Gender in science & technology : a collection of theses from the Physics Department at Lund university

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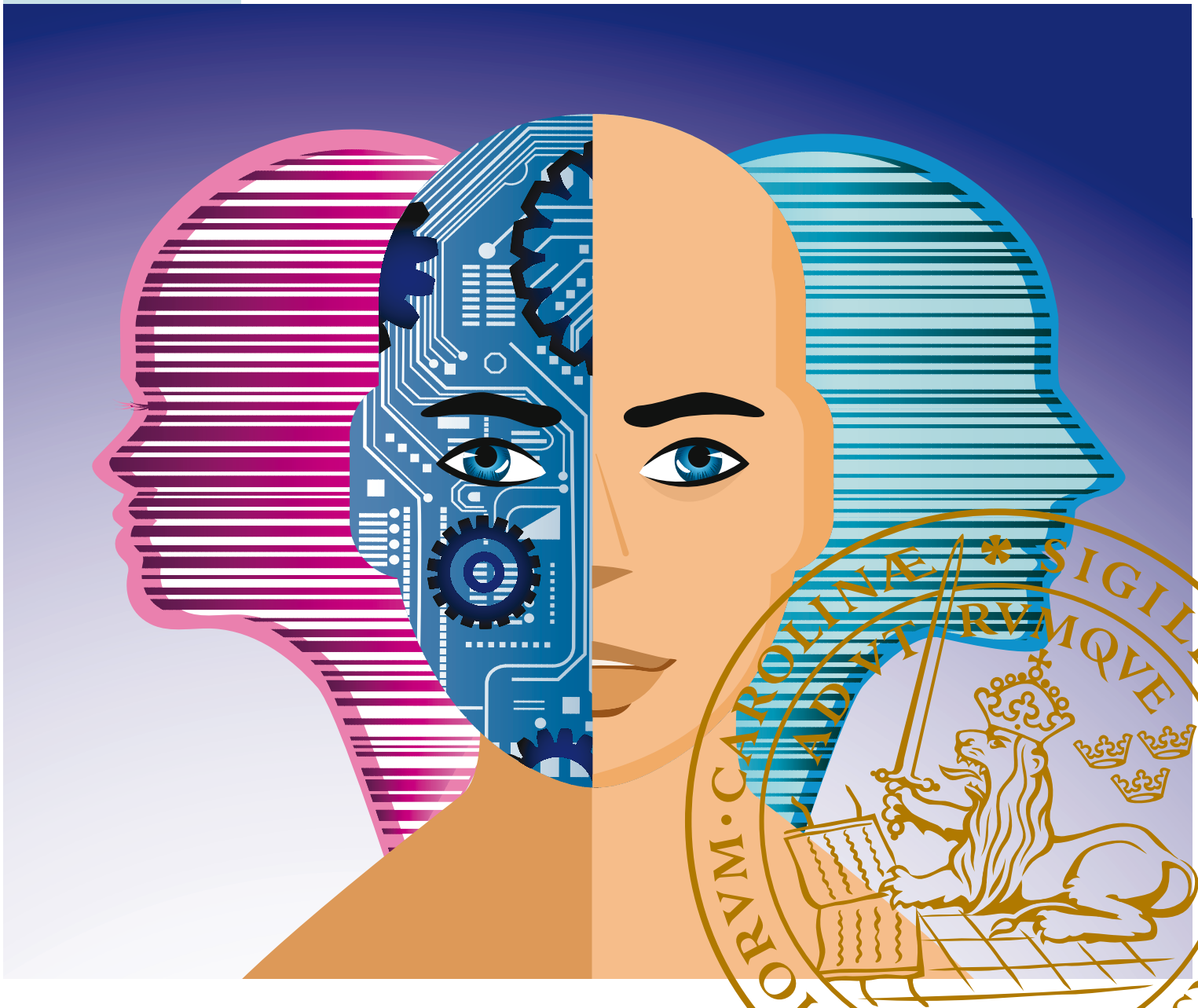
2014

Gender in Science & Technology

A COLLECTION OF THESES FROM THE PHYSICS DEPARTMENT AT LUND UNIVERSITY



Gender in Science & Technology

A collection of theses from The Physics Department at Lund University

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Gender in Science & Technology

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Preface

This is a collection of projects that were written by students participating in our course on *Gender in Science and Technology* at Lund University. The course is based on a collaboration between the Department of Physics, the Science Faculty and the Department for Gender Studies, the Social Science Faculty. It is something of a record breaker in longevity, since in the autumn of 2014 it will run for the seventh time.

The project reports are presented in their original form, as handed in by the students after their oral presentation and our feed-back. They cover a large variety of subjects and show the diversity of this course. We have attracted students from at least three different faculties (Natural Science, Social Science and Engineering), making discussions and approaches very varied and interesting. It has also been a popular course among exchange students, with participants from e.g. China, US, Singapore, Bangladesh and Germany. The diversity of the student group has contributed a lot to the course, broadening the topics that were discussed and creating an interesting and innovative setting for the students.

We hope that this collection can inspire discussion on the important juxtaposition of Gender Studies and STEM (science, technology, engineering, and mathematics).

Lund March 10, 2014

Sara Goodman Matilda Svensson Tomas Brage

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2013-01-14

Changing into an engineer

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Introduction

The question I am asking and exploring is truly about me trying to understand a piece of myself and my life. Why did I choose to become an engineer? I want to try to understand what has guided me and why I made certain choices along the way. Did I and others in my generation think about gender and technology in a special way through upbringing? Is it possible to view it as me making choices or have other things influenced my way of living my life? I believe that exploring this questions will bring light over a part of our common nearby history.

Purpose

I want to write about the changing process female technology student go through in their studies. This means that I begin early in life, when the interviewee started school to see which early experiences effected her path to become an engineer. The student I have interviewed is a former member of an equality group at the Faculty of engineering at Lund University. From the interview I will try to see if the story is consistent with the texts we have read in the course and my own experiences. I want the interviewee to be gender aware, to be more interested in analyzing the meaning of their gender in the position she is in now and the meaning of her gender in getting there. I want to concentrate on the education system in becoming an engineer, but also changing something in the culture to become an engineer. I also want to ask about how come women chose certain final courses and how do men and women know which final courses that are male or female coded. How can a resistance against following given paths look like?

Method

The methods I will use are deep study interview plus literature studies. I want to interview young women who has become both feminists and engineers. The interviews are done with a narrow selection of people with a purpose. In the interview I want to ask questions about what has influenced the interviewee to become engineers and read technology and in the same time become a feminist. I will record the interviews so I am able to listen to the interviews over again and try to see if the models Danielsson use are applicable to the histories the interviewee tells. I intend to see if the model of masculinity Mellström, Traweek and Wajcman may suit in the stories told by the interviewee. I will also try to reason about cyborgs to see how the women think about a future and which identities a woman in science could have.

I want to stress that this is not a view that all women at LTH share. This is one way of looking at gender and technology and I make no claim to speak for women in general. Although, I think I can tribute with one way of looking at it, a story from some women, and that this could be interesting for others. I am also a bit bias because my own experiences reminds of those my interviewee have.

Gender and technology in time

Through time people's perception of both gender and technology have taken different expressions. Londa Schiebinger points out the fact that women have been considered less suited for science and technology (Schiebinger 2003:21). Women's brains and bodies were considered as impeding scientific progress. This lingers on through history to contempory time. Not that people think women are per ce stupid, but a thought of men more suited for technology lingers on in a general concept of men and women.

Both me and my interviewee are women born in the 1980s. We have been brought up in a certain kind of thinking of gender and technology which reflects that time and how people thought of the future and past in the 1980s. In the interview it is noted that my interviewee early in life understood that there were supposed to be a clear difference between women and men. My interviewee didn't agree with this notion and this has played a part in her way of living her life.

"I think I early on were aware of what girls do and I have always felt an opposition against that, to be categorized and limited by my gender in any way and I think that's a reason I've ended up in a very male dominated world"[1]*(Svensson, 2013)*

"I read some text about how men were and how women were"[2]*(Svensson, 2013)*

My interviewee was aware of gender as a child, but thought she didn't fit in the descriptions. She also decided to do the opposite, what was not expected of her. To do this she has to have had a space where she could do this, a place to make resistance against the picture of men and women. Her surroundings, family and friends, must have been friendly to this attitude. Different kinds of power structures as class and ethnicity play a role in if you are able to express a diverse gender identity.

1 The interview was conducted in Swedish and the original statement in Swedish is *"det var nog tidigt så att jag var medveten om vad tjejer håller på med och jag har alltid känt ett motstånd mot det, att kategoriseras och att begränsas av mitt kön på något sätt och det är nog också en anledning att jag hamnat inom en väldigt mansdominerad värld"*

2 The original statement in Swedish was *"jag läste någon text om hur män var och hur kvinnor var"*

I interpret this as through history the image of what women could do in science and technology has changed and in the 1980s a gender awareness made (some) girls aware of how men and women were but also that this wasn't forever to be. These girls could change that in their life, through living their life more in the “male” way of life or a life less strict in the usual gender roles. An example of this is to engage in the public life of technology and science.

Early experiences and positionings in life

As shown above, my interviewee early understood which properties men and women were supposed to have to be proper men and women. In upbringing significant persons are important to how the person in later life will react on events and how she will think about life philosophic questions. In my interviewees case her father played a role in her childhood in that has affected how she thinks about technology later in her life.

“During my childhood he built a lot of stuff to me. Insted of...I wanted a My Little Pony house. It wasn't that he went out and bought a My Little Pony house but we kind of took a big cartoon and put smaller cartoons in it and then we built a house out of it and cut out doors and windows.”[3] *(Svensson, 2013)*

For my interviewee tinkering, building and creating things was an important part of her childhood. This is something Ulf Mellstöm writes about in his study of Swedish engineers and Malaysian mechanics.

“...significant others that are referred to as formative in choosing to enter the world of technology are exclusive male- a father, an older brother, a best friend, or an enthusiastic teacher.” (Mellstöm 2004:374)

In Mellströms study interaction with machines is in focus, in my interviewees case it is more the tinkering and creative part that was distinctive, but I believe this plays an important part in her life, tinkering with her father.

Mellstöm also writes in his study that this is a part of the process of excluding women from the world of technology.

3 The original statement in Swedish was: *Under min barndom så byggde han mycket grejer till mig. Istället för att... jag ville ha ett my little ponny-hus. Det var inte så att han gick ut och köpte ett my little pony-hus då utan då tog vi liksom en stor kartong och så la vi andra kartonger i det och så byggde vi ett hus av det och skar ut dörrar och fönster i det.*

"...passions and pleasures found in "rituals of tinkering" are closely connected to the masculinization of power within the world of technology- especially because, where these homosocial practices are at work, they hold back women engineers"(Mellstöm 2004:380)

My interviewee seems to have made a break in this male chain of passing on knowledge. She also tells a story about how she discovered that she could do things better than her father.

"I have a father who always have liked technology, maybe had his thumb in the middle of his hand but yet been fond in having the latest technic gadgets, even though he didn't master them. It was something we children soon became better in than he."[4]*(Svensson, 2013)*

I think this is important, to early have a feeling on mastering technic gadgets better than the father, the significant person, and an attitude that you don't have to do just things associated with women, to be able to break the pattern and become a female engineer.

Freedom from gender in the world of technology?

The most techno-positive feminist I know of is Donna Haraway. As Judy Wajcman puts it:

"...sees cybertechnology as as a potential asset for emancipation."(Wajcman 2006:82)

This view I noticed in the interview too. My interviewee sees technology as a way of enforcing herself. She thinks technology is free from gender and she see the opportunity to prove that she can be better than men in the arena of technology.

"...the technology in it self is... is not genderbound..."[5]*(Svensson, 2013)*

Several times my interviewee talks about to prove people wrong in their opinions about men and women. She enjoys to chock and shake people's beliefs.

"...and then it was so damn good to be able to walk in and beat them on their fingers and to say like this Ha ha I'm an engineer too"[6]*(Svensson, 2013)*

This thought of changing how people are and this positive view on future is something my

4 The original statement in Swedish was: *"Jag har ju en pappa som alltid har gillat teknik, kanske haft tummen mitt i handen men ändå varit väldigt förtjust i att ha de senaste tekniska prylarna, även om han inte behärskat dem. Det var något som vi barn ganska fort blev bättre än honom på."*

5 The original statement in Swedish was: *"...tekniken i sig är... inte är genusbunden..."*

6 The original statement in Swedish was: *"...och så var det så jäkla skönt att bara kunna gå in och slå dem på fingrarna och säga så här att Ha ha jag är minsam ingenjör jag med"*

interviewee shares with Haraway.

“Indeed, in stressing the liberatory potential of science and technology, she is rephrasing an old modernist theme linking science with progress.”(Wajcman 2006:81)

I think both Haraway and my interviewee expect a future with more women in the world of technology. Although this positive view they both see a need to stress the negative sides of technology on gender equality. Haraway writes about the cyborg like this:

”From one perspective, a cyborg world is about the final imposition of a grid of control on the planet, about the final abstraction embodied in a Star Wars apocalypse waged in the name of defence, about the final appropriation of women’s bodies in a masculinist orgy of war (Sofia, 1984). From another perspective, a cyborg world might be about lived social and bodily realities in which people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints.”(Haraway 1991:122)

My interviewee is aware that there are teacher who don't think women should be engineers (Svensson 2013). In between these two perspectives my interviewee seems to have created a way of operate for a different kind of understanding of gender in the world of technology.

Material conditions to be a good girl

I think it is important to stress that we as individuals have a certain space to choose how to be within. There are the material conditions like the fact that it is possible to study at a university as a woman, which is not the case further back in time, and persons who encourage women to study. The Swedish government talked a lot about the goal they had and still have, that 50 % of the population should study at the university. Young people were encouraged to study, it was the right thing to do. I am aware that I take a more poststructuralist point of view but I don't think that we are free individuals. My view of it is that we can make choices within our “boxes of possibilities” or “matrixes” and certain positions are harder to make than others.

Different power structures such as class and ethnicity, and discrimination grounds such as sexuality and physical and cognitive ability limits your options in life. My interviewee is a white woman from the middle class and a lot of the choices she has done are in the line of being a good girl and doing the things her parents would have wanted. Her possibility to make an uprise in certain areas like in gender is easier if she stays in the norms in the other areas, being white, heterosexual, middle

class and so on. This is important to bear with you. Non the less, it doesn't make it easy to divert from the gender norm and I don't want to diminish that.

The male genius and other myths

First, technology is heavily connected to the male. Wajcman points out the centrality of gender relations in the social shaping of technology (Wajcman 2006:53). To be able to sustain a world without women there must be general stories and stereotypes to reproduce in the next generation.

One of the stereotypes in the world of technology is the male lonely genius, who is a natural talent in maths and physics. This was something I imagined was a preset to study technic sudjects until a teacher pointed out the obvious, that there weren't going to be many technology students if only the geniuses studied these subjects and that of course you could study them without having top grades in the subjects. This is something my interviewee also comments.

"...and had the worst grades in maths and physics, they weren't my strong subjects, but they interested me"[7]*(Svensson 2013)*

I had the strange idea that it wasn't enough to be interested in science and technology to study them. We seem to be a couple of boys and girls who managed just fine without being top students!

Another more modern stereotype is the nerd. Anna T. Danielsson describes a nerd in her study as devoted, someone with an ability to ficus whole-hearted on one thing and not to give up, but it is also used in a degrading way (Danielsson 2009:157). This makes it a big step to enter the world of nerds. You have to be devoted and a bit of an outsider. I think many women have a hard time looking at their selfs in this way and it is hard to get accepted in closed, very niched communities.

Sharon Traweek also stresses the gap between the reading student and the very distant geniuses of science. Traweek points out the importance of storytelling, of regenerating the romance of science (Traweek 1992:102). Through these stereotypes, cultural creations and stories of heroic adventures crystallizes a picture clearly, as my interviewee simply says it:

7 The original statement in Swedish was: *"...och hade sämsta betygen i matte och fysik, de var inte mina starka ämnen, men de intresserade mig"*

”The picture of the engineer is a man”[8]*(Svensson 2013)*

To understand different ways of expressing to be an engineer

Many women become physicists and engineers, but is it possible to be in a different way than the rest of the male physicists and engineers? Women still find their selves in a work-life dominated by men. My interviewee has the strategy to do as the men do. She has:

”taken on male attributes or properties to... to not get thread upon”[9]*(Svensson 2013)*

This is one strategy, but I would have wanted it to be ok to not be like the men and still to get as much respect and gratitude. Another thing she has adapted is to test things without knowing, to make mistakes and to not care to much if you make a mistake.

“Some of these stuff works, you get further if you don't care if you know something or not”[10]*(Svensson 2013)*

Two devices she lives after is:

“fake it till you make it”(Svensson 2013) and *“fake it till you become it”(Svensson 2013)*

Sometimes women are judging themselves to hard and in work-life it doesn't work if you linger on in old mistakes, you have to act and try new ways of solving the problem. My interviewee also talks about herself separated from women generally.

“I've kind of had a contempt for women in many years because of the many things that I perceaved as weak, as weak caracteristics in women”[11]*(Svensson 2013)*

I think many women create a picture of women generally and an image of their selves. These are not always the same. I have also experienced male friends who create a special box for women who do technology, somewhere between men and women. My friends could talk about their girlfriends in a certain manner and their female class mates in a totally different way.

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8 The original statement in Swedish was: *”Bilden av ingenjören är en man”*

9 The original statement in Swedish was: *“anammat manliga attribut eller egenskaper för att… för att inte bli trampad på”*

10 The original statement in Swedish was: *“Vissa av de här grejerna de funkar, man kommer längre om man inte bryr sig om man kan något eller inte”*

11 The original statement in Swedish was: *“jag har nog haft liksom ett kvinnoförakt i många år just för mycket som jag upplevde som svagt, som de svaga egenskaperna hos kvinnor”*

Counter pictures to a stereotype

Through the interview a clear line is that my interviewee wants to prove people wrong in how they think about women and technology. She also wants to prove that women can do technology as well as men. This is not something she does just for her self. She talks about changing through being a role model to other women and to be proud.

"To be a woman, to be proud to be a woman and to show that there are others, that you are able to be a woman in different ways. Because I have been in to the more androgynous track earlier, the genderless track, but I'm no use to women as genderless."[12] *(Svensson, 2013)*

This statement is clearly political I think and I also think that it is interesting that she has changed her mind about how to act to be more useful for women in general. I think my interviewee and Donna Haraway is united in their way of looking at technology in a political way. My interviewee in a personal-political stand:

"I am a standpoint in myself"[13] *(Svensson, 2013)*

and Haraway in her mystical statement.

"So my cyborg myth is about transgressed boundaries, potent fusions, and dangerous possibilities which progressive people might explore as one part of needed political work." (Haraway 1991:121)

12 The original statement in Swedish was: *"Att vara kvinna, att vara stolt över att vara kvinna och att visa att det finns andra, man kan vara kvinna på olika sätt. För jag har varit inne på det mer androgyna spåret tidigare, det könlösa spåret, men jag gör ingen nytta för kvinnor som könlös"*

13 The original statement in Swedish was: *"jag är ett ställningstagande i mig själv"*

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Articles

Haraway, Donna "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century," in *Simians, Cyborgs and Women: The Reinvention of Nature* (New York; Routledge, 1991)

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Interviews

Svensson, Angelica (2013-01-03) Interview conducted in Lund

Appendix

Time plan

12 november short description
19 november further supervision, Method, References, discussion on material
20-24 complementary reading, contact with interviewees
24-30 november interviews
31-6 november/december writing, analyzing
14 january hand in exam paper
17 january presentation

Interview questions

How did you perceive technology through your school period, from first grade to university and in work life?
How did you perceive engineers through your school period, from first grade to university and in work life?
Was this perception gendered in some way and when (if) did it become gendered?
Has there been some distinctive person(s) that has influenced the way you perceive technology?
Which final courses did you take?
What do you think influences persons to choose the course?
We have read texts that stresses both that you may ignore gender in technology and that this could be a positive thing and texts that stresses that gender is more fixed and a pretext to engage in technology. What do you think of this?
Do you think about engineers as divided in those who do more practical or more analytical things?
Do you get trained in a certain kind of thinking at LTH?
Do the methods at LTH differ from those at the social science faculty?

Britt-Marie Ringfjord

The Cultural Constructions of Gender in Innovation and Technology – How Media frame science as gendered

The Cultural Constructions of Gender in Innovation and Technology

- How Media frame science as gendered

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ABSTRACT

The aim with this paper is to investigate how Innovation and Technology is represented in media content and how this relates to cultural reproduction of gender in science.

The theoretical perspectives used in this study are selected from course literature on gender in science and from media- and communication theories on media's gender representations. How science and especially Innovation become gendered in the magazine *Ny Teknik* (New Technology) can offer some explanations about why gender structures in society and in science still exists today.

The method is qualitative content analyse, based on three selected articles edited 2012 from *Ny Teknik* about innovation, technology and politic.

The conclusion calls for careful consideration in how to achieve gender equality in society, in science and in politics. This study shows that women and men still are divided into two separate spheres for politics, innovation and technology, concealed and supported by the articles. The ideological understanding of science and technology are based on typical masculine attributes in a field of action and rationality where femininity still has a subordinate position.

Keywords: Gender, technology, innovations, media representation, content analyses, Ny Teknik

The Cultural Constructions of Gender: A Study of Innovation and how Gender is represented in Science.

This paper is connected and based on a project together with my colleague Annelie Ekelin, Doctor of Technology Science, Linnaeus University: *The Social Practices of Innovation Cultures: An Ethnographic Study of Innovation Journalism and Local Entrepreneurship*.

The aim with this paper is to investigate how innovation and technology is represented in media content and how this relates to cultural reproduction of gender in science. The aim *is not* to answer questions about *how many different representations of innovations there are in media content and how often* media content are used to shape meaning about innovation, science and gender. The approach in this paper description is to continue my questions, to investigate *and* to exemplify how women and men are represented and what this might tell us about innovations, technology, and science and gender structures.

