to make sense of the sometimes complex information they gained. As a consequence some students ended up by basing their narratives on uncertain information. Another was that it turned out to be hard for young people to decipher the complexity of the educational system and the labour marked by themselves. Counsellors are one way of supporting students in their choice-making process. Another is a more general awareness on the production of discourses of choices as an inner hidden secret.

The work on individualising social and cultural expectations was in line with what Michel Foucault pointed to with his notion of governmentality (1997). As such, the internalisation and personalisation of the choice can be perceived as a broader tendency within the society as a whole, where each individual is expected to 'engineer themselves' and to take on an increasingly greater role in the crafting of their own future (Rose, 1998). This is particularly interesting concerning students' science choices, as recent research shows how students defer from choosing science as they find it to be a poor platform for developing and realising themselves and their science interests (Holmegaard et al., 2014b). As a consequence students might find science to be interesting, but refrain from choosing a science-related HE study programme because they do not find it to be an attractive point of departure to develop themselves. To support students in personalising science to fit into their choice-narratives, upper secondary and HE science educators are urged to present science in a way that invites students to take active part in crafting their own education. This includes considering how to widen the participation in science: that is, making room for different ways of learning and relating oneself to science.

The Influence of Social Relations

Social background turned out to be significant in the students' choice-narratives. First, information about study programmes was collected in the students' network; second, the narratives were recognised, rejected and adjusted in the network and third the

network provided the students with a repertoire of viable pathways. The analysis showed how the educational resources in the students' families interacted with how they performed their narrative. Students from well-educated families articulated how they found it mandatory to continue into HE. In their narratives there were several examples of how the social network provided them with insider information about studies and career path. However, their narratives also revealed how their parents implicitly expected of them to choose certain prominent HE programmes. On the contrary, students from families with less-educated families did not feel obliged to choose a HE study programme. They articulated the importance of choosing a study leading to a prestigious and high status career rather than a prominent study programme.

The results were interesting in at least three respects. One was related to a previous point, namely that the choice was experienced as a personal task. However, it is clear that social background offers various resources for the students to draw upon both in terms of information but indeed also in terms of expectations guiding the narratives. Second, it seems that the career perspective was more important for students with less-educated families. This highlighted another point made earlier in the discussion, namely that HE must consider how to make various career paths available to the students. Third, the results were interesting in a Scandinavian and in particular a Danish context where choice of HE was not dependent on economic constraints (it is free of fees and students are fully supported with monthly governmental grants). As mentioned in the introduction, studies in particular within the UK have found how the increased inclusion of students from less-educated backgrounds produces a new *diversion* in the sense of an increased hierarchical differentiation of the tertiary system. In a Danish context, Thomsen from a sociological position reached a similar conclusion (2008).

This study contributes to the discussion by showing how the restrictive practices interact with students' choice-narratives. Performing a proper choice must be balanced between negotiating, adjusting and transforming individual interests to what is socially and culturally perceived to be a sensible career path. The Scandinavian model does not solve the issues of social mobility and the barriers for the full realisation of the mass university. Instead of being controlled by regulative economic practices (Pennell & West, 2005), this study confirmed how HE choices in a Scandinavian context are regulated by social structures that are internalised and performed by the individual.

Disclosure Statement

No potential conflict of interest was reported by the author.

Note

1. This paper presented the results of an analysis based on data also reported elsewhere (Holmegaard et al., 2014; Holmegaard et al., 2014a, 2014b). However, the aim of this paper differs substantially from previous publications.

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