Perspectives: Concepts, theories and methods

Two theoretical perspectives have particular relevance to culture and meaning making processes of how innovation intersects with gender. One perspective emphasizes the cultural and human meaning making occurs in social contexts that are determined by social structures, which are based on various social institutions as family, education, employment, media and innovative environments. Social structures governing the lives of the various groups, in particular, how power relations between women and men often are cemented by specific gender orders. These social structures of innovation, technology and journalism direct how gender is represented and acted in specific environments for women and men. The second perspective emphasizes the cultural processes in social contexts where humans create meaning through social actions, which are based on how different groups deal in practice with and affect social structures. Cultural processes show how men and women through active choices can affect their lives in different social contexts and shaping their personal identities, despite limited gender structures. (Giddens 1991/1998:75ff, Lindberg 2010: 67f, Thompson 1995/1999: 185f). Both perspectives are important for how we understand innovation, technology, politics and gender in media content.

This assignment's focus is two folded:

Firstly: how are innovation, technology and gender in science reflected in media content?

Secondly; how innovation and technology in media content support or restrain democracy and citizenship for women and men?

The plan is to study how innovation becomes gendered in journalistic texts by qualitative content analyses using some selected articles from the Swedish branch magazine *Ny Teknik (New Technology)* about innovation, technology and Swedish politicians.

How journalism and the Media portray innovation is an important part for democracy for citizens in all nations and countries. How female politicians are represented in articles about innovation and technology are parts that will be particularly studied. One of The Medias important tasks is to inform, describe and review power in society. This task is connected to democracy and for informing citizens by offer us different kinds of interpretations about our society. The Media representations of society is then one of the important parts for democracy were the "informed citizen" can participate in society and take decisions based on reflections. (Nord 2007; Nygren 2008:301) Examining how technology and innovation is described by *Ny Teknik* can give us some facts about gender structures within science as well. This perspective on innovation, technology and gender clearly relates to studies on political journalism were the media attention is supposed to support democracy and give opportunities for social citizenship.

The anthropologic turn in natural science, when focus shifts from how to produce science to how culture produces scientists is also reflected in the media content. How we communicate with language, with symbols and concepts within our different science field are gender marked – based in from what gendered position claims have been made on that specific science field from different kinds of research group, and what gender they represent(Wajcman 2004:7, Traweek 1988). Since science culturally has been defined by men and for men, you can claim that half of the population in our society historically has been excluded from being a part of the development in science. However the literature also shows some early examples of women in science, but they are rare and often over shadowed by a partner of the opposite sex ascribed the result of research findings. This also shows that the social welfare in a society has a strong impact on what possibilities citizens have to enter science and take active part in research despite biological sex. So for whom science is possible? And how do women and men in their ordinary practice as researchers act within or against gender structures?

Gender and technology

Women and men often are defined first by their assumed biological sex, then by a culture's definition of gender. In media and journalism there are several examples on how the assumed sex in genres like domestic news on politics, sports or in advertisements uses this universal stereotypes for female and male groups. The *gender* concept is important in my paper so I will continue this discussion in order to set the scene for my study based on some feminist media work. In short gender is social constructed, in cultural contexts of geography and/or history. (Camauër 2000:29f, Creedon 1994:29, Sturken & Cartwright 2001:21, van Zoonen 1994:31). How gender became science in different fields according to this course's literature, also shows several interesting approaches to how to define what our scientific work have been concentrating on, and opens up for new questions to ask about how gender structures in society and in science still exists today. (Schiebinger 1999, Traweek 1988, Wajcman 2004, Mellström 2004, Danielsson 2009).

There is also a need for careful consideration using the concepts of masculinity and femininity by splitting up gender into two homogenous groups, when they in reality consist of more complex and heterogeneous groups. In everyday life other demographic factors such as social classes, education, professional roles or sexual preferences, also can unite people as they share common interests. So as gender is social and culturally constructed, I use the definitions femininity and masculinity as qualities possible to have for anyone despite biological sex. It is by socialization in gender within a given power structure embedded in a culture's different fields, that the division into gender-preferred stereotypes reproduces the power relations (van Zoonen 1994: 34, Butler 1990: 144ff).

According to Wajcman(2004:32f), the scientific approach to gender in technology often includes technological determinism working like a self-going force, supporting the power structure in science as well as in society. Following her interesting discussion the important question rises about gender representations on science and innovation:

- For who is technology and how can technology serves democratic engagement and processes?

In news articles on the Internet in western society often assume that all content on the web is available for everyone, no matter where you live. This top down perspective on citizens in western countries, not only exclude other continents and cultures. The exclusion of citizens within the European Union is obvious, when we don't even share the same language. The news production on Internet also divides us into different sub cultures, based in what professions or interests we share and define us to. So if news or information on the web is available about innovation and technology, we also need to consider how it is represented and in what purposes? Internet and news production on the web shows how technology makes society possible, by the representations of innovation, technology and gender. The content in news on Internet about these representations also serve as one important mind set for social relations in the fields of science, were women and men reflect over media content in their everyday lives. (Wajcman, 2004: 39f)

Innovation

The concept i*nnovation* is within the European Union defined as "improvement of products, processes and services" which is supposed to be accomplished by the creation and stimulation of innovation systems and cooperative clusters, including competences such as representatives from the business, the public sector and the academia. (Lindberg 2010:29-40) Here the innovative strength and result is dependent on the ability to put local, regional or international cooperation between different social and cultural systems into work in practice.

To conclude the mapping of the concept innovation and its relation to gender, the concentration has primarily laid on projects and results, governed by political innovation programs or efforts directed by politics and authorities. (Danilda & Granat Thorslund 2011). So there is a lack of studies from gender perspective on innovative practices and innovative

thinking. One part of how the practices of innovation and gender are reflected in our culture is by media content. The relations between innovation, journalism and gender are then interesting to investigate from other perspectives than those normative discourses.

Innovation Journalism is an elusive concept with different claims depending on what perspective is adopted. One suitable starting point for this study is from VINNOVA's Program for Innovation Journalism. Here the claim is that innovation journalism shall support society in order to promote sustainable community growth. By media attention to innovation and innovative companies, journalism is seen - to a greater extent - to help disseminate information, stimulate debate, do critical examination of actors and activities, and to disseminate the concept of the public. Another definition might suggest that journalism is developing more innovative, i.e. renewed by combining political, economic and cultural aspects of how innovation systems and processes are monitored and reported in the media content. (www.vinnova.se 2010-10-24, 2011-01-07). This perspective on innovation journalism is often found in several reports and studies with similar definitions, but also supported by some criticism on power structures and focus in journalism. (Nordfors & Uskali 2007) For this assignment the purpose is to explore some articles and describe how innovation, technology, politic and innovation can carry symbols of gender representation.

Content analyses and narratives.

I will use qualitative methods for content analyses of media texts. Semiotics in order to sort the material up in what types of signs, codes and symbols are used in the articles about innovation. Innovation, technology, politics and gender are communicated in specific ways based on how signs, codes and symbols are used in culture by citizens, when they talk and interact with each other and when the use media content. Semiotics deconstructs the taken for granted conventions to make us aware of how reality is constructed in media texts. Media texts also can be seen as narratives of our culture, telling stories about how we use gender stereotypes in different ways in the everyday lives of men and women. Narrative analyses make it possible to understand how social actions and culture interact with representations of gender roles in media content. (Bignell 2002:59, van Zoonen 1994:68f, Gauntlett 2008:120). In this study narrative is used to find the story's structure, actors and reoccurring themes about innovation and technology in order to investigate how power relations are framed.

I have used the search engine Mediaarkivet available at Linnaeus Library University to select my articles for this assignment. The newspaper is *Ny Teknik* (New Technology), using the key words: "Innovation"," uppfinningar", "teknik" och "politik" (innovation, uppfinningar in Swedish, technology and politics). Twelve articles were selected by the search engine between the dates 2012-01-01 and 2012-11-12. I chose three articles to make my analyses (see appendix).

Political struggle over Swedish innovation (Politisk kamp om svensk innovation 2012-05-09)

China invests billions in Swedish innovation (Kina satsar miljarder på svensk innovation 2012-06-07)

Research, a hot topic for Fredrik & C: o (Forskningen het för Fredrik & C: o 2012-08-22)

The following questionnaire was developed about innovation, technology, politics and gender:

- How innovation and/or technology are defined within the specific field for politics in the articles?
- How innovation and/or technology are described?
- To whom or in what ways is it directed?
  (To 'techno elite'? To all citizens? To men or to women or to both?)
- In what ways are gender aspects represented? Signs, codes symbols?
- How is the narrative shaping gender positions?
- Is the narrative supporting women's self-confidence as researchers and/or as citizen in democratic and equal sense?

Ny Teknik has been a Swedish branch magazine for technology since 1967 with a yearly edition of 156 300 copies and is issued every Wednesday with a total of 40 issues per year. (www.nyteknik.se 2012-11-18).

This magazine claim to be Sweden's leading technology and IT newspaper. The target groups according to the papers web site are decision makers in IT- and technology, engineers' technicians and IT-specialists. The editor promise to give their readers the latest news, interesting articles about products, trends and innovations. On the newspapers web site we are invited to read the latest news about technological development within areas such as IT, telecoms, energy, environment, automation and aviation. (www.nyteknik.se 2012-11-18).

Political struggle over Swedish innovation (Politisk kamp om svensk innovation 2012-05-09)

Who is most friendly to innovation? At the moment a race between the government and the political opposition – the Social Democrat party's leader Stefan Löfven wants to implement a council for innovation policy. Not a good idea according to Minister for Enterprise Annie Lööf. Here the policy is portrayed as a contest in sports between competing opponents. A field in which the conquest of innovation is being played out on an international arena were Sweden is fighting for first place. Löfven features the idea of a political Council as new, while Lööf uses other strong symbols which connote another type of struggle. Both of them are talking about domestic policy and how to achieve the highest standard for innovation and technology. But while Löfven is promoting communication between industry, research and partners on labour market, Lööf talks about the government's intentions to support competitiveness by contribute through tax subsidies to companies with creative environments. Cited from the Swedish News Agency TT, Löfven said:

- We live in an international competitive environment which means that conditions change from day to day, and that's why dialogs with various industries is so important.

In an emailed answer to *Ny Teknik* Lööf reject his ideas:

- It is not the creation of several Councils which is the best way to strengthen the innovation and competitiveness. Instead there are efforts in research and innovation, venture capital, reducing costs for companies and creative environments. Here is the focus for the Government.

However, Lööf welcomes the Socialist interest for dialog on the subject as positive bur calls for more concrete proposals from the Social Democrat party.

In Swedish Public Service Channel 1 Prime Minister Fredrik Reinfeldt ridiculed Löfvens proposal:

"Stefan Löfven invites to Coffee Break and the jobs will increase".

Another actor in this drama is Professor Braunerhjelm at KTH Royal Institute of Technology and President of Entrepreneurship forum, who says that the Politicians are fighting on who is most friendly to innovations. Professor Brauenerhjelm also contributes with a remark on Innovation as the new buzz-word amongst politicians in European Union and OECD. This is also related to how President Obama explained Sputniks impact on innovations in United States – a measure of prosperity in society. The President's speech is also added in a note were Obama presents innovations like the Sputnik-moment, when America entered a new frontier in research and in space technology.

The article ends with a short list of how often innovation is used by the Swedish political parties. This also reflects over the struggle between two opponents; the governing party and the party in opposition where a fight over media attention and media space is acted. The

government use the word twenty times in their budget, the Social Democratic Party in their shadow budget twenty four times, but the Green Party only nine times and the Left Party eight times.

Looking at the specific media room were innovation and technology are defined we find Swedish innovation policy placed on an international arena connected to actors like president Barack Obama, the European Union, OECD(*Organisation for Economic Co-operation and Development*) and Soviet Union. The actors on a national level are three men and one woman, two of the men are politicians and the women, and the third man is representing science by his expertise role as professor and duties as president for Entrepreneurship Forum. The field seems to be filled with contests and conflicts often used in sports but also common metaphors in war journalism and here they are used in this article. There is a battle or a contest going on about innovation and technology, and the contestants are the politicians.

This contest can also signify how western society define masculinity as strong, active and in possession of the gaze and femininity as weak, passive and to be looked at. According to van Zoonen (2004:99f) in a patriarchal society, men seldom look direct into the camera or at the spectator. If he does, his gaze is rather penetrating and stirring at the viewer. Visual and narrative codes often employ a traditional gender structure. Images of politicians are then representations of reality, when they construct parts of the social reality. Media texts are not mirror images representing what exists in the real world, but they organize, construct and convey our understanding and interpretation of reality. (Bignell 2002; Sturken&Cartwright 2001:13)

The main actors are Stefan Löfven representing the Social Democratic Party and Annie Lööf representing the Government. The two pictures illustrating the actors symbolises the conflict between two parts. Stefan Löfven is depicted as a man of power, seen from below which symbolises how citizens were supposed to look at ruler. Löfven is looking out at the left angel of the image; his gaze is directed towards the sky. This implies he see the future, he is the strong leader. Perhaps our next Prime Minister that offers us visions of innovation and technology. The paper in his hands also connotes that this Council already exist on paper. He has a plan for the future domestic science development.

The image of Annie Lööf is smaller and photographed by the top-down perspective which puts her into a position in relation to the reader of the article, looking down on her. Lööf is gazing down to the right angle in the image, which suggests she is looking back at history and tradition in politics. Her surrounding in the article consists of strong men in the Government, but the question is if Reinfelts comment is supportive enough. The direction to the past might also suggest that Professor Braunerhjelm is criticising her and uses Obama and Soviet Union as tools for this purpose.

The audience or the reader positions for this article are probably aimed at the innovation business and industries, as well as to researchers at the universities in Sweden. Here we are invited to facts and information on how to understand and act within the frame of innovation and technology. To get research founding we must understand how politicians make their

decisions and who decides on the political science agenda. This narrative talks from an unconscious male position claiming power for men over women if we chose to look at numbers representations of actors. Another suggestion is that Annie Lööf in this narrative has strong support in her group of politicians by criticism from Prime Minister Fredrik Reinfeldt. The third actor professor Braunerhjelm's statement as an expert is representing the industry as well as the researchers' community in Sweden. This actor's function is to connect the magazine's readers with the common consensus that exists in the article on innovation and technology.

The meaning and importance in media texts are created, reproduced and maintained by media and it's relation to the society. How we look at media texts and pictures is of course part of socialization to western codes of media use and language. The gaze is not in itself defined by gender, as men and women can share common cultural understanding, but the starting point for gender perspectives on media content is about how unequal power relationships between men and women are represented. (Sturken&Cartwright 2001:79; 84). The media produces homogeneous images of 'ideal' politicians who are internalized in society through how images are reproduced and used in different contexts. Media texts and pictures of female and male politicians who appear equal, and perhaps often are, can lead to that we do not question power structures and how gender is represented. Then we take the representations for granted and accept that policy, technology and innovation should be divided between men and women.

This narrative is not supporting women's confidence in fields like science, politics, innovation and technology. The articles political message is built on other sources, not first-hand interviews with the leading actors Lövfen and Lööf. Instead the article offers a media room to visit for a group of readers that share the same values about what is important to know. This is mediated by the expert Professor Braunerhjelm in this article. He uses the common codes for how to succeed in the world of research and innovation, connected to international enterprises.

Put in other words this is one example of western masculine narratives that communicate symbols, codes and signs for a traditional gender structure. Women and men are placed in different spheres with different functions. We also understand how society, technology and media are connected in reproducing gender power relations (Wajcman 2004:107). In this story it's all about who is in control over political decisions and what innovation means in our culture and welfare society.

China Invests billions in Swedish innovation (Kina satsar miljarder på svensk innovation 2012-06-07)

China's unexpected multi billions investments on cooperation between China and Sweden are going to innovation loans. These efforts will, amongst other things, give small and medium-sized enterprises better conditions in the sectors of research and industry. This announcement was made by the Chinese Prime Minister Wen Jiabao when he visited Sweden in April. When the Swedish Minister for Enterprise Annie Lööf visited China last week, was one of her

purposes with her visit to get clarity in what the minister really meant by his promise. Lööf signed a letter of intent to strengthen the cooperation in innovation during the visit to China last week.

> – I was told that the loan for innovations comes from China Development Bank and the applicants for loan are selected by MIIT (Chinas department for industry and IT).

However there is no clear indication of when or what type of project and whom the applicants can be when the meeting was held with the Chinese Industry Minister. Lööf explains that this is Chinese money and it is the Republic of China which controls the framework, but they have not yet set down the foot. So there still is some uncertainty about the framework for the Chinese innovation loans. The expert on China, Frédéric Cho from the Swedish bank Handelsbanken points to the importance for Sweden to act in negotiating the terms for these loans.

- There is a risk of ending up in a psychological disadvantage if we don't act. China admires Sweden as technological country and is interested in having cooperation with Swedish companies that have interesting technology to offer Chinese companies.

His assessment is that Sweden can act and dictate the terms of the Agreement. China's conscious focus on innovation and technology also involve a planned research centrum in Beijing. The Swedish companies participating at this research centrum are Chalmers, Volvo, Volvo Personvagnar and Vinnova the Swedish Innovation Authority. This cooperation in research for the Volvo Group is on traffic accidents and about driver behaviour.

The actors in this play is the Chinese Prime Minister Wen Jiabao, the Swedish Minister for Enterprise Annie Lööf, The Chinese Industry Minister, Chalmers, Volvo, The Chinese owned Volvo Personvagnar and Vinnova the Swedish Innovation Authority. We also meet an expert Frédéric Cho representing the Swedish bank Handelsbanken. He acts in the role of interpreter and narrator who invite us as audience to take part of this story about innovation, technology and politics. The narrative suggests that money is important for innovations and technology, so politicians must act and negotiate. We can also understand this plot like a competition over money and resources. We find the two nations represented by the Chinese Prime Minister, The Chinese Industry Minister and the Swedish Minster for Enterprise. These three persons we also find depictured. We can also include Mr Frédéric Cho as an important actor in this story, whose image we find in a small picture. However the main actors are The Swedish Minister for Enterprise, Chinese Prime Minister and The Chinese Industry Minister. The Swedish Minister for Enterprise is seen in two of the three pictures. In the bigger one she is shaking hands with the Chinese Prime Minister. They seem to be outdoors at an airport, where the aircraft is visible in the background. They are turning to each other in a welcoming gesture that perhaps shows respect for each other. In the other middle sized picture the Chinese Industry Minister and the Swedish Minister of Enterprise are sitting down at a large table signing the letter of intent simultaneously. The small picture of Mr Frédéric Cho is a portrait which is poorly cut were parts of his forehead is gone, while the important symbols for

masculinity, the tie, the white shirt and the jacket are visible in the picture. He is looking straight in the camera. This is a confident look that will support his statements in this article.

Innovation and technology like a contest is supported by the descriptions of how the two nation's strategies are in negotiating this letter of intent for co-operation. China is described as a mentally strong nation with a superior psychological advance over Sweden. According to Mr Frédéric Cho this should be the other way around, an implication of the incapable Swedish mind to think strategic and rational. This is also possible to relate to how women are supposed to keep a low profile in public. Perhaps the femininity connected to the fact that the Swedish Minister of Enterprise is a woman? On the other hand China is said to admirer Sweden for the advanced technology that makes the negotiation appear to be between to equal parts.

Again we only find one women representing the female part in this news story. The unbalanced gender aspect shapes the division in two separate positions were women and men act within the narrative for innovation, technology and politics. The implicit critic against a passive Minister of Enterprise, place her in a subordinate position in relation to a masculine power structure. The symbols and codes used to define femininity as passive, slow or irrational is based in culture assumptions we find in science as well as other parts of our society (Schiebinger 1999:70ff). All citizens are not included in this narrative and address a white western middleclass perspective on research as politics and as business. These implications also lead to an interpretation that innovation and technology are related to political strategies and business. The strong connection to sport or war metaphors suggests that this is a battlefield for a certain kind of men fighting with brains and money. Of course the readers of the paper in itself exclude many groups in society, but women with interests in research, innovation, technology and politics are not invited, as well as men with other ethnicities than the white western middleclass.

The dominant patriarchal culture is still following a traditional gender structure were men look at women and women watch themselves being looked at (van Zoonen 1994:103). The narrative codes in this article illustrate how the female politician symbolise a subordinate position in the patriarchal culture surrounded by men in power, defining the narrative for innovation, technology and politics. This news story also supports the implicit power relations in politics, innovation and technology concerning femininity and masculinity. Politics and technology are defined as masculine skills that are connected to the rational and strong mental mind set. Here the gender stereotypes constitute the divide between how femininity and masculinity is reproduced. The taken for granted assumptions about politics and technology as masculine symbolise what it is to be a man in this context (Mellström 2004:360f).

Research, a hot topic for Fredrik & C: o (Forskningen het för Fredrik & C: o 2012-08-22)

Debaters would like to see cooperation across party boundaries. The Swedish Government wants to spend more resources on research. The areas that are pointed out for more money are bio medicine and energy. The government is now ready to open their wallet and one of the winners in coming budget negotiations are research.

In his summer speech prime minister Reinfeldt said that now is the time to concentrate on research and infrastructure to build a long-term and stronger Sweden.

It has been popular to mention research and innovation among politicians. This is in part, a löfven-effect according to Björn O Nilsson, President of Swedish Academy of Engineering Sciences (IVA):

- Stefan Lövfen has raised the question. Both Government and opposition party recognise the importance of knowledge in the creation of new future jobs.

At the government research and innovation is hot issues in this autumn, and soon the nation's innovation strategies are presented. In October, a new research and innovations proposition is expected.

The minister for education Jan Björklund is clear: research needs a few billions more each year. This time Björklund is directing money for various elite investments. For example, the young talented researchers should be able to get their own large research resources.
This proposal is welcomed by the President of the Royal Technical College Peter Gudmundson.

- In principle, it is good. Today, it is a global competition for elite researchers. But it must not be too much control. Higher education institutions should have the freedom to manage their resources.

Björklund also plans to allocate money to recruit a few successful international researchers to Sweden. However the debaters called for greater long-term approach, comparing to the fiscal area were the government and the opposition should seek to agree on an innovation policy framework.

Despite an invitation this summer from the opposition party to communicate, has the government been silent according to The Social Democrats spokesperson on education, Ibrahim Baylan. The government must be aware of the fact of the non-existing majority situation in parliament. The risk is that nothing will happen in research and innovation which need to be long-term.

In this article innovation and technology are placed within the domestic policies only dealing with Swedish budget finances for research and prosperity in welfare. The contest metaphors from sport and war journalism are used to show what the battle is about. A fight between the contesting parties within the national parliament. The contest concerns how state finances should be used and what creates welfare for the nation. Innovation and research are mentioned as two hot topics for The Swedish President and his companions. However his companions only are visible by The Minister for Education, while the rest of the colleagues in the government are present only in the articles headline. The reference to the government then is not a strong collective group if we consider the criticism from the other actors in this article.

The opponents are Mr Nilsson, President of Swedish Academy of Engineering Science, Mr Gudmundson President of the Royal Technical College, and Mr Baylan representing The Social Democrat Party.

The picture of the Swedish President standing outdoors on a scene with his arms stretched out in a welcoming gesture, invite us all to participate in the government's vision of research and innovation. He is standing in front of a tree with green leaves. The fresh green connotes prosperity and hope for future welfare. The President is looking right at us and the perspective is from a below angel suggesting that this is our leader who is welcoming us to join his company mentioned in the headline. A smaller picture of Mr Gudmundsson is a baldy cut portrait showing a man's face with the power signs, black tie, white shirt and black jacket. He is smiling and also looking straight at the viewer of the picture. In both pictures the gaze from the depicted men are signs of trustworthiness. They symbolises masculine power in the Swedish society and a white western ideal for masculinity.

The narrative is shaping a gender structure that is very masculine, since no women at all are present in this article. This masculine stereotype for innovation, technology and politics is represented by contestant men striving for political power or power over research resources. In this article women are excluded and by this define femininity in politics and technology as the non- existent counterpart in opposition masculinity (Schiebinger 1999:70ff). The collective groups of men can be divided in politicians and scientists or researcher. We are also invited to follow the different arguments on how a welfare state best is build and who is in power to make decisions about these important issues. The Swedish President representing the Government as a collective group have the political power for the moment, but this is a power which is challenged by the opposition which also has comments on how innovation and research should be carried out. The Social Democratic Party wants to communicate and discuss a long term policy for research and innovation. Another large group is made up of researchers and scientists in leading positions, who also are interested in to have an impact on how resources should be allocated.

The story in this article clearly addresses techno elite and that is the men within this collective group. The exclusion of women and other ethnicities do not speak in favour for Sweden as a gender equal country. Of course this magazine is directed to a specific audience with specific interests in science and technology, but in articles like this the tone and the communication do not give room for other stereotypes of gender identification than a white western middleclass masculine one. This also is an example of communities of practice, were a shared history of learning creates group boundaries (Danielsson 2009: 64f). To participate you need acknowledged skills, education and title. Looking at the title used in this article they all signals high education like Professor or skills for top jobs like Prime Minister or assignment in the Government.

The heterogeneity in Swedish culture, where citizens in a democracy should be able to find collectives or group they can identify with, is perhaps not always a responsibility for the

media institutions. However, when science and technology in a branch magazine is framed only from one perspective, there is a clear risk that women in those areas in society look else were to find role models or that society miss half of the available researcher capacity. In a democracy claiming to be gender equal, this waste of well-educated citizens can imply that women are not welcome in these fields. Many of them who have invested time and perhaps loaned money to take a grade within a science field, might then serve as the fact that education and carriers for women is not worth anything. Then the subordinate position for women in politics and technology rather is concealed so any effort is useless.

Discussion and conclusion

In this study I have tried to show how media content plays an important part in how our culture creates, communicate and shape ideals about gender. The technical magazine *Ny Teknik* frames and reproduces innovation, technology, politics and science with traditional gender stereotypes and gender structures in the articles. The symbolic forms, codes and signs that are communicated are reflected and adjusted to a specific cultural context by the producers. The producers mind set of their "ideal recipients" consisting of researchers, politicians, industry branches and audiences interested in innovation and technology. Media represents a powerful institution in society reflecting dominant values and takes an active part in the socialization process regarding gender roles for women and men. The gender structures in society as well as in mass media are interrelated in a complex system of many parts in people's everyday lives.

To understand mass media content and its relation to culture, we also need to consider how we all are trained to read cultural codes such as images that signify gendered meanings (Sturken & Cartwright 2001:27). As citizens we take part in how meaning is communicated and reproduced, consciously or unconsciously, by media content and in our everyday lives we produce meaning about society and culture. After all the circulations of gender stereotypes occurring in the media generally act as a basic element for the construction of gender identities in everyday life. We also need to connect this technical magazine to the cultural context and society it is produced in. Mass media must, in order to communicate with their audience, use the commonly used language for signs, symbols and codes in a society. They cannot present gender ideals that are unfamiliar to society. (Gauntlett 2010; 4, van Zoonen 1994:105f). The co-production of technology and social life that is communicated and reproduced in *Ny Teknik*, also shows the interdependent relation they have to each other in order to uphold the power structures(Wajcman: 39)

My study is based on three articles, which can be critiqued for a too small representation. However these analyses shows familiar pattern occurring in media content were femininity and masculinity is narrated like two separate spheres. The examples also illustrate how one woman and her carrier as politician is questioned, how the narrative transform her from accepted, bad and finally non-existent. If politics and technology are defined as masculine and continues to reproduce symbols for masculinity as a taken for granted assumption, were femininity is subordinated – or at the worst not even present – the science and the society runs the risk to miss the advantages of using every citizens skills in order to serve democracy. The cultural demands on women and men to adjust to a society without breaking any gender boundaries is not so well suited in a democracy claiming to be one of the best nation on gender equalities in the world. In this study the result also can open up for new questions about where to look for alternative for politicians, scientists, researchers and citizens that do not fit in the stereotypes for masculinity offered in *Ny Teknik*?

Is there any media content for other groups than the established elite groups than those appearing in these articles?

Perhaps a further content analysis based on more material from other media texts like newspapers or statistics on research founding can broaden this study. In what ways does media content play an important part in the cultural construction of gender in politics, technology and innovation? Another interesting question for further investigation is about the concept innovation and if the construction of the word shifts meaning in a female research group. Is innovation something different for women working in occupations like researchers, scholars, politicians or journalists?

My conclusion calls for careful considerations about gender equality in society, and who it is represented in articles on innovation, technology and politics. Women and men still are divided into two separate spheres for femininity and masculinity, which is clearly supported and concealed in the analysed articles. The masculine symbols representing innovation and technology are based in a field of action and rationality for a collective group of men. The femininity is represented as solitaire, which is symbolised by a lonely woman who still holds the subordinate position in the gender structure.

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Appendix

Linnéuniversitetet BIBSAM(Växjö Universitet Kalmar Högskola)

Uttag 2012-11-18

Nyheter från Ny Teknik

Nyhetsklipp

Politisk kamp om svensk innovation	Ny Teknik	2012-05-09
Forskningen het för Fredrik & C:o	Ny Teknik	2012-08-22
Kina satsar miljarder på svensk innovation	Ny Teknik	2012-06-07


NYHETER

Politisk kamp om svensk innovation

Så ofta nämns ordet innovation

Innovationsrådet – gammal

NyTeknik

Politisk kamp om svensk innovation

Ny Teknik. Publicerat i print 2012-05-09.
Marie Alpman. - marie.alpman@nyteknik.se. Sektion: General.
Sida: 6.
Del: 1.

Vem är mest innovationsvänlig? Nu pågår en kapplöpning mellan regering och opposition. S-ledaren Stefan Löfven vill införa ett innovationspolitiskt råd. Ingen bra idé, enligt näringsminister Annie Lööf.

Det var många som höjde på ögonbrynen när socialdemokraternas partiledare Stefan Löfven avslöjade sin stora nyhet på första maj: om han blir statsminister 2014 kommer han att in-föra och leda ett innovationspolitiskt råd.

Idén är inte ny och ett liknande råd finns bland annat i Finland. Det långsiktiga målet är fler jobb genom att innovationsfrågan lyfts upp och samordnas på högsta politiska nivå i dialog med näringsliv, forskning och arbetsmarknadens parter.

- Vi lever i en internationell konkurrens och det innebär att förutsättningarna förändras nästan från dag till dag. Det är därför den här dialogen med näringslivet är så viktig, sade Stefan Löfven till TT.

Men näringsminister Annie Lööf av-visar idén.

- Det är inte inrättandet av fler råd som i första hand stärker Sveriges innovationsförmåga och konkurrenskraft,

det är satsningar på forskning och innovation, riskkapitalavdrag, sänkta kostnader för företag och kreativa miljöer. Det är på de delarna regeringen lägger sitt fokus, säger Annie Lööf i ett mejlsvar till Ny Teknik.

I sin skuggbudget presenterade socialdemokraterna fler förslag på innovationsområdet, som mer pengar till forskning, bättre möjligheter till avdrag för FoU-utgifter och en innovationsstrategi för offentliga upphandlingar. På detta svarar Annie Lööf: - Jag välkomnar givetvis Socialdemokraternas intresse för näringsfrågor men förslagen de hittills presenterat är antingen återvinning av gammal politik eller sådant som regeringen redan genomfört eller aviserat.

Arbetet med den svenska innovationsstrategin, som regeringen arbetar med sedan drygt ett år tillbaka och som ska presenteras till hösten, innebär redan en nära dialog mellan politik, näringsliv och forskning, enligt Annie Lööf.

I söndagens partiledarduell i SVT förlöjligade statsminister Fredrik Reinfeldt socialdemokraternas för-slag om ett innovationspolitiskt råd "Stefan Löfven bjuder in till att fika så att jobben blir fler".

Att politikerna nu slåss om vem som är mest innovationsvänlig är inte så konstigt, enligt Pontus Braunerhjelm, professor på KTH och vd på Entreprenörskapsforum.

- Innovation är det nya buzz-ordet bland politiker. EU och OECD driver frågan. För Barack Obama är innovation hans Sputnik. Tittar man bakåt är också innovation det som har varit viktigast för att skapa välstånd i ett land.

Så ofta nämns ordet innovation

●● Regeringens vårbudget 20

● S skuggbudget 24

● MP skuggbudget 9

● V skuggbudget 8
Fotnot: I sitt tal till nationen förra året sade Barack Obama att innovation "är vår generations Sputnik-ögonblick.". Att Sovjet blev först med en satellit i rymden var det som satte fart på amerikansk forskning och rymdteknik.

Bildtext: Stefan Löfven, S, planerar att leda ett innovationspolitiskt råd, om han blir statsminister efter nästa val. Inrättandet av fler råd stärker inte Sveriges innovationsförmåga, enligt Annie Lööf, C.

NyTeknik


NYHETER

Kina satsar miljarder på svensk innovation

Samarbete om bilsäkerhet i Peking

Elever flyger inomhus

Sjöland&Thyselius

Kina satsar miljarder på svensk innovation

Ny Teknik. Publicerat i print 2012-06-07.
Marie Alpman. - marie.alpman@nyteknik.se. Sektion: nyheter.
Sida: 4.
Del: 1.

Kinas oväntade mångmiljardsatsning på samarbete mellan Kina och Sverige ska gå till innovationslån, bland annat till små och medelstora företag. Men Sverige måste se till att kunna påverka villkoren för lånen, anser Kinaexperten Frédéric Cho vid

...Handelsbanken. Under sitt besök i Sverige i april deklarerade Kinas premiärminister Wen Jiabao oväntat att landet satsar nio miljarder kronor på ökat samarbete med Sverige inom forskning och industri.

När näringsminister Annie Lööf besökte Kina i förra veckan var ett av syftena att få klarhet i vad Wen Jiabao egentligen menade med sitt mångmiljardlöfte.

- Det jag fick reda på är att det kommer att vara innovationslån genom China Development Bank och att man skulle bli utvald genom MIIT (Kinas departement för industri och it), säger Annie Lööf till Ny Teknik.

Men vem som kan söka, till vilken typ av projekt och när det kan ske fick hon inga klara besked om vid samtalen med bland annat Kinas industriminister.

- Det är kinesiska pengar och det är Kina som styr upp ramverket, men de har ännu inte satt ner foten, säger Annie Lööf.

Klart är att Kina vill främja mindre företag. En avsiktsförklaring om att stärka innovationssamarbetet kring små och medelstora företag undertecknades vid Kinabesöket. Syftet är bland annat att skapa en bättre dialog kring frågor som immateriella rättigheter, standarder och byråkrati. Den innehåller också en artikel som kopplar den till innovationslånen.

Enligt Frédéric Cho, Kinarådgivare på Handelsbanken, kommer det att ta tid innan några lån kan betalas ut.

- Det är en tydlig avsiktsförklaring, men lånen måste baseras på konkreta projekt. Hur urvalet ska ske är ett av flera frågetecken.

För Sveriges del gäller det nu att vara med och påverka.

- Tyvärr hamnar vi alltför lätt i psykologiskt underläge när det borde vara tvärt om. Kina beundrar Sverige som teknikland. Vi kan vara med och diktera villkoren.

I Sverige finns än så länge rätt få kinesiska företag som skulle kunna delta i projekten. Frédéric Cho nämner Volvo Personvagnar, som ägs av kinesiska Geely, Huawei och ZTE.

- Det kommer att komma fler, men det blir ingen massinvasion. Snarare kan lånen gå till svenska företag som har en intressant teknik att erbjuda kinesiska företag.

Frédéric Cho påminner om att Sverige ställde upp med stora lån till Kina under 1980- och 90-talen. Pengarna användes för att hjälpa svenska företag att exportera till Kina.

Han säger att det inte är något nytt att Kina ställer upp med stora lån till andra länder genom Kinas utvecklingsbank.

- Men hittills har de främst varit riktade mot Afrika, Mellanöstern och Latinamerika. Nu börjar de också gå in i mer utvecklade länder. Det är en medveten satsning med fokus på bland annat teknik och innovation.

Samarbete om bilsäkerhet i Peking

●● Sverige och Kina har också undertecknat en avsiktsförklaring om fördjupat samarbete inom bilsäkerhet. Detta är dock inte kopplat till Kinas miljardsatsning på innovationslån. ● Ett gemensamt forsknings- centrum kommer att skapas i Peking. Från svensk sida deltar Chalmers, Volvo, Volvo Personvagnar och innovationsmyndigheten Vinnova. ●● Samarbetet om forskning handlar för Volvokoncernens del om orsaken till trafikolyckor och om förarbeteenden.

● ● Under det närmaste halvåret ska parterna diskutera hur samarbetet ska utformas.

Bildtext: Frédéric Cho.|När Kinas premiärminister Wen Jiabao besökte Sverige och Annie Lööf i april, deklarerade han oväntat att Kina ska satsa nio miljarder kronor på svensk innovation. Näringsminister Annie Lööf skrev under en avsiktsförklaring om att stärka innovationssamarbetet kring små och medelstora företag under sitt besök i Kina förra veckan.

NyTeknik

Forskningen het för Fredrik & C:o

Debattörer vill se samarbete över blockgränserna

Teknik. Publicerat i print 2012-08-22.
Marie Alpman. - marie.alpman@nyteknik.se. Sektion: General.
Sida: 8.
Del: 1.


NYHETER

Forskningen het för Fredrik & C:o

Han vill ha mer subventioner till miljöbilar

Tio förslag för att göra Sverige mer innovativt

Debattörer vill se samarbete över blockgränserna

LUFTKNIVAR För renblåsning

026-176550

Spraying Systems Sverige AB

Regeringen vill satsa mer på forskning. Biomedicin och energi är områden som kan få mer pengar.
Men flera debattörer vill se samarbete över blockgränserna för större långsiktighet i forskningspolitiken.
Regeringen är nu beredd att lätta på plånboken, och forskning är ett av de områden som ser ut att gå vinnande ur budgetförhandlingarna, som drar i gång på fredag på Harpsund.

I sitt sommartal i helgen sa statsminister Fredrik Reinfeldt att det är dags att satsa på forskning och infrastruktur för att bygga Sverige "långsiktigt starkare".

Utbildningsminister Jan Björklund har uttalat att forskningen behöver "några miljarder mer varje år".

Att det blivit "inne" bland politiker att prata om forskning och innovation är delvis en "Löfveneffekt", enligt Björn O Nilsson, vd för Ingenjörsvetenskapsakademien, IVA.

- Stefan Löfven har lyft frågan. Både regering och opposition inser att vi bara kan skapa nya jobb i framtiden genom att satsa på kunskap.

På regeringskansliet är forskning och innovation heta frågor i höst. Inom kort presenteras den nationella innovationsstrategin och i oktober kommer en ny forsknings- och innovationsproposition. I den förra, som kom 2008, fick forskningen ett lyft på fem miljarder kronor, bland annat till olika strategiska områden.

Den här gången vill Jan Björklund se att en stor del av de nya forskningspengarna öronmärks för olika elitsatsningar. Till exempel ska unga forskartalanger kunna få stora, egna forskningsresurser.

Det är ett förslag som får stöd bland annat av KTH:s rektor Peter Gudmundson.

- I princip är det bra. Det är i dag en global konkurrens om forskarstjärnor. Men det får inte bli för mycket detaljreglering. Högskolorna bör ha stor frihet att själva styra över sina medel.

Björklund vill också att pengar ska avsättas för att få framgångsrika internationella forskare till Sverige. Till exempel ska de lockas till biomedicininstitutet Sci Life Lab i Solna, en av de satsningar som väntas få mer pengar.

Många debattörer efterlyser dock en större långsiktighet.

- Precis som inom finanspolitiken borde regering och opposition enas om ett innovationspolitiskt ramverk. Vissa forskningsbeslut borde också ha en längre tidshorisont än fyra år, säger Björn O Nilsson.

Trots en invit om samtal i somras har oppositionen inte hört ett knyst från regeringen, säger Ibrahim Baylan, Socialdemokraternas talesperson i utbildningsfrågor, till Ny Teknik.

Han poängterar att regeringen borde vara medveten om att de inte har majoritet i riksdagen och att forsknings- och innovationspolitiken behöver vara långsiktig. Annars är risken att alltför lite blir gjort.

Bildtext: I sitt sommartal utlovade statsminister Fredrik Reinfeldt mer satsningar på forskning och infrastruktur.|Peter Gudmundson.

Carin Österberg and Johnas Eklöf
Gender and Video Games

Gender and Video Games

Supervisors: Tomas Brage, Sarah Goodman

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GEMF05 LTH
Carin Österberg, Johnas Eklöf

Abstract

The fact that video games are gender unequal is often overlooked by the game designers; this could be due to that the average player is considered to be a white man. The gender aspect of videogames will be discussed considering the Cyborg solution. Three games will be taken to consideration, Mass Effect, Assasin´s Creed and World of Warcraft. Our own experiences and existing articles will be used when analyzing the games. Game characters are often over sexualized in these games and the story does not address gender problems. Women self-esteem in relation to gaming could be a topic for future research.

Key words: Gender, Videogames, Cyborg, Character's attributes, Players

Table of contents

Research question

Are characters in videogames designed in a gender consciously way and what are the preconceived ideas about the videogame players?

Introduction

There is an increasing awareness of gender issues in the modern society, especially when considering the relatively new phenomena video games.

Miller M. K. et al, summarizes in the report [1] how there is a significant gender difference in the present video games. The article shows that men occupies the main characters while the female characters takes a lesser important role for the game. The women in the games are as discussed in the article over sexualized, often with revealing clothes, more attractive attributes and have smaller and more innocent personalities. The male characters have in comparison more muscle mass, uses weapons and dressed in the role of heroes.

Miller M. K. et al, [1] continues to discuss the fact that the media form video game is something that have great impact on the people in the society comparing to other media forms and especially the children which spends a lot of their free time playing videogames. There are great differences in watching a movie, seeing supportive roles getting killed in different ways by the main characters and actually take the decision to kill the supportive roles yourself in a videogame. Miller M. K. means that the children that plays videogames often refers themselves to the characters in the games. When they start to compare themselves with the characters, there is a great chance that there self esteem will be damage when they fails to live up to the characters habits in the games.

Due to this reasons there is of interest to investigate a little bit deeper in this by comparing different games and see how the characters are portrayed. Could for example the way that the game designers chose to describe the characters in the games affect the amount of men/women that uses the game? Could there be anything else that could affect the amount of playing women/men?

The focus of this report will be on how the video games are created to attract male players and how the games will exaggerate the masculine role and the female role in the characters of the

game. But also how a girl which plays video games is perceived by others and which role they have to play to fit into the culture of video games.

The fact that the games look different when the creator have tried to make a game attractive to women compared to the ordinary games and how the users will advance in the corresponding game is different from the traditional video games will be treated and taken to consideration when doing the method and discussion.

Is the video games deliberately designed to a specific audience, a specific male audience just because that they are the target group assumed to buy these games? Could some form of positive feedback explain this behavior, if the buyers are mainly men, then it is kind of logical to design male targeted games. It should be mentioned that the games is not targeted to all men, but rather a specific group of men and women.

Hopefully the discussion will lead to some suggestions of why the video game users are mainly men and give some examples of what is needed to be done to attract more female video game users.

Theory

When reading “Has Feminism Changed science”, there is easy to come to the conclusion that women has been underrepresented in the world of science during the centuries. For example women could not admit to the Royal social until the end of Second World War, meaning that they had been excluded from taking part into the recent evidences in science and technologies adding their own thoughts and developed their own opinion. [2] When the first computer was designed in the 1940´s they were seen as the frontier in technology. Women were still underrepresented in scientific contexts at this time, meaning that they also were underrepresented in the novelty field of computer design and development. Hence, the men had the pole position in the new technology fields compared to women.

When the term Cyborg (a hybrid between human and machine) was developed in the early 1960´s people started to play with the thought that the concepts male/female could be redefined by introducing the Cyborg concept [3]. The boundaries between the attributes of men and women could be blurred, when for example the lack of muscle mass could be solved by using machine power, the control of labor could be enable thanks to hormones and perhaps even by growing embryos in vitro. In the 1960´s when the possibilities of manipulating the human body were still relatively limited Donna Haraway introduced the so called Cyborg solution where the concepts male/female and even human was completely erased and replaced by Cyborgs, which is also thought to be the next logical step in the evolution of the Homo Sapiens Sapiens.

At present thousands of people has a pacemaker device that assists their heart, and even more recently the first person got his heart completely removed and replaced by a complex pumping device [4]. The medical science has reached so far that it is possible to change sex and deform our bodies with the help of plastic surgery. Even though that the technique is available, does people use them to blur the concepts of male/female or perhaps is the techniques used to amplify the differences between men and women? Over two million American women have manipulated their breast sizes by using implants during the last twenty years [3], and more and more men uses steroids to induce their muscular mass, both of these attributes are considered to be feminine respectively masculine.

When the first videogame was developed, they were simple and based on letters and texts, but soon they develop into new worlds where the player can take the role as a completely new being, perhaps not even human. Could this video games be considered as a Cyborg, similar to heart or breast implants? Could the videogames be considered as the Cyborg solution and create possibilities for humans to travel between the present genders? Does the video games blurs the concepts of male/female or do people use the games to amplify their gender attributes?

Method

We have chosen to investigate three different video games in the action/adventure genre to be able to contribute to the present gender debate about the design of game character attributes and habits. These are the following games: Mass effect released by Bioware, World of Warcraft released by Blizzard Entertainment and Assassins creed released by Ubisoft Entertainment.

Mass effect uses a sci-fi story in a near future; it enables the player to choose sex and appearance of the main character. Mass effect is based on a multi linear storyline where the user can for example experience different endings.

Assassin's creed is a game which takes place both in the present, but also in different historical eras where the main character is consistently men. The game gives the user a lot of freedom exploring the game, but the main storyline is strict linear, hence only results in one ending.

World of Warcraft is an online game giving user the ability to interact with other users. The story is multi linear and is also a never ending story, meaning that the game will update itself with new quests and sub stories. The game is strictly fiction in comparison with the other games above. The users have to choose sex and race when creating the main character.

We will analyze different existing articles about the games and compile the most interesting part into this document. Debater's opinion in a forum will also be used. It should be said that we have played all the games thoroughly; this means that we will be able to describe the

games via our experience of the games and add our opinions to the discussion as well. When drawing the conclusions we will reconnect to the theory formulated above.

Discussion

Mass effect

The thesis by Rebekah Robson-May (2011) [5] analysis the game Mass Effect 2 and the study is done with USA as the target. Rebekah Robson-May (2011) makes an analysis how the game is marketing and finds out that in the campaign, to promote the game, only a male main character is presented and the fact that you choose your gender by your self is nowhere to be found. This is strange because Bioware, which is the creator of the game, would benefit from making it clearer that you, as a player, choose the gender. This would probably speak out to a lot more customers and would to a bigger extend attract female players.

Rebekah Robson-May (2011) also tries to find out the reason for this male dominated marketing for the game. The reason she writes about is the assumption that the 'typical gamer' is a young, white, heterosexual, male, but if you look at the research done by Entertainment Software Association (ESA), an industry group "dedicated to serving the business and public affairs needs of companies that publish computer and videogames..." the numbers from 2010 speak a different story where 40 percent of the gamers are female and the average age for a gamer is 34 years old.[5] The reason for this high amount of female players is due to the fact that ESA didn't just count the videogames and computer games but also phone games such as bejeweled and solitaire. These games, more puzzle like, are more popular with female players so this will increase the percentage of women playing. So if just looking at the adventure/action games the number of female players would probably go down. As Rebekah Robson-May (2011) writes, this could be due to a negative circle, where the game creators due to their marketing campaign doesn't attract female player, but exclude them by choosing to just portray the option of a male character in the game. This will of course lower the number of female players and lead to the fact that the 'typical gamer', which companies looks at when doing a marketing campaign, will still be a young, white, heterosexual, male.

To be noted, the marketing was previously discussed regarding Mass Effect 2, but for Mass

Effect 3 the cover of the game had two sides and you could choose either to have a female Shepard in front of the game or a male Shepard, this is a step in the right direction for a more equal marketing.

To widen their range of buyers they could use the female main character as well, which would show a game that gives the opportunity to play a strong female leader who saves the universe. But even though the game is a good game to play if you would like a strong female as a role model, Rebekah Robson-May (2011) still shine some light on the sexism that exists in the game. The main character, (named Shepard) is almost spared from the objectification of the female body and is not hypersexualized, this due to the clothes and uniforms she wears which seems to be more practical than revealing. For example the armor she uses cover the entire body and there is no cleavage, but there is still quite form fitting so the body shape is still visible but Shepard's breast are not oversized and her waist is not super thin, her body shape is more normal than others.

When creating the Shepard character you can customize it and choose the eyes, chin, skin color, hair etc. Although Bioware has done a good thing and choosing to make the skills the same regardless if you choose a male or a female, there are one big difference that as the female character you can choose which make up she should have, like eye shadow, blush, mascara and lipstick. This is not an option if you choose the male and this make it clear that Shepard, as a woman, would like to have makeup when saving the universe.

When looking at the NPC's (Non-Player-Character), the characters that helps Shepard in her quest to save the universe, the female characters have sometimes very revealing clothes and even if it seems impractical, have high heels. Even though some of them suppose to be of another species than human, their appearance is still very human female looking. If you compare to the male characters from other species they can look very different than human and often they have full covered armor. One thing that Rebekah Robson-May (2011) comment upon is the fact that the NPCs that work on the ship doesn't have the work that you would expect for that gender. For example, the doctor is a female and so is one of the engineering experts, on the other hand, the secretary and the psychologist are female and lots of the soldiers that Shepard meets are male. To be noted is the fact that among the crew, an observation can be made that in general it seems that the male characters are often better at weapons and the females are often better at "magic" (biotics), but biotics is not simply healing

and back up, it is often offensive and some of the males masters this “magic” as well and the females is also using weapons.

There are some parts of the game where sexism against females is quite obvious. For example, Shepard visits different bars throughout the game, and in some bars there are Asari dancers. The species Asari is blue of color but they look very much like a human female. These dancers dance on top of tables surrounded by male characters from different species admiring them as an object. In the most criminal club there is also prostitutes which is both human and Asari.

Bioware have done something different with the species which is quite interesting from a gender perspective. The species Asari is in fact mono-sexual, they have no male counterpart. The Asari is portrayed as wise and will live for a very long time (1000 years old is in fact middle aged), but they are continually portrayed as a sexually female (table dancer) this is done in a two sided way. On one part, since there is no male of this species all the high position and respectfully warriors are female, but on the other hand they seem to attract males of other species in just the same way as the human female. Another species, Geth, is in fact a machine, this would imply no gender at all but as Rebekah Robson-May (2011) writes that the voice of the Geth are more male than female but the appearance is quite gender neutral.

As Rebekah Robson-May (2011) writes “The game tackles many social issues involving moral judgment, such as xenophobia, engineered genetic defects, corruption in government, genetic manipulation and cloning, self-determination, violence, and the ethical treatment of criminals.”
However it is sad to see that the one thing that is more of a background issue and are not straight up confronted or questioned is Sexism and gender bias. This game is suppose to take place in the 22nd century and these problems still is not seen as a great deal and not been addressed even with several other species with knowledge at hand.

The report by Rebekah Robson-May (2011) is, as mention before, done on Mass Effect 2, but the series continues to the third and final part. In this last part one major change has been done, which the blog 1up [6] writes about, and that is that Shepard now can have homosexual relationships. This is done in a very good way, there is one character in Shepard´s crew that is lesbian and one that is gay this will make it possible to have a homosexual relationship

whichever gender Shepard has. If Shepard is a woman and chose to approach the gay character, he will still be gay and not interested in a relationship with the female Shepard, but talks about his loss of his husband. As a female Shepard you could still have a homosexual relationship in the previous game but the new and interesting thing is that the male Shepard also could get involved in a homosexual relationship. This is commented upon in the 1 up blog and the reason for this is that male gamers enjoy "seeing pretty ladies kiss" but the muscular men in a relationship is more of a statement from Bioware which has taken a step further in that everyone is of equal value.

Assassin's creed

Assassins creed is a game series released by Ubisoft Entertainment. The series consists of five different games in which you take the role as the main character Desmond Miles. Each game revolves around the fictional machine called the ANIMUS which enables the main character to relive the lives of his ancestors; the different games in the series will be unfolded in different historical eras. In the first game Desmond relives the role as Altair, a man who lived during the third crusade. All the important roles are played by men, where the women only play passive roles without replicas.

In the second game Desmond takes the role of a young gentleman from the Renaissance sphere in Italy called Ezio. This character evolves during three games and he travels from Florence to Rome and subsequently to Istanbul in the fourth game. In this three games female characters starts to appear, for example Ezio can call the aid for female courtesans (and later on Romanies) to lure guards (which is of course men) from their posts using their sexual attributes, or even female thieves who can distract people by pickpocket them. In these games Ubisoft introduces a couple of important female characters with lines in the script which makes the act moving forward, his mother and most important his sister. Since the game developers wants to be as historically correct as possible they still have clothing correspondingly to that time, the differences is that the cloth are not as revealing compared to other games due to the differences in fashion from the Renaissance compared to nowadays.

The last game which was released this very autumn takes place in the revolutionary America, the main character in this game is also a male person called Connor. Ubisoft tries to involve a broader cultural spectrum by introduce the main character a half native American and the ways of the character´s tribe, although still a male person. As in the previous games there are

still independent women who figures in this game, although the female characters in this game have no part in the main storyline, only having importance for the optional side quests.

When reading an online forum about gender and Assassins creed III (the fifth game in the series) there is easily to see that several debaters have that opinion that it would be nice to have a female character in the game. They clearly point out that there is no problem for the game designers to have a female character and go against the history because the characters are all fiction from the start. In other hand, the debaters also point out that they are satisfied by being forced to either a male or female character. They actually demand this, arguing that the game is not designed to be a role playing game. Some debaters argues that it would complicate things too let Desmond experience the life of a female relative, since there is a risk of confusing the sexual orientation, if the hypothetical historical female main character would be attracted to male characters, the present main character would then be gay, and vice versa. [7]

According to the creators of the game series assassins creed, there were thoughts of having a female main character in the third game, but they finally decided to use a male character just in order to be more historically correct, meaning that a male character at the 18th century would have a bigger freedom in speech, opinions, movement and the ability to blend in. When reading the book "*Has feminism changed science*" you could draw a conclusion that there have been a lot of important, forceful women in history, the only differences to the men in history is that the women have not been rightfully retold by the historians and this could influence the appearance of women when trying to do a historically correct game. [8]

World of Warcraft

About 12 million play world of Warcraft [9] 2010. In Europe only 29% of them was female [10], but this is an increased number if you compare to the study done by Vio Szabo 2008 [11] "Spelare som råkar vara kvinnor" where only 16% were female players. Szabo 2008 mentions several observations about the female players and how the norm in the game is strictly male. The players are always assumed to be male and when the female players point out that they are in fact female they meet prejudice about their game skills which is assumed to be lower than for a male. Because there are so few female players there is also this other treatment where the male players will help and give things to the female player and even flirt. This is expressed by the female players as both an advantage and a disadvantage, this because

you get a lot of thing and help for free which you wouldn't get otherwise, but in Szabo's report 2008 they also explains that they feel less worthy because the other players assume that they can't manage to complete quests on their own which the males are presumed to do.

Szabo 2008 also describes the appearance of the game and how the female characters often look much less monstrous and often have more features of beauty. In some races the difference between male and female is so big that they almost seem to be different races. Attributes such as oversized muscles are exaggerated for the male characters, this correspond to attributes such as strength and power which is something you need in the game, but the attributes that are exaggerated for the female characters are such as big breasts and a thin waist, this will sexualize the character and do not contribute to any attributes that is needed for the game because you cannot have sexual encounters with other players. This will rather make the female character more included in the race "woman" than in the race in which it is included in the game (Corneliussen 2008)[12].

The characters which is not controlled by a player but is programmed by the creators, the so called NPC's (Non-Player-Character), are more male than female (Corneliussen 2008) and the background story of WoW is dominated by male characters. But a way for blizzard to make the game more equal is that the NPC's often have a good distribution of male and female in the different occupations. So you can find both male and female guards and smiths which in the real world is considered more male occupations. But when the NPC's is portrayed as animals, which you can't interact with, such as an elephant like animal walking on the savanna, the male and female creatures are very different. The females are often the ones walking around with calves and with other individuals in a herd and they are often non aggressive. Males on the other hand often walk alone and when a player comes to close the NPC gets aggressive and will attack. This will show the more typical animalistic attributes of the male and the female where the female takes care of the offspring and the male is aggressive. The attributes between the male and female creatures are little or none existing, but the male individuals are portrayed as ox, bull, ox, bullock etc.

According to Yee (2005) the percentage for a male player choosing a female character was 23% but only 3% for a female player to choose a female character. This could be because the females want to escape reality and experience, in one way, the freedom it means to be a male in a male dominated society such a WoW and not be judged by their gender but by their skills.

This could be an underlying cause why so few female players choose a male character in game.

Our own Reflections about the games

Mass Effect

There are several game options at the end of the game. One of the end is to kill all electronics and let the biological life live on its own. The second ending which to choose is to make the main character into a machine controlling all the other machines and direct all the life in the universe in the most appropriate direction. The third way in how to end the game series is to mix the main character´s DNA with the electronic program which now controls the universe. This turns all biological life into Cyborgs and ends the war between machines and biological life. This is the ultimate step into a gender neutral society and follows the theory written by Wajcman where a Cyborg society in the future will result in an equal value for everyone where gender and race doesn't matter.

When considering the Geth, a machine constructed by an alien species, they could be seen as a version of Donnas Cyborg society where all beings are gender free. The only thing is that the Geth has never encountered the problems that occur to hermaphroditic species at some point in their evolution. Geth were never designed with different gender and they were never designed as separate individuals but rather as a superior program that is able to download itself to different vessels (the physical robots) still linked to the other vessels, this means that if one vessel discovers or experience something then all the vessels is able to act in relation to that, it is therefore impossible for contradictions to occur between different Geth because of this. Due to the common consciousness the Geth will achieve perfect understanding to each other. If the same thing could be applied to the present human species it would lead extension of all individualism in society this compared to Donna Haraway's theoretical experiment with Cyborgs which demonstrably has not reach gender equality.

Although a parallel can be seen to the internet today which is a place where information and cultural beliefs is gathered and opened for the public. In theory this has lead to the fact that human beings has greater understanding to each other, but there is still a long way until we have reached where the Geth is with a perfect understanding to each other and a common consciousness.

It could be hard for women to choose a male character because they don't want to step up in the pyramid of power [5]. Another reason why women chose female characters could be that it is easier to identify with that character. In the game you would receive more power compared to the real life scenario where a woman's skills would be questioned because she is a female working in a male dominated such as war and politics. It could be interesting to note that the default settings for the Mass Effect games concerning the main character is a white male person, and if you would to be lazy and don't want to customize your character you would end up with a white male character.

Assasin´s Creed

This is a game, dominated by male characters and the game developers does not take the chance of introducing more female characters. For example the main character Desmond could easily be a female since we live in a more gender equal society nowadays.

There is a supernatural twist to the story, where gods from the past talks to Desmond in the present. Theses gods are mostly represented by two females which had a civilization before the birth of ours. At the end you realize that the gods have put their consciousness into a big computer program which they use to communicate with Desmond. They could be seen as Cyborgs but they do not act gender neutral and rather highlights their femininity, which contradicts the Cyborg solution. Additional one of these characters' goal is to rule the world which would not lead to an equal society but rather the opposite, an enforced way of living.

Gender problems are not approached in the Assassins Creed series. The story focuses on other inequalities in the society and deal with discrimination of race and class differences hands on. Therefore it would not be farfetched to introduce some gender dilemmas into the storyline which the player could reflect on. This would probably lead to a deeper understanding of the gender problems through time, and show the positive results that come from changes done by forceful women and men which have strived for a more gender equal society through history. More women would perhaps play the Assassins Creed series if Ubisoft Entertainment would have included theses dilemmas about gender in the storyline, this because the women could perhaps easily relate to these gender dilemmas and feel sympathy with the women in those time in which the game takes place.

World of Warcraft

This game is easy to compare to the Cyborg solution because you design your character and use it as an avatar. This avatar disguise you're truly identity, the abilities of your character does not depend on the gender, a male character with the same race and class as a female, has equal chance to complete a quest and level the experience. The differences first appear when interactions happen between players. Several players might in fact cover their own identities by designing a male or female avatar totally different from their own personality. This can make people act in a different way than they normally would have done in real life. In some way this could give more freedom to the players to explore social roles that they normally would not experience. For example women could play a male character and experience the feeling of being taken seriously and men could play a female character in order to get the aid from fellow male character players.

The fact that the abilities of the character is not dependent on the gender could be a part of the Cyborg solution described in the theory, but the difference appears when the players start to interact with each other and fall into the normal social gender roles. As written in the theory about Plastic Surgery being used today to exaggerate the gender attributes such as breast implants and steroids, WoW also highlights the different attributes between male and female and this in some way will counteract the Cyborg solution.

Conclusion

After this project there are a lot of conclusions that is able to be drawn considering gender and video games in the present society. There is probably really hard to reach a complete gender equal society if considering the Cyborg solution. The technology has already in some way the possibility to equalize the characteristics between men and women, at least if considering the world of the video games, where it is possible to create a character where the player are able to choose the gender and appearance. Although the human race still exists of separate individuals with their own thoughts. This is of course a source of contradictions between humans; the ultimate solution would then be if all humans shared the same thoughts (as the Geth), hence increasing the understanding to each other and eventually leading to a gender equal society.

At the moment there are trends that go in different directions. Novelty technologies are used both as a gender equalizer but also as a tool to exaggerate the different gender attributes. For example, plastic surgery has opened the possibilities for people to change their sex and appearance, but this technique is also used when enlarging breasts or muscle mass. It is also visible in the video games were female/male characteristics are exaggerated but where the strength and agility is not dependent on the avatars sex.

This genre in the gaming industry, does in some way exclude the female player. It is perhaps not by purpose but the assumed player is a white heterosexual male so the game creators are marketing towards that group in the society. This will in some way exclude the female players which will result in a continuous gendered marketing to attract the already existing target group. So by changing the storyline to include more gendered morals and perhaps more strong heroines to become role models to female players, the gaming industry would open up to a whole new audience, hence result in a bigger profit for the developers. They could also change the appearance of the characters so the female body is not as objectified, the comfort for female players could then increase. There are of course the argument that by doing these changes the gaming industry would lose buyers that would like it the way it where, but for the most part, the guess is that it is the storyline and the challenge of completing the game is what attracts the buyers to play these games. The gaming industry need to be modernized just like the rest of the society to include women as well.

The fact that the games needs to be modified to reach gender equality between the characters is not only important for the industry, but also for women who wants' to play games in the action/adventure genre. As discussed in theory women has been excluded from the scientific realm for centuries where the concept of trial and error or the fact that it is ok to fail and then try again is general accepted. The gaming experience practices this concept and maybe a solution of how to avoid this phenomenon that exists today for young women where they constantly have to perform good results without the possibility to fail and try again. This is hard to verify but there would be interesting for future research to look at how an increase in videogame playing for women could influence their self-esteem. Subsequently give the opportunity for female players to build up their own feeling for accomplishment though action/adventure games and not just enter a man's world where the feeling is borrowed for as long as the women play by their rules.

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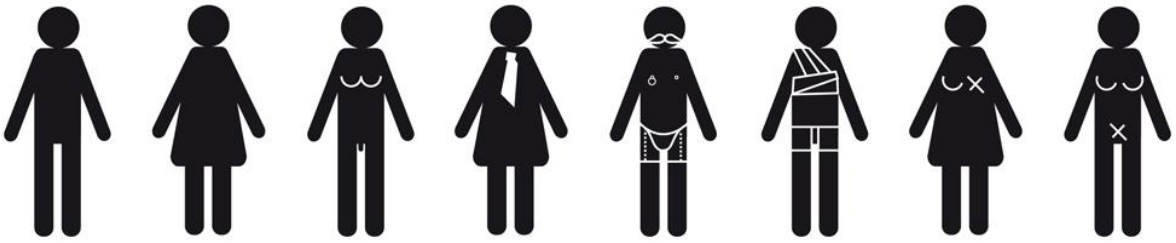
Victor Lundgren

Gender in design and innovation

Gender in design and innovation

- Victor Lundgren



Abstract: The purpose of this paper is to highlight what role gender-construction has in design and product development. This is done by using established literature and gender-science as well as recent publications and articles. In the field of design it's always relevant to achieve an innovative environment resulting in new or better products. This paper therefore illustrates how gender-perspective can be used to guide the design-process towards product innovations.

Keywords: Gender, innovation, discursive design, persona

Contents

Introduction

This paper is about design and the processes that lead to new products. As a designer you need to some specialized skills but being a really good one often comes down to being able to understand the end-user. It is the final user that determent quality and success of a product so their experience must always be put first. The target group is often hard to point out early in a design process leaving room for problem and misperception between product development and the actual user. There are many researched design tools established over the years that try to deal with this. For example you can conduct exploratory usability testing, make different ranking charts and so on. The result of these methods can of course vary but they still include that the designer have to guess the target group or interview an existing one. Nowadays there's a design philosophy that tries to count in everybody in the target group, making what's known as "design for all". In this way you count not only the capital-strong and normative population but also minorities such as elderly, disabled or in other ways left out buyers. The goal is not only to make product that are available to everyone but also that the user-experience of the product will benefit.

Purpose of paper

I'm going to address how gender construction is reflected in product design and the finished products. I will also analyse if a gender-perspective can be useful in the design- and innovation process and, if so, why it should be achieved.

Overview of research-method and literature

The paper is based on subject-oriented articles published in internet (see References) with an addition of literature and knowledge from the course (GEMF05 Gender in Science and Technology at LTH) and experiences during my design-studies. The internet articles are chosen to give recent and relevant information about gender in design in this continuing developing subject. The course literature works as a foundation to the science of gender in technology allowing a broader understanding to be made.

This work is very much informative or theoretical research meant to raise thought and problems linked to product design and innovation from the perspective of gender-construction. The articles are therefore illustrating and evaluating the subject (Vinnova 2009), presenting examples in gender aware design (Hansson.L, Jahnke.M, 2009) and exploring new methods of working (Wikberg.Å 2009). Further information is derived from literature (Cockburn, Fagerström etc.).

The work method is set to give the most out of the research time and maintaining an effective and inspiring process.

Innovation

I start off by clarifying the word innovation. In the dictionary, it is explained as something new or different introduced. The word can also describe the act of innovating as introduction of new things or methods. From this it is understood that by innovating you are making some sort of radical change.

The concept of being innovative is something that many people and companies strive for. It is, according to me, seen as something both exiting and glorified. You are changing the standard by introducing a new way of making, seeing or approaching things, whilst taking a risk doing it.

Gender and gender perspective

The term gender is used to address the relationship between male and female, as social and cultural constructed categories. This gender-order is often connected to certain power structure in different relations, similar as to how for example class, religion or ethnic background can affect the power structure in the society.

A popular way of describing gender-roles is the concept of "doing gender" (West.C et Zimmerman.D, 1987 etc.). This perspective focuses on gender as actions, made by the individuals interacting with each other. Gender is something that we, knowingly or unknowingly, do as a result of social and cultural constructions. In this way you different the gender process from the group or individual, seeing gender as something that is created from terms and standards in the society. The doing of gender can be simplified in to four categories (Acker.J 1992 modeled by Vinnova):

- Difference between sexes is made through the division of what's male and female
- Gender-construction is done by symbols and the image of what's male or female
- Gender is done by the interaction and relation between women and men
- Construction of the individual gender-identity is made by approach/choice

Gender in design

In 1993, the authors Cynthia Cockburn and Susan Ormrod released the book "Gender and technology in the making" using the introducing of the microwave oven as an example how gender-construction is displayed through design and marketing. The product, developed by male engineers, is marketed and intended as high-tech goods, and sold next to hi-fi stereos and other male-centered products. In this way it first fails to reach its full potential and wide-spread use in the house-hold. This is a very good example on how a product is loaded with gender-identity right from the design process.

Persona

A persona is a well-established tool for understanding the user's practical and emotional experiences during the design process. The method involves in creating a fictive character that will help to both understand and communicate the target-group's needs and wishes of a final product.

"Without Personas, development teams routinely make decisions about features and implementation without recognizing or communicating their underlying assumptions about who will use the product and how it will be used" (Grudin. J et Pruitt. J, 2003).

You want to base the character on empiric data like interviews or observation of existing users. After this, you can build you persona from the ground up basing it on real people and situations. The end result will be a refined, CV-like, document (including name and picture) but with a more describing content (see fig.1).

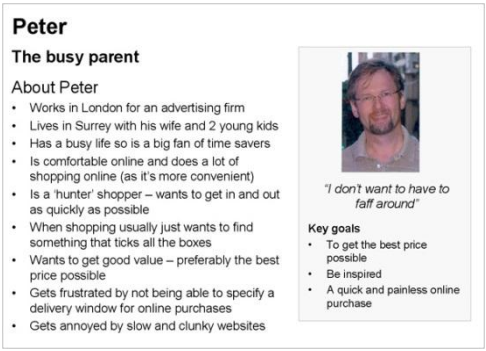


Fig 1: Example of a Persona

For this method to be useful you need to make it believable by creating a well communicated character. It is also possible to combine it with a scenario, giving the person a narrative story to further realize the character.

What Åsa Nilsson Wikberg introduces in her article "*Innovation: change initiated by a design and gender approach"* is another way at working with personas. By creating "the most likely" character you risk making the persona, and therefore the base for design target-group, to an innovation obstacle. Let's say you're creating the persona from a very homogenous group of users, it could be a male dominated line of work. Then your character will represent the typical male-user, creating a gender stereotype of the product's user-group, adding on to gender-inequality. Åsa Nilsson Wikberg presents this stereotype to a group of people (all from the same workplace context) forming a work-shop. They discuss the male persona and find him representative and satisfying of the context's users. To highlight gender-issues and construction she then presents another persona, who is a female representation of the male one. This character is exactly the same as before, only a female. The group continues to discuss, first thinking this a whole new persona. This leads to comment like she's the only woman working at the department. This will maybe separate her from the others leaving her more exposed, for good or bad.

Both personas also bring up the characters family-life, describing them as not so active parents. Their partner works half-time whilst they work long-hours, though taking time to help with the vacuuming. The participants in the work-shop only react when discussing the female version, wondering why she has children at all if she does not want to take care of them. This is probably a common area of gender-difference concerning work-load in family life.

Designing for gender awareness

In the same way that manipulating a persona creates gender-awareness it is possible to design physical products that bring up the subject. This falls under the newly identified category of discursive design that different from traditional, consumer-driven, design in that the goal of the product is to express ideas and raise awareness. The product can therefore be seen as more of an artwork but there's no reason it cannot also be mass-produced and marketed.

To exemplify how discursive design can make the user of a product more aware of gender-inequality I am going to present results from a student project (Hansson.L, Jahnke.M, 2009). The outline for this project was to design and create an exhibition piece with focus on gender- and social construction. During the process, the students would start to reflect on how many products are "gendered by design". When purchasing a razor you could for example go for either the masculine- or feminine type (see fig.2).

Fig.2: Razor marketed for male and female.

Fig.3: The chair "Slothfully"

By observing existing product and using their own experiences they could include this into their own designs. One participant got inspiration from what would be described as a stereotypical male way of sitting, leaned back with a slacker position and wide spread legs. This behavior was experienced on the bus, resulting in that the man was taking up unnecessary space, when the women would rather be crossing their legs. These reflections lead to the making of a chair that forced the person into this "masculine" sitting position (see fig.3).

On the website genderedinnovations.stanford.edu you can look the project "Pregnant crash test dummies – Rethinking standards and reference models". As the name reveals it's about the development of a new type of crash-test dummy that simulate a pregnant women during car crash-testing (see fig.4). This is to give more representative data on how the seat belt affects these women, and especially their babies, during a car crash. What this example shows is how a large percentage of the population often is left out when designing since standards, models and references traditionally are set to fit the average man.

Fig.4: Pregnant crash-test dummy

Discussion

In the field of design it is important to always come up with new and better solutions. Many times it's a process of combining various known things to make this "new" product. The innovation is here in seeing practical, user-oriented and esthetically attractive combinations and not so much in introducing a whole new technology. The designer role is then maybe to connect technology with human-experience, optimizing the link between the often rough technical aspects and human interaction.

The innovative process in design is therefore something that needs to be nurtured, creating a favorable work environment. The consideration of awareness and maintaining an open-minded attitude is vital in growing innovative cultures (van de Ven 1986 quoted in Wikberg 2011). By attaining and maintaining this open-minded culture the result will strongly benefit the design process, allowing radical change (if acquired). Things like norms, standards and fixed ways of thinking will only risk blocking fresh and innovative ideas.

The tweaking of the persona, which was brought up before, is maybe taking a step away from the standard goal of the method as a design tool meant to guide the design process in the right direction. Though, from the previous consideration of gender's part in design and innovation, it is seen as a necessary or at least preferable combination, treating gender-construction as an existing subpart in a broader system.

By switching gender of the typical persona it is possible for reflection of gender-construction with its underlying standards and practices. My belief is that the method brings up a more non-filtered opinion from the observer and therefore makes people aware of gender differences.

When addressing gender-issues it is important to emphasize the mutual benefit of equality. In a design project, or any other project for that matter, equal starting points for men and women will lead to better use and development of work skills, ideas and competence. By questioning current norms you start finding and noticing new ideas, which will lead to new products and markets. These products will hopefully fill a gap in peoples (and especially women's) need for adapted and well-functioning design. They will be based on real usability data (for example the development of a pregnant crash-test dummy) and not gender-construction and symbols like a "shrink it and pink it" way of addressing women through design (se fig.2).

Conclusion

Design has a significant part in cultural creation of gender construction and images. With this said, gender is still not an established part of practice and the design-processes, and not much research is being done on the subject. Products that are addressing men or women often fail to live up to any real user-friendly needs for the targeted group. Instead they tend to help to define and solidify outdated stereotypes and gender-symbols that may not be suitable any more.

By including gender perspective when designing you take in count a greater majority of users. When stepping away from a habit as seeing men as the targeted group, you open up for new or better products that will be satisfying for many more.

As everything else, this change takes both time and initiative. The struggle is to see the gender-constructions that are often obvious but still hard to bring forth to due to many years of cultural adaptation. Here can different design concepts, or methods like a switched persona, be useful for highlighting gender-issues.

Through reaching a more equal design situation you gain diversity in many areas including the work process, new ideas and products. This diversity in thought and competence is in this paper argued to be a key to making really good products and product-innovation.

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Image front page:

http://www.design-research-lab.org/?projects=gendered-interfaces (Fetched 2012-12-03)

Johanna Paulsson and Viktor Nordblom
The Importance of Gender in the Education of Physics at the Faculty of Science, Lund University – A Journey from the Past to the Present

Gender in Science and Technology:

The Importance of Gender in the Education of Physics at the Faculty of Science, Lund University- A Journey from the Past to the Present

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Lund University 2012

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Abstract

Many physicists believe that physics is free from gender issues because of the descriptive nature of the subject. Still it is clear that physics since long have been regarded as a typical masculine science. Some reasons for fewer women in the field of physics can be the lack of opportunities of women in the past, biological differences in the function of the brain separating women from men, early socialization and the formation of a gender identity based on home environment and media etc. It might be interesting to study when during childhood these gender differences occur to better understand their effects. It seems to be that boys and girls in primary school in Scotland are equally interested in science, while a few years later, in the early secondary school stages, these same students show a segregation in their attitudes towards science. In general their level of interest in science has degraded from primary school to secondary school, moreover boys show a greater interest in physics and chemistry than girls, while girls show a greater interest in biology. Crucial choices of subjects to study are made when adolescents are most likely to be aware of their own gender identity and the gender identity of different school subjects. At the university level the methods of teaching might affect the knowledge gap between female and male students more that the teacher affects.
A common belief is that gender differences are decreasing as society is getting more modern. This is however not always necessarily true. Also in physics at the Faculty of Science in Lund University, Sweden, fewer women than men choose to study. Lund University has a computerized system, LADOK, allowing to keep records of students all the way back to 1976. The study made using these records show no particular trend in the ratio of women choosing to study the first course of physics at the Science Faculty of Lund University. Some years or periods have had a lower ratio of men to women, while other periods have had a higher ratio.

Keywords: Gender, physics, Lund university, women, class-room, student.

1 Introduction

"Sex is probably the single most important variable related to pupils' attitudes to science" (Gardner, 1975:1).

Physics have since long been regarded as a typical male science as opposed to e.g. biology or medicine. To understand why this is, a number of articles and literatures discussing this topic have been investigated.
In this study the gender ratio between first year students at the Physics Department belonging to the Science Faculty in Lund is investigated. In addition the gender ratio between students with degrees in physics is studied.

2 Background

Fewer women than men is a well-known phenomenon throughout the higher education in physics. In this background section the authors will have a look on weather there is some established explanation for this. Many of the first year physics students at the Science Faculty are adolescents, meaning that the understanding of the adolescent mind might be a key point in understanding why fewer women the men choose to study physics at the university. An adult reader might also remember their adolescent thoughts as less nuanced than today, summarized by Linn and Songer to "The sex-role stereotypes which ensue become particularly pronounced during adolescence" (Linn and Songer, 1993). Smail writes that the crucial choices of subjects to study are made by the students "when they are most likely to be aware of the gender identity of school subjects and to use subject choice to make a positive statement about their own sexuality" (Smail, 1985). Hence, studies made on adolescents might give us an idea of why fewer women than men choose to study physics at the university.

2.1 Women in physics

What is then the reason for the large gap? Londa Schiebinger discusses this in the book 'Has Feminism Changed Science?'. The common belief is that physics is free from gender issues because of the descriptive nature of the subject as compared to the social sciences.

Further Schiebinger discusses the notion that physics is regarded as a very difficult/hard subject, and that this notion could be connected to the fact that there are very few women studying the subject. Other natural-science subjects are not regarded as difficult, for example, biology see an increase in the number of women.

The same gap can be seen not only in education but in the worklife in general, a job requiring lot's of math, which is regarded as hard, see a decrease in the number of women and an increase in the prestige.

Schiebinger also make a connection between the military and physics. World War 2 was the first war were the real battles were fought not only on battlefields but in laboratories constructing more and more advanced weapons and ultimately, the atomic-bomb. Schiebinger writes that the reason for not hiring women when researching and developing weapons was that the would not be able to endure the 'mental stress' weapon development require. However, Schiebinger writes that they could indeed endure the mental stress of calculating integrals and differential equations while their husbands worried about other, more 'important' things. (Schiebinger, 2001)

From a historical perspective, there are many example of female physicist who should have become more famous for their physical discoveries rather than the circumstances surrounding them. One of them is Lise Meitner, who together with Otto Hahn discovered and explained nuclear fission. Instead of them sharing a nobel prize

it was Otto who received the credit for the discovery. In the text 'Lise Meitner: a 20th century life in physics' by Ruth Lewin Sime, she writes;

"Gender questions thread through a woman's life. Would a man of Meitner's prominence have been so poorly received in exile, so readily excluded from an important discovery, so quickly rendered nearly invisible by historians? Recently a Swedish historian noted that women and gender questions have always fallen below a certain 'historiographical threshold'; he then proceeded to entirely omit women, including Meitner, from his own edited volume on 20th-century Swedish physics24. Traditional historians have disproportionately neglected women. The story of Lise Meitner's life and work shows that questions of women's history are essential to the history of science and to history overall." (Sime, 2002)

Another example is the discovery of the double-helix structure of the DNA, by Watson and Crick 1953. Their discovery and Nobel prize would not have been possible if it wasn't for Rosalind Franklin, however, she was not credited for the prize.

Rosalind Franklin was a British chemical physicist who specialized in x-ray crystallography and she took the picture that led Watson and Crick to understand the DNA structure. Jazilah Bte Othman writes about this in an article in The Journal of the Australian Science Teachers Association. She discusses the fact that science seldom is completely devoid of politics and ethics behind the discoveries. (Othman, 2008)

In the equality plan for the Science Faculty from 2010 (Jämställdhets- och likabehandlingsplan för naturvetenskapliga fakulteten 2010) the gender difference between professors in science (not only physics) is presented. The numbers show that the gender difference is larger the higher the education. Of a total of 114 professors, 101 of them where male, this is equal to 89%. (Lunds Universitet, 2010)

Similar numbers can be obtained from the National Science Foundation in USA which shows the number of Ph.D.'s given to male and female physicists (NSF, 2010).

Characteristic	All physical science fields	Chemistry	Computer and information sciences	Earth, atmospheric, and ocean sciences	Mathematics	Physics and astronomy
All doctorate recipients (number)	8319	2306	1665	864	1589	1895
	Percent					
Sex						
Male	70.4	62.6	78.8	57.5	70.6	78.4
Female	29.5	37.4	21.2	42.5	29.4	21.5
Unknown	·	0.0	0.0	0.0	0.0	0.1

Table 1: Statistical profile of doctorate recipients in physical sciences fields, by sex and field of study (NSF, 2010).

Is it something wrong with the way physics is taught?

2.2 Is there a reason for fewer women than men studying physics at the university?

Some listed key points valid in England/Wales (unless specified otherwise) are given below (Stewart, 1998).

- Lack of opportunity
  In the past there has been a lack of opportunities for females. In mixed schools there is a tendency of some subjects to become "girl's subject", while others are "boy's subjects".(Stewart, 1998)

  In the United States AIP has made statistics on this matter. How popular different sciences were between 1966 and 1999 among women, that is, the ratio of how many women obtained a bachelor's degree some science, can be seen in figure 1(AIP, 2000).

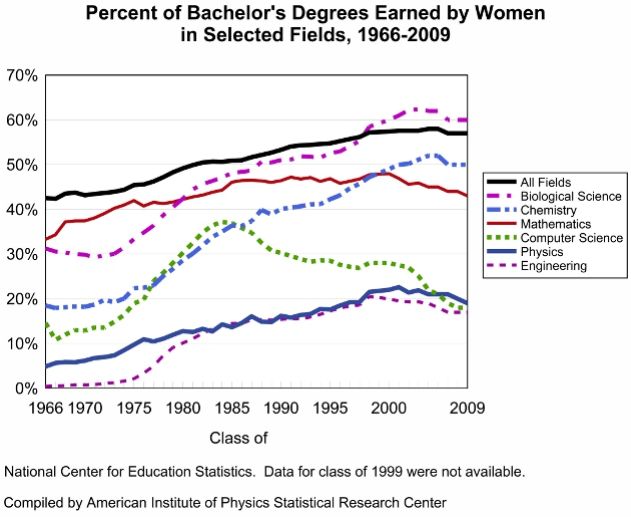

Figure 1: The ratio of women receiving a bachelor's degree in different sciences in the United States between 1966 and 1999 (AIP, 2000).

- Biological differences
  There are biological differences in lateralization of the function of the human brain. Tests show that men outperform women on tests of spatial ability (Gray, 1981).

- Early socialization/ gender identity
  A number of things play a vital role in shaping a child's interest and self image, such as early childhood experiences in question of home and local community environments, and exposure to media and advertising (Johnson and Murphy, 1986; SSCR, 1987; Murphy, 1990). Kelley calls the early socialization "the cultural theory", and claims that boys and girls are differentiated in an early stage by "the toys they are given to play with, the hobbies they are encouraged in, the household jobs they are asked to help with and the masculine image of

science and scientists in books, films and television." (Kelley, 1981)
Physics has a well-documented masculine identity (ASE, 1990; Harlen, 1993, Volman, Van Eck and Ten Dam, 1995; Whitehead, 1996). This might very well talk against women choosing physics at an age when they are anxious to establish their gender identity (Stewart, 1998). However, it is interesting how girls do not avoid masculine subjects to "anything like the degree as boys are avoiding feminine ones" (Whitehead, 1996). A study of this kind is being made at Lund University.

- School effects/subject-matter
  In Sweden there are no single-sex schools, however it might be interesting to consider single-sex schools impact on students' attitudes towards physics. Single-sex schools are widespread in the Western society in countries like the United Kingdom and the United States of America. Girls might develop a more positive attitude towards physics if taught in isolation from boys; Smail found that a higher number of girls choose to study physical sciences after attending single-sex schools in England (Smail, 1984). In any case, the teachers' attitudes towards the girls' abilities in physics are crucial to the girls' self-image and confidence in science (Stewart, 1998).

2.3 When do the gender differences begin to occur?

A new born baby hardly expresses any gender, and yet at the age of 19 the differences between gender might be immense, so when do the differences begin to expose and why? In Scotland both girls and boys in primary school (9-11 years) are positive in their attitudes towards science. However, especially boys seem to find the lessons more interesting and girls find that they learn a lot of new information in science lessons.(Hadden and Johnstone, 1983) 89% of the boys and 96% of the girls express a will to study more science in secondary school, moreover, both girls and boys find that they

- are coping well
- are enjoying doing experiments
- are obtaining a lot of new skills
- like their teacher
- are learning a lot of new information in their science lessons (especially true for girls).

(Reid and Skryabina, 2003).
In the early secondary stages (ages 12-14) in Scotland a decrease in the interest of science expressed in primary school was observed among the very same pupils a few years later (Hadden and Johnstone, 1983). Below some key points in the differences of the pupils' attitudes towards science between primary school and secondary school are given

- In England it has been found that the amount of science done in primary school has no influence on the pupils' further level of interest in science in secondary school (Graig and Ayres, 1988).

- Both in England and in Scotland a number of pupils, both girls and boys, who had shown high levels of interest in science in primary school, showed very low levels of achievement in the first year of secondary school (Graig and Ayres, 1988; Stark and Gray, 1999).

- In England the level of interest in science among the girls, which at primary school had been sometimes even higher than that of boys, seem to have dropped considerably in the first year of secondary school (Graig and Ayres, 1988).

- Girls who had studied extra science in primary school in England, "high science girls", did not express a stronger interest in science in secondary school, in fact, it was instead found that the "high science girls'" interest in science in secondary school was even lower than that of "low science girls" (Graig and Ayres, 1988).

- A study of pupils at the end of their first year in secondary school in England showed that boys had indicated a higher level of interest than girls in physics and chemistry topics. As compared to with primary school, the girls' interest in biological topics remained strong, but their interest in physics and chemistry topics had decreased considerably during their first year of secondary schooling (Graig and Ayres, 1988).

More recent research done in Scotland on second year secondary school pupils (ages 13-14) shows that girls' feelings about their ability to cope with the science course were considerably lower than boys. In addition, significantly fewer girls considered science as "definitely my subject". Hence, the decreased interest in science in the transition between primary and secondary schooling of both girls and boys observed by Hadden and Johnstone (1983) was found to still be evident. (Reid and Skryabina, 2003)
At the end of the fifth or sixth year of secondary school in Scotland (ages 16-17/17-18) twice as many girls as boys favour biology and twice as many boys as girls favour physics. It is notable that the ration of boys to girls in physics stays constant during the remaining years of secondary school after established during the second year (ages 13-14). (Scottish Examination Statistics 1995-1999). In England and Wales three times as many boys as girls favour physics at the GCSE (a part of secondary school between ages of 14-16), and five times as many boys as girls favour physics at the GCE (a part of secondary school between the ages of 14-16 for those who wish to study at the university) (OFSTED 1994).

In Sweden Skolverket makes statistics over the national programs in high school every year. In the table below, table 2, only preparatory programs (programs preparing the students for university studies) are presented. Students in the programs natural

science, international baccalaureate or technology study physics as a part of their program.

National Program	Men (%)	Women (%)
Natural Science	48	52
Technique	84	16
Social Science	37	63
Economy	49	51
Aesthetic	44	66
International Baccalaureate	43	57
Humanism	18	82

Table 2: Ratio of first year high school students accepted to corresponding program in 2011/1012 (Skolverket).

From table 2 one can see that technique is more popular among boys, while natural science and international baccalaureate are more popular among girls. However, the difference of the number of men and women is not as pronounced in the natural science and international baccalaureate as in technique (Skolverket). These numbers can give us an idea of the interest in science for high school students, however, it is possible for all people, even those who did not attend high school or attended a non-preparatory program, to do further reading after the high school years to enable studies at the university in programs such as physics. Of course, there is no guarantee that the students that attended natural science, international baccalaureate or technique in high school will be interested in science after completing their high school studies.

2.4 Physics In the class room

A study conducted at Harvard university investigated the gender differences in an introductory class of Newtonian Mechanics in order to see what methods could be used to reduce the knowledge gap between male and female students.

To do this data was gathered over a 7-year period and the students knowledge was assessed using a standardized test for evaluating the understanding of Newtonian Mechanics. This test is called Force Concept Inventory, in short, FCI.

During the 7-years the teaching method changed, from normal lecturing for 3 hours a week plus 1-2 hours of discussion in smaller groups to a more problem solving based approach. This consisted of the students gathering into smaller groups (4-5 students), discussing concepts in physics rather than doing the normal problems. The results showed that the difference in understanding of Newtonian Mechanics was reduced when the latter method was used. Several teachers also used the two methods mentioned and the result was the same each time, indicating that the difference was due to the different methods used and not contributed to the teacher. (Lorenzo, Crouch and Mazur, 2006)

2.5 Is the rate of women in physics increasing as society gets more modern?

One thing that many people believe is that the gender differences are decreasing and that the gap between the number of men and women on higher level educations classically preferred by one of the sexes is also decreasing. This may however be a misconception. An investigation carried out in England and Wales on A-level students (ages 16-18) showed that between 1972 and 1982 the ratio of women had only increased by 2%, from 18% in 1972 to 20% in 1982 (Smail, 1985). 11 years later, in 1993, the ratio of women had only gone up to 21%, corresponding to an increase of merely 1% (OFSTED, 1994).

In the United States AIP reported an increase of the ratio of women studying physics in high school between 1987 and 2005, see figure 2 below.

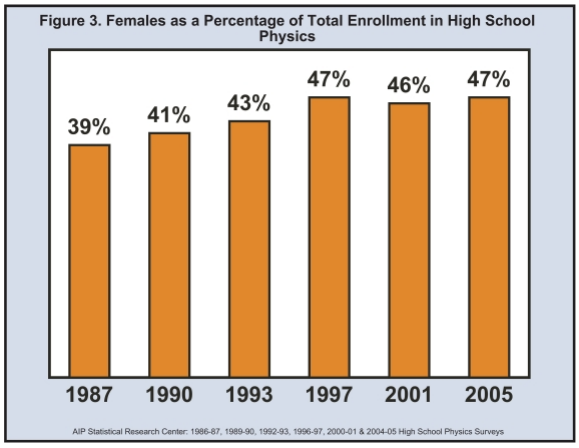

Figure 2: The ratio of girls enrolled in high school physics between 1987 and 2005 in the United States (AIP, 2006).

AIP also reports an almost twofold increase in the ratio of women receiving a bachelor's degree in physics in the United States between 1981 and 2010 (AIP, 2011), figure 3.

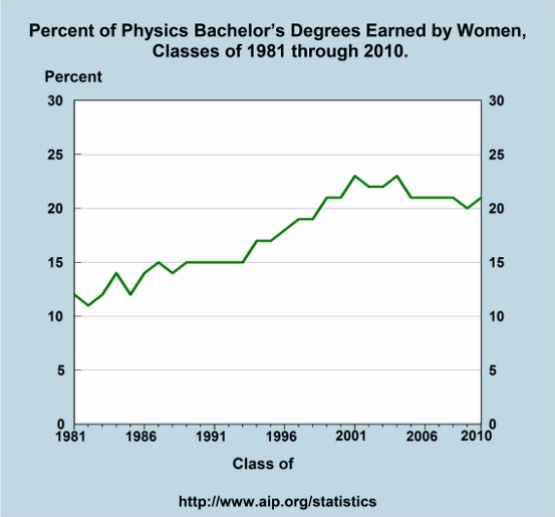

Figure 3: The ratio of women receiving a bachelor's degree in physics in the United States between 1981 and 2010 (AIP, 2011).

Looking at the ratio of female students in the United States who have earned master's and/or Ph.D. degrees between 1979 and 2008, it can be seen that the ratio of women earning a master's degree has more than doubled, and the ratio of women earning a Ph.D. has almost increased three times, figure 4 (AIP, 2009).

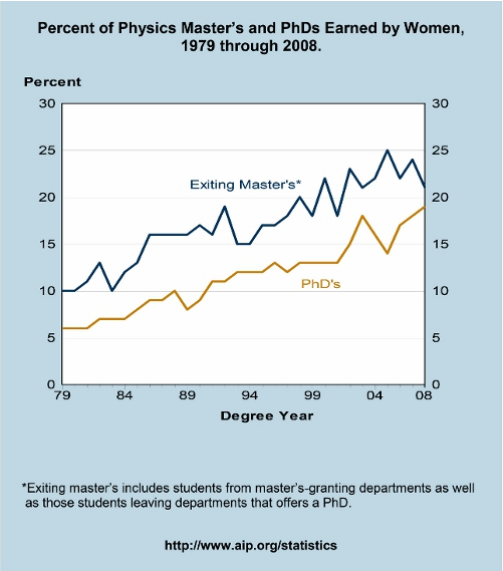

Figure 4: The ratio of female students who earned a master's and /or Ph.D. degree between 1979 and 2008 in the U.S (AIP, 2009)

2.6 Physics at the Faculty of Science at Lund University

It is clear that fewer women than men choose to study physics in general. Physics at the Faculty of Science at Lund University is no exception. However, the relation of how many women who start their education, obtain a bachelor and obtain a mas-

ter is obscure. Smithers and Robinson claim "where gender stereotyping remains, those going against the tide for their sex tend to be particularly able" (Smithers and Robinson, 1994), suggesting that the ratio of women in physics should at least remain constant throughout the education. The first step in physics is to obtain the bachelor of science degree. After the bachelor degree some students, in particular those who have studied meteorology, consider themselves done with their studies given that there are job opportunities for them. For the students studying general physics it is mostly wise to continue to study until obtaining a master's degree.

In this section we have looked at some reasons for why there are fewer women in physics than men. Now the attention will be turned to investigating the ratio of men and women who have studied physics in the Faculty of Science in Lund University to see if these statistics are comparable to statistics from other western countries brought up in this section.

3 Method

The records of physics students at the Faculty of Science at Lund University go all the way back to when the faculty first started. Since 1976 the records of physics students at the Faculty of Science are computerized in LADOK, a Swedish computer based system for recording of all students in higher education in Sweden, leading to that it is relatively easy to obtain data of interest. This data was then analysed using Matlab.

4 Results

4.1 Gender difference at the Physics Department in Lund

All the students attending the introductory course in physics since 1976 were analysed. The result of this can be seen in the figure 5.

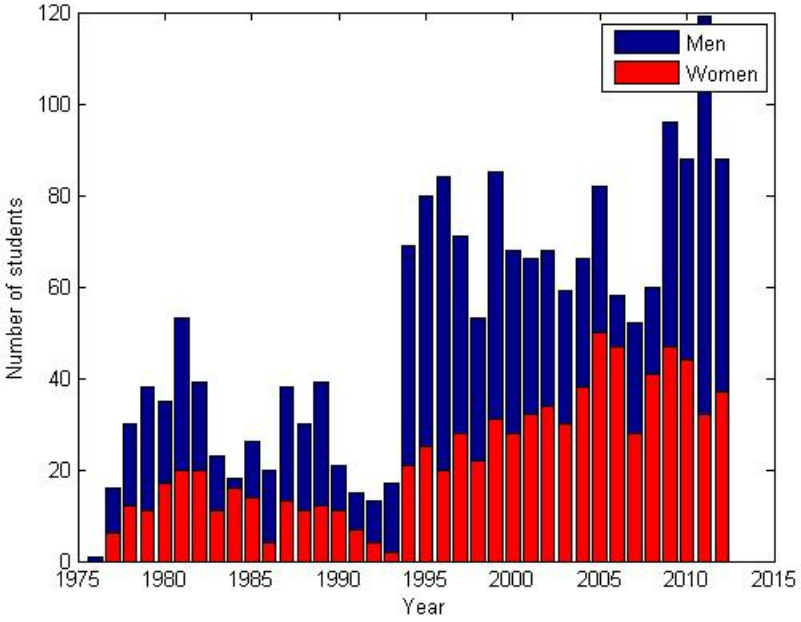

Figure 5: The number of male/female students of first year physics at Lund University since 1976.

In figure 6 the ratio of male and female students in the introductory physics course is plotted as a function of year.

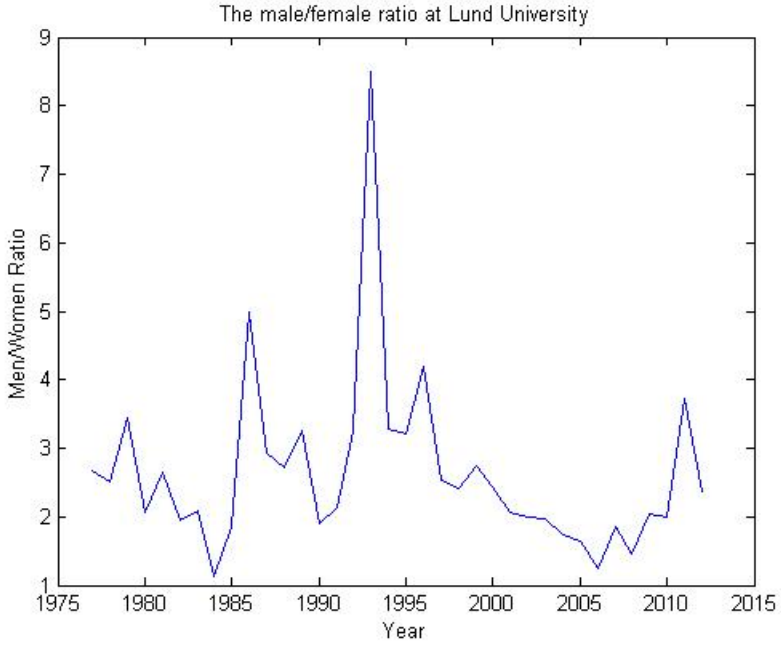

Figure 6: The ratio of male/female students at the Physics Department in Lund, from 1976 to present.

It is not only important to look at how many students take the first course,

but how many students that get a degree. These statistics were also obtained from LADOK and are shown in figure 7. It should be noted that, due to a political reformation in Sweden 1977, degrees were no longer awarded to students. A reversal political reformation was made in 1994 reintroducing the degrees, however, a dwell of a few years before the first students could obtain their degrees should be expected. In any case, the lack of degrees in these years affected men and women equally, hence, the lack of statistics during these years do probably not affect the total ratio of men and women unreasonably much.

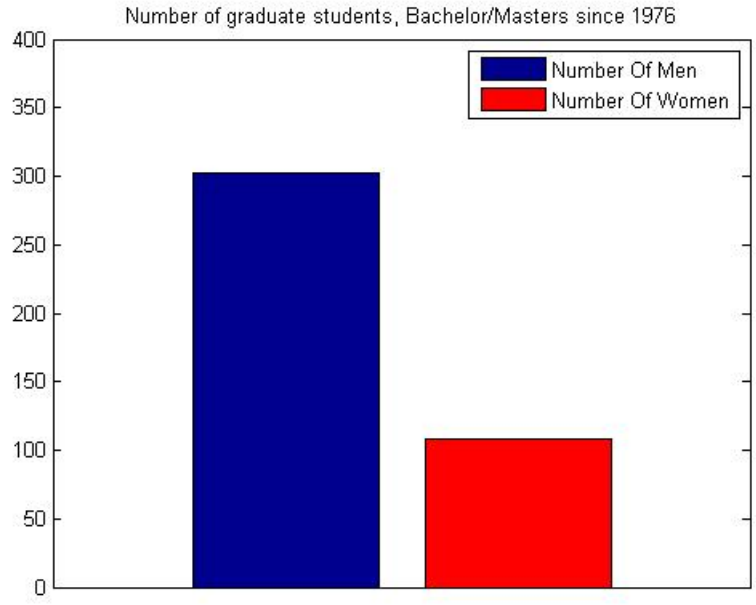

Figure 7: The number of physics degrees (bachelor/magister/master) since 1976.

The ratio between the number of male to female graduates is 302 to 108, hence 2.79 men for each graduated woman.

5 Discussion

It is clear that fewer women than men choose to study physics in general. Physics at the Faculty of Science at Lund University is no exception.

The first thought was that the number of female students would increase over time so that the gender gap between male and female would decrease. However as figure 5 shows that is not the case. The number of students see an increase but the ratio remains almost the same. This is more clearly seen in figure 7 where the ratio between male and female students is shown.
In figure 6 it is possible to see that the ratio always favours male students, some years more than others. To make a rough estimate the ratio is approximately three to one.

When comparing this to the studies made in the United States, presented in this paper, it is possible to see the same pattern at the Physics Department in Lund. The gender ratio at the Science Faculty is also very unevenly distributed, 89% of the professors are men. At first we thought the reason for this was that the science education was more biased in the past resulting in a larger number of male students. It was also brought up that women in the past might have lacked opportunities (Stewart, 1998), which could have led to fewer women studying physics. As this study has shown, not much has changed, at least not in the Physics Department in Lund since the 1970's. This could suggest that the male to female ratio of professors will remain large in the nearest future as well, possibly resulting in a vicious circle; Few female students will be motivated to study physics, leading to more men in top positions, which in turn contributes to a decline in female physics students. All due to the fact that there are so few female professors.

In the future many interesting figures can be obtained from the data used to produce the results in this article. For instance, it could be interesting to separate different degrees in physics from each other, as well as looking at the gender distribution in different characteristics of physics (such as meteorology, medical physics, astronomy and theoretical physics). From our time own time spent in the Physics Department, we suspect that meteorology and medical physics, characteristics ending with a qualification, attract more women than other characteristics. A thorough study could shed some light on why this would be.

To conclude this paper we can say that the quote used in the beginning of this text is at least not completely erroneous; sex does matter when it comes to the attitude towards science, as well as how students choose their field of studies, which has been shown yet again in this paper.

Acknowledgements

Primarily many thanks to Mikael Antic for finding us the data that we needed to complete this article. We would also like to thank professor Tomas Brage for giving us tips along the way and showing interest in our work. Last but not least, many thanks to Carl-Erik Magnusson for informing us of the different reformations in the Swedish university law (Högskoleförordningen) that has affected the history of graduating students at the Physics Department.

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Kristoffer Nygårdh

Why are woman a minority at the Väg- och vattenengineer program at Lunds Tekniska Högskola?

AUTUMN TERM 2012

Why are woman a minority at the Väg- och vattenengineer program at Lunds Tekniska Högskola?

Gender Studies: Science and Technology

- GEMF05 -

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Väg- och vatteningenjörsprogrammet at LTH

7/12/2012

Abstract

In this report I try to analyse the question "*Why is woman a minority in the Väg- och Vattenengineer progam at LTH"*. My opinion is that this image of the construction industry as an aggressive and competitive industry for men creates a barrier for women to enter this industry. By making members of the construction industry aware more of "gender", for example by lectures, could lead to make members doing active choices of which identities they adapt and not just accepting this stereotypic masculine identity. More equal gender identities will hopefully attract more women to the industry.

Keyword: *Gender identities, Masculine, Feminine, Construction industry, Construction worker, Society of practice, Changes*

Contents

Short literature overview

"*Doing Physics – Doing Gender: An Exploration of Physics Students' Identity Constitution in the Context of Laboratory Work"* is a thesis of Anna Danielsson. The author focuses on how physics students in university learn to be a physicist from a gender perspective. Through her theoretical framework (situated learning, post structured gender etc.) and an empirical study (interviews about the students physical studies) she analyzes how the students "doing physics" affect their way of "doing gender".

In the article "*Exploring Construction of Gendered Identities at Work"* Lena Abrahamsson discuss learning and doing gender at workplaces. She focuses on how changes in workplaces affect gender and the construction of masculinity. The framework is built on how different organisational processes (such as structure and symbols) affect gender identities in the workplace. She has also made an empirical study on miners in an iron ore mine, concerning the creation of masculinity.

In "*Has feminism changed science?*" Londa Schiebinger writes about women's historical participation in science, an area with a historical "picture" of being male-dominated. Further she talks about how feminism has affected science. She focuses on three main approaches; more women in science, reforming cultures of science, and creating new questions for science research.

Introduction

My question arose quite naturally since we are rather few women in the program Väg- och vattenengineer at Lunds Tekniska Högskola, LTH, and as I assumed statistic showed that women are a minority in the construction industry (see below). I will analyse how gender identities are created and recreated in construction industry, which signals this transmit to the general public, and how this can create barriers for women to enter the industry (and therefore not chose to study to become a construction engineer). The construction industry is complex with many different participants, but I will mainly focus on the work at constructions sites (companies as Peab, Skanska, NCC...), which I think is the most known part of the construction industry for general public and therefore probably have the biggest impact of the transmitted "picture". This picture is partly created of how a construction worker should behave, which also involve doing gender. My perception of the industry is that it is based on traditionally masculine features such as hard physical work and competitiveness.

Is it still this historical masculine picture of a hard working constructer with all his machines, or can we see any different image, a new kind of masculinity or maybe a more equal image?

Statistic

In the last five years there have been around 30 percent (VHS, 2012) women in the program Väg- och vattenengeneer at LTH. Graduation from this program you can become a construction engineer, but also work in other industries such as traffic and water resources which might increase the number of women. Ten percent of the professors in the construction filed in Sweden are women (På Väg, 2011). If you look at the construction industry as a whole, women are in a substantial minority (around 2 percent, SCB, 2012). If you look at the officer workers in the construction industry it is more equal, around 15 percent (SCB, 2012), but this number decrease the higher up you are in the hierarchy. Why is it that women chose not to (voluntary or not) enter this industry? This, I will explore further in this report.

Theoretical and methodological considerations

Who can be a member?

A culture consists of unspoken values and assumptions of its participants. These implicit assumptions are (as Schiebinger describes it) deeply rooted and recreated in cultural language, daily routines, social interactions, different hierarchies and so forth. Many of these cultures have been formed without the participation of woman due to the historical separation of men in the public sphere and woman in the domestic sphere. A large part of the public sphere adapted properties as competitive and aggressive properties that mostly are social constructed as properties of a male. These masculine properties are, according to Jayne F. Bennett, dominating in the construction industry. As Schiebinger addresses, these values creates a general picture which transmit signals of who can be a member or not in the culture of practice. Schiebinger mentions that we often fall into these expected behaviours, which are social constructed, of how a female and male should behave. She further argues that in areas that are constructed as competitive and aggressive, often creates barriers for neat and retracted personalities, often described as feminine features.

How do identities take form? (Situated learning)

Before going into detail with the construction industry, there will be a brief explanation of what Anna Danielsson describes the theory of situated learning, which will be used in the theoretical framework. Danielsson argues that when you are entering a certain society of practice, this society also defines the frames of your identity shaping, i.e. you cannot separate

an individual without considering the surrounding culture. Knowledge is highly ambiguous (Alvesson, 2004), but can be seen as a product of activities, views and culture within a practice area. This means that you do not only learn the explicit knowledge when you become a member of an organisation (Danielsson, 2009), you also learn how to operate due to the politics within a firm (Alvesson, 2004). Danielsson describes knowledge as something we do, not something we possess. The society of practice teaches newcomers how to behave in order to become full members, and therefore also defining their identities. In this way the norms within a society of practise can be produced and reproduced. Naturally the individuals within a society of practice are not forced to accept these identities, but can influence how the society shapes these identities. Danielsson writes that the higher up in the hierarchy you are, the more can you affect, but it is often those who loose most with changes. In the same way the society creates identities of practice, they also create and recreate gender identities (according to the gender view in the society of practice). This creation of gender identities is a dynamic process; "we aren't born with gender, we do gender". Salminen-Karlsson (2006, p. 34-35) writes *"When workplaces, or communities of practice, have a implicit expectations as to how femininity and masculinity should be "done" these expectations join other messages as part of the material for constructing the individual's work identity."*. Finally, we should not view the society of practice as separated from the general society, in the same way of not viewing the individual as something separated from the society of practice.

Doing gender (post structural gender)

The view of doing gender is based on the post structural gender theory (Anna Danielsson, 2009), which questions the self-evident of how masculine and feminine is defined in the society. Gender is not deterministic, but a dynamic process that is constantly changing. Danielsson continues by writing that the behaviour in society constantly produces, reproduces and negotiates gender identities. There is a need to erase the dualistic view of the narrow boundaries of performing a stereotypic masculinity and femininity and create a wider acceptance of doing gender with multiple identities. To see gender as something stationary and fix will continue to reproduce these stereotypic identities. Danielsson describes that the influence of certain characteristics gives advantages within certain situations. This makes us willing to adapt and perform these characteristics. An example of these advantages, as described above, is the entrance in a certain society of practice. This means that for breaking the stereotypic identities of gender, there is a need to make people want to adapt these "more gender equal" characteristics by gaining something out of it.

Changes in an organisation

In this report gender is seen as something we do and create through social interaction, and it has no biological core. This dynamic picture of how we do gender at workplaces will be challenged by changes. This will in many cases lead to the questioning of the deeply rooted tradition of "how to behave". Lena Abrhamsson, 2006, divides organisational change processes into four parts; structural, symbolic, relations and identity. *"Structural"* contains of the structural division of power and labour. *"Symbolic"* embraces cultural and informal angle of work, i.e. perceptions of how a "real" worker behaves. *"Relations"* contains of cultural norms of interactions between people. The last part *"Identity"* includes how the organisations create and recreate identities, i.e. a part of becoming a member of the organisation. These four parts have are interrelated, but are not necessarily enhance and support each other. An example of this will soon be given.

As Annika Mårtensson et al, 2010, mentions, the knowledge within building construction has changed over time. Previously constructing took place through more "hard physical work" and through "try and fail" methods, where you through experience learned to "feel" what was defined as a "good" structure and how the material worked (timber, steel, concrete etc.). But as the economical (and safety) questions increased in impact on the construction industry we have gradually shifted to methods where you design buildings through accurate calculations according to physics and solid mechanics rules. The importance of managing a construction project has increased through time, and a major part of the work is done from inside an office. As Jayne F Bennett mentions the culture of this "old-fashioned" knowledge still have strong roots within the construction industry, a culture with a characteristic feature of "macho-masculinity". To maintain and reconstruct this masculinity within the culture, the workers can for example romanticize this special emotional connection that some men have to their machines (the construction industry abundances of machines) and this tacit knowledge of "feeling" the machines (or structures), as Ulf Mellström describes. Further they can through language and picture transmit signals that targets men and therefore keep the masculine picture of a construction worker. The changes in the structural level from a tacit knowledge to a more theoretical knowledge affect the culture and its creation of identities at workplaces. As Abrahamsson mention in her article, there is a major risk of creating an "us" and "them" in this situation, where you can get an "identity lag" due to asymmetry between these structural changes and the symbolic changes (as the "old-fashioned" tacit knowledge), where

the changes triggers an increased process of maintaining or even intensifying the masculinity on the symbolic level.

Empirical study

An empirical study will be added to the theoretical framework where the public view of construction industry is studied. This is a minor qualitative study where 7 male students at the construction engineer program at LTH have been interviewed. The questions asked concerned how they perceived the construction industry, and if they thought there were any differences between their view and the general public view. A question about what they thought defined a "good" construction worker was also added. An analyse that is based on their answers combined with the theoretical framework will be done.

A synopsis of the interview results is that the students gave a rather homogenous picture of the construction industry as a tough and competitive branch with a clear hierarchy and male-dominated. The industry is seen as very conservative, where people have very strong opinions of what they think is right and wrong. Time-pressure and a brusque jargon mean that you have to have a strong personality to succeed. Some complementary questions were asked (see appendix). The conclusions made by the interviews will be used in the discussion part where quotations also will be made (*italic text*). The interviewees will not be mention with their real names.

Discussion

The students I interviewed gave a rather homogeneous description of the construction industry as a "*tough and competitive area with a clear hierarchy and male-dominated"*. The students thought that one difference between their view of the construction industry compared with the general public view was that "*the public view just sees the construction site*" and not the office worker so much. Nevertheless they thought that the differences were minor since their view also was mostly created from a construction site.

Being a woman in the construction industry

One of the student mentioned that the construction industry have a very *"brusque jargon"* where *"nice girls"* don't fit in. "*If you are a woman in the construction industry you have to adapt the masculine norm, if you where acting "feminine" it would perceive "wrong"".* Later in the interview the student told me two interesting experience he had had. "*At the construction site I worked at last summer there was this female middle-aged carpenter who*

was very "masculine". She always had this skirt and never shaved her leg. This was a major conversation between the male carpenter who thought this was disgusting, they even photographed this and send between them. They thought that this woman should behave more "feminine" since her "masculinity" was just strange". The student continued with another experience; "*there was this younger female office worker at the construction site, who had this "attractive-look". Many of the male workers talked about how good looking she was and what they "wanted to do with her". They just saw her as a sex object. One day one of the male workers harassed her by touching her at places she didn't wanted him to do. Luckily this man was sacked, but many of the male workers thought that she had overreacted and defended his behaviour; she was after all "very attractive"".* Another student mentioned that there is a risk that if you are a woman working as a construction worker you are seen as a "female" (abnormal to what you "should" be) at the workplace but when you meet your friends "outside" the construction industry you're seen as a "tomboy" which do not fit into the social constructed view of a woman. How should a woman fit in to work places like this? You have to adapt to the masculine norm to "fit in", but when you do this you are seen as abnormal and "disgusting". But when you act feminine you are seen as a sex object and not as a competent co-worker. I am sceptical that it is "enough" for a woman to adapt to this masculine norm in this culture of practice. The fact that the woman is a woman creates a barrier, e.g. it is not just question about "feminine" and "masculine" but also "male" and "female". If this picture is transmitted to the public, I think it is quite naturally that many women chose not to enter this area.

Construction industry, a conservative branch

The students see the construction industry as very conservative. The typical picture of a construction worker is a rather bitter man with his strong views of how things should be. Even if there are this change in the industry, where it is more and more office work, it still have this picture of a very masculine and physical work, where you do not fit in as a "woman". The frames that this culture of practise creates of how you should behave to be accepted are very narrow. One of the students told me an interesting thing, which I think many other "newcomers" at a construction site can confirm. "*It's strange how I change my behaviour when I'm among these male construction workers. I act and say things I never would say otherwise, just to fit in to this norm of how you should behave as a construction worker".* I think that there are many workers that not actively want to construct and reconstruct this "masculine" identity (gender identity) that occur at construction sites, but by

accepting the norm of the learning of how to act as a construction worker define these gender identities and recreate this masculine picture of the construction industry. Even if many "newcomers" might feel "powerless" as a single individual towards the society of practice you have to do conscious choices and be aware of what consequences your choices might have. I think that by having a gender-class as this one for students that are to become a construction worker will increase their attention to the issue. Further, by trying to implement gender-analysis in the construction industry to make people aware of what gender is, how gender identities are created and what consequences this might have, can result in people questioning why they have to adapt this "macho-masculine" identity. Concrete examples of this could be to have education for workers in companies concerning gender-issues where gender consultants are leading the courses. It is common in construction companies to have education concerning safety, leadership, machine management and so forth, so this is not a "new" approach in the industry. The solution will not occur as a salvation from "outside"; there have to be a desire to change from inside the construction culture. By making members of the practice aware of this problem, there might be willingness to some individuals to question its inevitability of defining more acceptances and a wider view of doing gender with multiple identities, and not just the "macho-masculinity" norm. When some individuals start to question the norm, I think there can be a chain effect, where many other dare to actively take a stand. By making a more gender equal society of practice, hopefully more women will chose to enter the area. In this way, the image that women are not able to construct will hopefully be erased and replaced by a new, more modern image that they can. This will hopefully create an even more equal society of practice and a positive spiral effect can be created. This could be one way to create more equal conditions in the construction industry.

Changes in the industry

Is there any glimpse of active actions for a more equal gender-identity in the construction industry today? I have been in touch with one of the biggest construction companies in Sweden and asked some questions concerning this. They had introduced three strategies to attract more women to their company. The first was through a quote (i.e. X % of new employees should be women). This one is based on a liberal feministic view where you focus on the numbers of women. The second was to create a public view that both women and men can do this work (for example more pictures of women in companies' newsletters). The last is that the company discusses how the internal organisation and workplace can affect the creation of gender, i.e. the problem can be solved though actions inside the organisation. As I

mentioned above I think that the last action is the most important. It is not the women that are the problem, it is the culture. To work to enhance gender equality by actively quote women into the labour force as a management practice, and not by changing the conditions in the culture do not necessarily have to result in more equal conditions. In my opinion, quote is not the answer, there is a major risk for women (or other minorities) that are employed through quotation to have their skills challenged and can therefore be exposed of bullying from others. It can also result in something negative, if the industry disagrees with a quote-system and intensify the creation of masculinity in order to freeze out the women.

As Abrahamsson explains in her article it is not easy to just change an organisation and get the results that you want. You can categorise these actions described above together with the changes where there are more and more office work to a *structural* change in the organisation. Of course it is a positive thing that managers in the construction industry implement actions, but it is not obvious that these changes to more equal gender-identities in one part of the organisation will create the same result in other parts of the organisation. It is likely that those workers who are lower down in the hierarchy (e.g. the majority at a construction site) feels threatened by these changes and react in a way that strengthens the creation of the masculine picture in a *symbolic* level. This can appear though consciously behave more masculine since they "certainly do not want any women at their workplace" and therefore try to freeze them out. E.g. you have to consider that changes to create more equality in one part of the organisation can result in a more unequal *identity* creation in other parts. Cultures of practice have a very complex nature and it is dangerous to believe that you have an overall understanding of how the organisation will respond to changes and that the solution to this kind of problem has an easy and univocal solution.

Reflecting gender

One part I thought was interesting from my empirical study was that all students I interviewed started their answer to the question "What defines a "good" construction worker?" with "*He should .... ".* Maybe this is not that strange, but all interviewed defined the construction worker as a "he". When I brought this up, most of the students said that they actually thought that you have to be a male to be successful as a construction worker. My feeling was that many of the students had not reflected over how gender is something dynamic that we do. As one student puts it, "*female and male are as they are, and I don't think that the construction industry is created for women",* and (sadly) there where more students that had the same view. As I mention earlier, I think that we have to do people more

aware of our (unconscious or not) creation of gender identities. It is not just a problem in the construction industry; this is just a mirror of the society (which according to me, also have very stereotypic and narrow view of feminine and masculine). I think that we have to make the general public more aware of what gender is, that gender exist and that it is something we continuous create and recreate. This is a problem that many people do not even reflect over. By making this a current area in media, the academy and so forth people would be more aware of this. Compared with the history I think this is a process that already has started, but hopefully it will have a larger impact in a near future. I can compare myself now and how I reflected before taking this class, where I think that I have learned much during this course and hopefully will this affect my choices and behaviour in the future.

As a finish to my discussion I will make a comparison to a metaphor (Schiebinger). Older biology books have described the sperm as the aggressive and active component that overcomes and penetrate the passive egg during fertilization. We describe the sperm in social constructed masculine behaviour as the"important" component and the feminine egg more or less is only there. When this view was criticised as narrow and discriminated we changed the description of the egg to also be active, to be "masculinised". With this I mean that to create more equal conditions between the sexes in construction industry we cannot just increase the number of women, participating on the man's condition. There have to be a desire in the construction industry to change and expand the frame that defines how a member should be, so that different personalities (for example masculine and feminine) participate on same condition.

Empirical study

My empirical study is a minor qualitative study and should not be seen as a statistical proved picture of the general view, but is seen as a complement to my theoretical framework. In the courses that I am taking now there are no women at all, that is the reason I chose to interview only male students. Of course there is a probability that I had got different answers if I had interviewed female students. I think that if you are fitting the norm (as a male) you are less aware of gender issues in the industry. It is also not reliable to paint up a general picture, by just asking one small homogeneous group (which probably have a high correlation between the different individuals). I am also aware of that some students might answer in a bias way as they think is "correct", and not always 100 % honestly. Finally I am aware of the difficulties of doing these kinds of interviews, trying to participate in a dialogue without

affecting the results and then analyse the answers; this is something that needs practice. I have tried to take those negative aspects into account when I have analysed the result.

Conclusion

My conclusion is that the construction industry still has this"macho-masculine" image that earlier studies concluded; a picture of a rough, competitive and male-dominated branch where women do not fit in. The construction industry is very conservative and individuals have their strong opinion of how things should be (because this is how it always have been). The identities (including gender identities) that are shaped in this society of practice are strongly defined by this picture of how a real construction worker should be. This picture does not involve women, where you are seen as abnormal and strange if you adapt the masculine norm and seen as a sex-object rather than a co-worker if you are feminine. My conclusion is that this picture of women not fitting in to the society of practice, could be a major role in why women are a minority in the construction industry (and also in the "Väg- och vattenengineers" program at LTH).

To achieve more equal numbers between the sexes, we have to change these narrow frames of gender identities in the construction industry into wider frames of multiple gender identities. To achieve this we have to change the conditions in the society of practice, and there have to be a willingness to change from inside this society. To make people aware of what gender is how gender identities are created and what consequences this might have, can result in people questioning why they have to adapt this "macho-masculine" identity and affect them to do active choices of which identity they adapt. This can be implemented in companies, for example by organizing lectures concerning gender. This could hopefully be one way to create more equal conditions and attract more women to the branch.

Cultures of practice have a very complex nature and it is hard to predict how the organisation will respond to changes. I think that the solution to these kind of complex problem do not have an easy and univocal solution, but this is a problem that need time to be solved and we constantly need to follow the development and change direction for a more equal society when needed. My suggestions are just a minor part of the solution and I think that you have to study the society of practice in more detail to achieve a better understanding of how things work. With this knowledge you can create a more robust foundation to analyse how we can create more equal condition within the area. Further you should analyse how the society reacts on these actions and continue the work from there. This is for further research.

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APPENDIX

Questions in my empirical study:

"How is your view of the construction industry?"

"How do you think the general public view is?"

"What defines a "good" construction worker?"

"How do you think it may affect the industry that it's more and more office work?"

"Why did you choose the construction-program?"

"Do you have any experience of a typical" masculine" behaviour from the construction industry?"

Also some complementary questions dependence to their answers where asked.

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Contraceptive Use from a Gender Paradigm in Bangladesh

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Contraceptive Use from a Gender Paradigm in Bangladesh

Abstract: Bangladesh is a South Asian developing country with a huge population. Despite the fact of low socio-economic situation, it has made a remarkable progress in terms of increasing the prevalence of contraceptive use and reducing the fertility rate and contributing to the reduction of population growth in the recent decades. Thus this study aims to look at the power relations among men and women from a gender perspective and other associated factors with contraceptive use in Bangladesh. The paper is mainly based on literature review from the studies published in academic journals. The findings of the study revealed that power relations between men and women in a family play a critical role in terms of contraceptive use. Therefore, more programs and efforts should be arranged in order to involve men in family planning program to make it more effective.

Keywords: Contraceptives, Bangladesh, power relations.

Introduction

The prevalence of contraceptive use in developing countries is comparatively lower than developed countries in the world. One of the main reasons behind this low rate of contraceptive use is male dominated cultures and practices. (Mosha et al., 2013). Some other major reasons include the fear of side effects of the contraceptives, less participation of women in domestic decision making and the lack of proper understanding about contraceptive methods. Despite the fact of the low prevalence of contraceptive use in developing countries, Bangladesh, a South Asian developing country with a low socio-economic indicator, has made a remarkable improvement in terms of increasing the use of contraceptives over the last two decades (Nosaka, 2003). Even in the rural areas in Bangladesh, the use of contraceptives has increased since government has made it available through health care facilities in rural Bangladesh. However, power relations between husband and wife remains one of the key factors in deciding about contraceptive use, where gender relations play a key role who will decide what to choose for family planning. It is not only about deciding about contraceptives, but also any family decision is mostly taken by the husbands, where women are subordinated by the men in the families. The scenario is a little different in urban areas, especially where women are educated and employed (Laskar et. al., 2006).

Though educated and women can exercise more power than those who are not uneducated and unemployed. Issues like enough maternity leave among working women in private sectors is still a problem among many working women in Bangladesh. Also, day care centers are not also popular in Bangladesh. Typically women are supposed to do all the domestic works in a family whereas men are responsible for earning money. Therefore, men take the lead to make decision in family matters (Laskar et. al., 2006). It is common that women, who are employed, have to do more hours of work than normal working hours because in that case they have to do the office work and household chores both. As a result, women have to bear the heavier burden in the family, when they are employed. In this scenario, unintended pregnancy adds another extra burden to women's shoulders, since it is the women who have to rear and take care of the children. Therefore, Contraceptives plays an important role in protecting women's health in many ways, particularly works against unintended pregnancies play is important in terms of family planning and socio economic growth of the country in general (Ullah et.al, 2006).

Again the intersectionality such as education, race, ethnicity, and locality where they live, has played a key role in decision making regarding the contraceptive use (Khatun & Cornwell, 2009). Also, child gender preference has been a factor, which influences the contraceptive choice (Islam et. al, 2009). Likely many developing countries, preference for a male child has been one of the influencing factors while deciding on contraceptive use. It is also shown by the research that while having preference for son reduces the use of contraceptives; the preference for not having daughters increases the use of contraceptives (Nosaka, 2003). Another study in Tanzania also demonstrates the influence of male power on the contraceptive use by the women or men in Tanzania (Mosha et al., 2013). A study in Southern Ethiopia also suggests that family planning decision and contraceptive use is mostly driven by the male counterparts except the fact that modern women in urban area are taking the lead now a day (Bogale et al., 2011). Theorizing the evidence from the above studies, this study aims to explore the gender influence on contraceptive use in Bangladesh.

Most of the studies which were previously conducted in Bangladesh specifically on contraceptive use, but they tend to ignore the fact how the husband and wife power relationship might affect the choice of contraceptive use. It is interesting to note that whereas at the household level, men play an active role in decision making in almost all the aspects in a family, these men are not that active, when it comes to decide on contraceptive use. In order to make the point of gender relations and contraceptive use in married couples, this paper will initially explore the gender relations and power dynamics in a married couple in Bangladesh. Then it would try to explore the factors which influence the contraceptive use in Bangladesh with a special focus on gender.

Methods

This paper is mainly based on literature review. The academic papers published on different academic journals during the year (1990-2013) were reviewed in order to have a comprehensive understanding about the total situation about gender relations in Bangladesh. The keywords used for the search are “contraceptive use and gender in Bangladesh” and “contraceptive use and gender perspective”. It gave around 119 hits with the keywords used for

the search, and then only 20 papers were chosen after reading the abstracts of research papers depending on the relevance of the topic of interest of research. Most of the research was focused on the factors associated with contraceptive use in Bangladesh. There are very few academic papers which focused on the power relations of gender and contraceptive use in Bangladesh. A few other papers were chosen which were conducted in Ethiopia and Tanzania in order to generalize about the contraceptive use situation in different developing countries. Contraceptives are defined as oral contraceptives (mainly pill), use of condoms and any other permanent procedures taken by the couples.

Results

Bangladesh is the 9th most densely populated country in the world with a population of 150 million. Two of the main factors, which are accelerating the population growth in Bangladesh, are early marriage and early birth. Bangladesh is still a developing country with low socio-economic indicator. In spite of this low socio-economic situation of the country, it is one of the best examples of strong family planning program and declining the fertility rate upto the mark to contribute to the total population growth of the country (Khan et. al, 2012). It is a moderate conservative country where patriarchy is still practised strictly, where most of the family decisions are made by the men of the family. It is no exception when it comes to contraceptives. Studies have shown that men's attitudes towards contraceptives directly influence the choice of what kind of contraceptives a family can choose for themselves. Other studies have demonstrated that men have more knowledge than women about contraceptive use and fertility regulations and the use of contraceptives by couple mostly depend on the husbands' choice. It is also found by the research that men's decision is also the main reason behind the non-use of contraceptives. The pattern of men deciding about the contraceptive is mainly rooted on the culture that has been practised over the centuries in Asian countries. Bangladesh is not an exception to that.

The traditional patriarchal system allows men to possess more power and privilege in a typical setting compared to a woman, which also allows them to exercise their power in terms of contraceptive use. It very much resonates to the reproductive theory by Aristotle where he showed men are superior to women because of men having more ‘more heat’ (Martin, 1991 & Tuana, 1988). The theory still somehow is there, when it comes to decide about contraceptive use. One of the main reasons is that women's household work is not recognized as “work” as

men's work is more recognized because of their earning. Since being men is an advantage itself in a patriarchy setting, it encourages people for son preference, which is also indirectly associated with contraceptive use. One of the studies has shown that while having preference for son reduces the use of contraceptives; the preference for not having daughters increases the use of contraceptives (Nosaka, 2003). This certainly creates a power imbalance between a wife and husband in a family, which is somehow minimized when a woman is educated and have a job by which she can contribute to the family expenditure. Since Bangladesh has patriarchal system, the system itself puts more emphasis on men, more privilege, domination and power, which ultimately leads to son preference or daughters. This son preference over daughter was found to be strongly associated with contraceptive use.

Therefore, women's contraceptive use attitude does not only depend of their choices regarding contraceptives, but also on the husband's attitudes towards contraceptives. Previous studies have demonstrated that men have more knowledge than women about contraceptive use. It also shows that men's decision mostly affect the fertility rate in a family, where women are only passive members (Kamal and Mostafa, 2013).

One of the interesting findings from Khatun and Cornwell's studies suggests that respondants have reported that people who own land, they are more likely to use contraceptives (Kharun and Cornwell, 2009). Since land is considered as an important indicator of wealth in rural areas in Bangladesh, it was used to predict whether people who owned land as wealthy and those who do not were not wealthy. Therefore, owning land in urban or rural areas seemed to be associated with the contraceptive use and level of fertility (Khatun and Cornwell, 2009). Therefore, socio-economic situation of a family was also reported to be strongly associated with the prevalence of contraceptive use. A study by Kamal and Hassan also found that socio-economic condition defined by owning land, TV, and electricity connection as important indicators of the contraceptive use. Media is also reported as one of the important determinants of contraceptive use. People who have access to TV and internet, the likelihood of using any kind of contraceptives is much more than who do not have any access to media (Kamal and Hassan, 2013).

Similarly, Khan et. al found that education is one of the important factors which were reported to be strongly correlated with contraceptive use. The more education level the women

have, the more it is likely to use the contraceptives. It can be interpreted as the education rate for women increases in Bangladesh, people come to know more about the existing birth control processes. Also, it is associated with other factors such as the living expense is on the rise in Bangladesh like any other countries in the world. People who can't afford children choose the birth control methods. Moreover, women who are working were reported as using contraceptives more than those who were not working (Khan et. al, 2012).Also, it is also reported that communication between husbands and wives have a strong impact on the prevalence rate of contraceptives (Khan et. al, 2012)

In the recent decade, women's autonomy is reported to have an important impact on the use of contraceptives and (Rahman et. Al, 2011), which is why it is important to understand the relationship between women's autonomy and contraceptive use for Bangladesh, because it helps us to predict about the factors which affect the contraceptive prevalence rate.

Patriarchal society and unequal power distribution between couples within a family limits women's freedom and decision making power in a family. The power relations between a man and woman is important to understand since men's and women's choice about contraceptives might differ, and if there is not a representation of both persons, when it comes to decision making about a family life, it might be an indication of male domination over women. It is also reported by the study that the more equitable a woman is towards gender attitudes, the more she is likely to use contraceptives (Nanda et. al, 2013).

More than 50% of most study population have reported to be using oral contraceptives by women, whereas the remaining half of the population use contraceptive methods such as condoms, IUT, and other traditional methods (Ullah and Humble, 2006). Although the number of contraceptive users in Bangladesh has increased a lot in the recent decades, the contraceptive switching pattern and discontinuation of the contraceptives make it more difficult to generalize the overall impact of contraceptive use (Demographic and Health Survey, 1996).

Recommendations

Since men make most of the decisions in the family due to the type of its societal norms and practises, therefore including only women in the family planning processes wouldn't be that effective. The government of Bangladesh has taken a remarkable number of initiatives in order to reduce the high population growth, as a result of which, the contraceptive use has increased remarkably in the recent decades. However, most of the programs and initiatives tend to focus on women ignoring the men in the family. The government should take more effective initiatives to involve the men in the family so that they can be a part of decision making in terms of contraception to tackle the problem of gender and power imbalance (Khatun and Cornwell, 2010). Not to forget, women empowerment through education might play a vital role in terms of giving women more power to exercise their leadership in family planning process.

Conclusion

To sum up, it can be said that traditional and conservative society plays a crucial role in power relations in terms of contraceptives use. The supreme power on the men of the family and in most cases, women having no say in many family decision making processes makes it much worse for the women. Also, in Bangladeshi typical context, wives are supposed to listen and obey what their husbands suggest about contraceptive use or not. As a result, women can't actually participate actively in this family decision. Therefore, women's empowerment through education and employment can change the scenario a little. Some of the previous studies have suggested that women with education are more likely to take part actively in a discussion with their husbands about contraceptive use. The light of hope is that women's literacy can change the total situation of contraceptive use with a positive implication (Nanda et. al, 2013) .

From my personal experience, I think men should be more educated about family planning process so that they can choose the right options available for them. Also, men have a misconception that family planning and using contraceptive use is a feminine thing, so men will only decide when and what kinds of contraceptives to use, but women are the ones to who have

to take the responsibility, since women are viewed as the main source of reproduction. Therefore, more family planning programs should target men and women both in order to make the power balance in family.

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Teresia Olsson
Course Evaluations at LTH from a Gender Perspective

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Course Evaluations at LTH from a Gender Perspective

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2014-01-12

Course evaluations play a prominent role in higher education and it is therefore of interest to study their influence in academic teachers. The purpose of this study was to analyze the critics given in the written comments in the course evaluations at Lunds tekniska högskola from a gender perspective. The analysis found no significant gender bias in the written comment givens in the course evaluations, but due to the limitations of the study no distinct conclusions can be made except from the result that the students have high expectations on their teachers.

Keywords: course evaluations, gender bias, Lunds tekniska högskola, LTH

Introduction

Couse evaluations play a prominent role in higher education and it is therefore of interest to study the evaluations influence on academic teachers. The purpose of this study was to analyze the critics given in the course evaluations at Lunds tekniska högskola (LTH) from a gender perspective. Focus was on the written comments given in the course evaluations. Similarities and differences in the critics given to female and male teachers were analyzed as well as the similarities and differences between the comments written by female and male students.

Theoretical Background

The Importance of Course Evaluations in the Careers of Academic Teachers

According to the Higher Education Ordinance (Högskoleförordningen) in Sweden all students that participate in or have finished a course in higher education shall have the possibility to present their experiences of and opinions on the course in a course evaluation arranged by the university [1]. Course evaluations therefore involve all academic teachers and it is of interest to study which effect these evaluations have on the teachers. Through the course evaluations the teachers get data that are useful for course development, but also comments on themselves as teachers [2]. The course evaluations therefore play a role in the teachers' development as well in their working environment. The results from course evaluations might also influence in appointments and promotions [2]. According to the Higher Education Ordinance, you need to have shown a pedagogical competence to get a position as lecturer or professor [1] and results from course evaluations can be used for this purpose. The course evaluations thus might have a significant effect on the academic career of the teachers and hence it is of importance to study what influences the critics given by students in course evaluations.

Teachers' Experiences of Course Evaluations

The teachers' experiences of course evaluations have been studied previously. A study at LTH performed by Bergström & Roxå [2] where teachers were interviewed found that the students' opinions were important for the teachers. Furthermore, it was clear that the evaluations gave the teachers a judgment of their ability as a teacher. For many teachers the course evaluations were their only way of getting credit for their teaching and confirmation of them being good teachers. The written comments given by the students in the course

evaluations were considered more interesting that the other statistics collected by the evaluations and for several of the interviewed teachers the written comments were the first they decided to read in the evaluations. Some of the interviewed teachers in this study took the critics given by the students personally and implied that the evaluations gave rise to emotions, whereas other teachers only took it as critics concerning the course and not them personally. Among the teachers there also existed a concern for how the results from the evaluations could be used in the future [2]. The results from the course evaluations are publically available and therefore it is possible for others to judge the teachers' pedagogical skills. There existed a fear among the teachers to be judged as bad teachers. They also worried about whether the results could cause future problems for promotions, academic concurrence or other aspects of importance for the development of their carrier [3].

Research concerning performance feedback suggests that females might be more receptive to the opinions of others than males. It is suggested that women and men are affected similarly by objective feedback, but women evaluate themselves more negative than men when it comes to subjective feedback. This might result in female and male teachers experience the course evaluations differently. A study by Kogan, Schoenfeld-Tacher and Hellyer found that overall the female teachers in the study appeared to be more negatively affected by course evaluations than the male teachers. The women were more likely to feel emotions like unhappiness and anger after reading the evaluations compared to their male colleagues. It is suggested that this could be due to women and men being given different types of feedback when growing up, leading to differences in how the self-esteem of women and men are derived and how they perceive feedback [4].

Gender Bias in Course Evaluations

Considering the importance of course evaluations in the career of academic teachers possible gender bias in evaluations is important to study. The bias in this case relates to the gender of the teacher and/or the gender of the students affecting the outcome of the evaluation. Previous studies concerning the gender bias in course evaluations have resulted in conflicting results and it seems to be a subject in need of further studies. Some studies have found no or very small differences between the ranking of the female and male students depending on the gender of the student, whereas other studies have found that male students rate female teachers lower than male teachers. However, this is suggested to be a result of shortcomings in the design of the studies. A review performed of 10 different studies found a small

tendency for same-gender preferences, but these studies did not consider variables such as course and field of the course, which might be important [5].

A study has been conducted by Centra and Gaubatz [5] designed to take this into consideration. When comparing the mean rating within the same classes this study resulted in female teachers getting higher ratings from female students, whereas male teachers received equal ratings from male and female students. The observed differences indicated that female students, compared to male students in the same class, thought the female teachers as better organized, better at communication, more interactive and giving better higher quality exams, assignments and feedback to the students. However, further analysis indicated that the female teachers used less lecturing and more discussions compared to the male teachers and the difference in rating might therefore depend on a difference in learning preferences between the female and the male students. When making comparison between courses in different fields no indication of the subject of the course having an impact on the gender bias in the evaluations could be found, meaning the subject of the course did not seem to be of special importance. Centra and Gaubatz also studied rating across classes where students of each gender evaluated different teachers. This study found some same-gender preference for both male and female students, but this analysis also indicated that this might be related to preferred learning preferences. Larger differences were found in some fields. In natural sciences both female and male students gave female teachers higher ratings concerning teacher/student interaction and assignments, exams and grading despite natural science being a male dominated field. The conclusion from these studies was that some same-gender preferences were indicated, especially for female students giving higher rating to female teachers, but the differences were small. The differences found could be related to a difference in teaching style between female and male teachers since the female teachers in this study tended to lecture less and use more discussions as well as being more nurturing to the students compared to the male teachers in the study [5].

Other studies have found that the personality of the teacher affect the course evaluations regardless of the students' learning outcome. Some studies have even found that the teacher's type of clothing might affect the students view. A study found that female teachers in formal clothes was ranked less compared to female teachers in casual clothes while the type of clothing did not have any effect on the rating of male teachers. Also physical attractiveness could have an impact on the students' opinions. Another study found that students could accurately predict the results from student evaluations by watching video clips of lectures

without the sound on. This implies that the teacher's ability to entertain is of importance for the result of the course evaluation [4].

Gender in Technology

LTH is an institution for education in engineering and technology, a field traditionally dominated by men [2]. Women are thus in minority which often lead to them having to perform better to get the same recognition as their male colleagues. Gender is a term describing the social structures related to sex, i.e. power structures, emotional relations and what is defined as feminine and masculine. In gender research the term "doing gender" is often used which means that gender in not something you are, but rather something your create in a given situation. For female teachers in a male dominated environment this means that they have two ways of expressing themselves, as a teacher in a male environment or as a woman. The norm for male teachers in a male environment is that they should express themselves according to a male culture, whereas the norm for the female teachers is to express themselves according to a male or female culture. The female teachers can therefore be assumed to have to handle a more complex situation compared to their male colleagues since the norms they have to express themselves according to might not coincide [2].

Some researchers suggest that it is not the sex of the teacher that gives a difference in the rating given by students, but rather how the teacher's personality matches or departs from the gender roles. This could mean that the notion used by students to judge and evaluate the teachers vary with the gender of the teacher [6].

Purpose and Methodology

Problem Formulation

The purpose of this study was to analyze the critics given in course evaluations at Lunds tekniska högskola (LTH) from a gender perspective. Focus was put on the written comments given by the students in the course evaluations.

The following problem statements were formulated:

- Can any similarities and/or any differences be observed in the critics given to male and female teachers?
- Are there any differences in the comments given by male and female students?

Methodology

Literature Study

A literature study was conducted to form a theoretical background for the study. The focus of the literature study was previous research conducted on gender bias in course evaluations and earlier studies concerning the course evaluations at LTH. The purpose of the literature study was just to give a brief introduction to the subject and is not to consider as full review of the present research.

The System for Course Evaluations at LTH

Since 2004, a system for course evaluations called Course Experience Questionnaire (CEQ) is used at LTH [3]. The CEQ form consist of 26 statements which are answered on a graduated scale (-100, -50, 0, 50, 100) and two questions for written comments concerning the best aspects of the course and opportunities for improvement [7]. The forms are usually distributed via e-mail to the students after the end of the course. The answers are complemented with data about the number of students on the course, the number of passed examinations and the sex distribution among the students [3]. The written comments given in the evaluations are censured by the students union at LTH before all the data are compiled together into a report [8]. The reason for this is to remove formulations that could be perceived as insulting. This report is then discussed at a meeting between the course responsible teacher/s, student representatives and the program board [3]. These three parts then write comments about the course, which together with quantitive data are compiled into a final report which are e-mailed to the students participating in the course and published on a webpage [3]. All the answers to the CEQ forms are stored in a database and it is therefore with permission from LTH possible to access them, for example for research purposes.

Study Method

The method used in this study was to analyze the written comments given in the course evaluations on one of the Master in Science in Engineering programs at LTH. The similarities and the differences in the comments given to female and male teachers were revised as well as similarities between the comments given by female and male students. The chosen program had a dominance of male students and male teachers, but to conserve the anonymity of the teachers it will not be revealed in this report which program that was chosen. The motivation for choosing a male dominated program was the assumption that female teachers

in male dominated would be more exposed for harsh critics compared to female teachers lecturing in an environment with more equal sex distribution.

The chosen study period was sex years, from the academic year 07/08 to the year 12/13. The reason for this choice was that during this period, for previous studies, the courses had already been linked with the course responsible and the information of course responsible's sex could therefore be accessed via the database.

During this period 21 out of in total 137 analyzed coursed had female course responsibles, but additional women were mentioned in the written comments since female laboratory assistants and exercise assistants were also active on the courses. 2053 of the comments were written by male students, 716 by female students and for 182 the student had not reported any sex.

Limitations

Considering the time available for this study only one of the programs at LTH was included in the study. Ideally, additional programs should have been included to get more statistics and to be able to make comparisons between programs. This study can therefore only be seen as a first study to conclude whether this is something of relevance to look deeper into and to try out the method that was chosen.

The study was also limited to the mandatory courses given on the program since the CEQ form is not used on all of the other courses. The number of students is also less on many non-mandatory courses meaning fewer comments possible to analyze for each course.

Results

The analysis of the written comments found no significant differences between the comments given to female and male teachers. Even though the focus in the CEQ form is the students' opinions on the course and not on the teacher, it is clear that the students have a great focus on the teacher. The majority of the comments concerned the teacher. The students especially expressed the importance of the teacher's commitment and will for the students to learn. Both female and male teachers got comments about their commitment for the course and their attitude towards the students, both from positive and negative aspects. It is clear that the rating of a course is related to a good teacher, which the students describe as a committed teacher which a large interest for the student opinions and learning progress. When answering

the question concerning the best aspect of the course many students answered the teacher. It is also clear that the students compare teachers and judge then against each other. Many comments described the teacher as the best teacher the student has had during their education or ever has had. Some of the analyzed courses had several teachers lecturing and then this aspect became even more visible in the comments. When describing negative aspects of the courses many students mentioned teachers that make the student "feel like a fool". This seemed to have a negative emotional influence on the students and be an important aspect of their rating of the course. The majority of the negative critics given in the comments were constructive, but sometimes it could be very harsh and directed directly to the teacher, for example saying that the best way to improve the course is to replace the teacher. The teachers also get comments about their handwriting, way of talking and behavior toward the students. However, these types of comments were found directed in similar extent to male and female teachers.

Gender aspects in the course are directly commented occasionally in the comments. Some students mention the lack of female teachers on a course with many guest lecturers and some students commented on female students being treated better by the teachers than the male students. Except from these comments, the majority of the comments did not directly bring up gender aspects on the courses.

The analysis of comments given by female and male students also found mostly similarities. No significant same-gender preference was observed in the comments given by the students. However, it was noted more comments from female students concerning teachers that made them feel stupid or dumb than from male students. This was especially interesting since the number of comments from female students in the study were roughly one third of the number of comments from male students.

Analysis

The result did not find any significant differences between the comments given to female and male teachers. However, the results clearly showed that the students focused on the teacher when evaluating a course. It was also clear that the students put high demands on the teachers. The teachers are expected to have commitment and to care about the students. The students also compare teachers and judge them against each other. When the teachers are not able to live up to these expectations the critics from the student can be very harsh.

The results indicate that the personality and behavior of the teacher are very important for the outcome of the course evaluations. Since there were no significant differences in the comments given to female and male teachers this seems to be a more complex process than just dependent on the gender of the teacher. The students' preference for different teachers seems to also depend on the personality of the student, for example which learning preferences the student has, and not only the gender of the students.

This study did not consider the pedagogical skills of the teachers. The results show no differences in the critics given to female and male teachers, but this does not mean that no gender bias might still exist. It is possible that the female teachers in the study in fact were better teachers than the male teachers in the study or vice versa, but the students judged differently depending on the gender of the teacher.

Both female and male teachers seem to get the same type and amount of negative critics. Considering the suggestion presented in the theoretical background that women are deeper affected by negative feedback than men and that the situation female teachers working in a male environment is more complex, these negative comments might have affect the female teachers more than the male teachers.

The small amount of direct comments concerning gender aspects of the courses imply that the majority of the students do not think actively on the gender aspects of the courses they study. Mostly this seems to be an aspect that is not discussed in the course evaluations at all.

The study of the comments given by female and male students did not either show any significant differences. However, it was interesting to find that the female students commented on teachers that made them feel stupid or dumb in a larger extent compared to the male student. This might imply that the female students have less self-esteem than the male students and are more aware about how the teacher sees them. The analyzed data are not enough to make any further conclusions, but this might be an aspect that could be interesting to study further.

The study that was performed had some serious restrictions which limit the conclusions that can be made. During the analysis it became clear that a larger amount of data needed to be studied and that the construction of the CEQ form is not favorable for this type of study. The CEQ form does not ask any specific questions about the teacher's performance and therefore the students experiences of this can only be read indirectly in the comments that are given.

Also, some courses have several active teachers which make it difficult to distinguish the influence from different teachers.

Conclusions

Due to the importance of course evaluations in the careers of academic teachers and for the teachers working environment it is important to study the outcome of the evaluations from a gender perspective. This study did not find any gender bias in the written comment givens in the course evaluations at LTH, but due to the limitations of the study no distinct conclusions can be made except from the result that the students have high expectations on the teachers. Whether these expectations differ depending on the gender of the teacher and the students cannot be said from this study. To make the image more complete the effect the critics have on the teachers also need to be studied further. It is possible that female and male teachers react differently to the critics they receive due to them have different experiences from feedback growing up and gender norms present in the society.

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Jim Larsson

Gender imbalance in physics education

Gender imbalance in physics education

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Abstract

Gender imbalance in the different physics bachelor's program at the natural science faculty have been investigated by studying number of registered students between the years 2010 and 2013. The biggest gender gap could be found on the theoretical physics program and balance regarding gender could be found on the chemistry/physics program. Overall there is a gender imbalance at the bachelor's programs in physics with more males than females, with the exception of meteorology which had a higher rate of females. For student not choosing to continue their studies no conclusion could be made on if it was selective regarding gender.

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Introduction

This essay is a compulsory part of the course GNVB05: Gender Studies: Technology and Science given in cooperation with the faculty of science and of engineering at Lund University.

The aim of the article is to investigate possible gender imbalance in the physics education at the science faculty. It is inspired by an article by Annika Rejmer [1] who did a statistical study on the gender segregation in the bachelor education from different faculties at Lund University. In this article the different bachelor programs offered at the physics will be studied with focus on gender imbalance.

In general gender equality is at the natural science faculty and Lund University an important part of the overall work towards better studying and working environment, recently an action plan for gender equality and opportunity has been published [2]. Gender inequality in physics education and the physics environment are topics discussed all over the world [3, 4, and 5].

Background

When choosing to enroll into the bachelor program in physics at the faculty of science, the students have five possible specializations beyond the general physics program. The possible specializations are astronomy, photons and neutrons, chemistry/physics, theoretical physics and meteorology. The different programs share the same beginner courses in physics and mathematics, and after the bachelor studies one can choose to continue studying physics in a master program.

Previous work done [1] shows that there exist a gender imbalance at the physics department, both regarding students and teaching personal. Between the semesters of fall 2007 and spring 2011 Annika reports that there exist a gender imbalance in the first basic physics course, a total of 1005 students have been registered over the years, with a gender ratio of 36% females and 64% males. The teaching personal, including supervisors, at the courses are in clear imbalance with 95% being males.

Theory

Leaking pipeline

The leaking pipeline is a model based on empirical analysis [6] and describes the scientific careers of women, visualizing it as a narrowing pipeline with sections which represent different steps in the academic career, where a deceasing number of women entering each

"section" are creating a shortage of females. The model was first mentioned in the1980 and with gained popularity helped to explain both why females are "disappearing" and also why fewer females enter the so called "pipeline", this is also referred to as vertical and horizontal segregation [7].

Scissor diagram

One example of the leaking pipeline, common in scientific careers [8], is the scissor diagram (figure 1). The name arises from the scissor-like picture in a diagram showing the gender gap for different steps in the academic ladder. The effect is that there is an initial gender balance, but higher the career ladder goes more the gender gap increases.

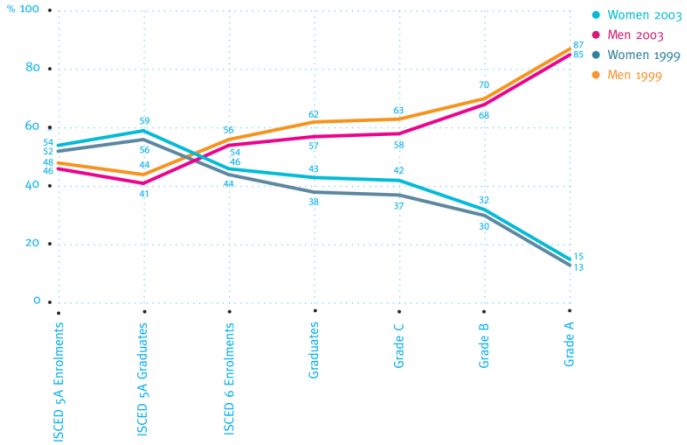

Figure 1 [8]: Scissor diagram showing how the gender gap increases in the academic career.

Gender imbalance

Determination of gender imbalance will follow the same definition as in the article "Blir du lönsam lilla vän?" by Annika Rejmer and Anna Sonander. The gender ratio is divided into three categories:

- 80-100% Unbalanced
- 60-79% Moderately imbalanced
- 40-59% Balanced

Gender is defined as either male or female and is determined by the ninth number in the Swedish 10 digit personal identity number, where odd is male and even is female.

Method

The data used to investigate the different bachelor's programs has been retrieved from the database LADOK, which is a register of study results for higher education in Sweden. The

data was accessed with help from the study administration guy Mikael Antic at the physics department, no personal information was disclosed when retrieving the data.

Results

In the semesters between 2010 and 2013 a total of 358 students have been registered on a bachelor's program in physics at the faculty of science, of these 92 were female. This can be considered moderately imbalanced (25.7%). The students have then been divided into one of six possible specializations: *Astronomy* (ASTR), *Photonics and Neutrons* (FONE), *General physics* (FYSI), *Chemistry/physics* (KEFY), *Theoretical physics* (TEOF) and *Meteorology* (MEBG). The most popular specialization is general physics with 161 starting student and a female representation of 21%, which can be considered moderately imbalanced. A Gender unbalance can be found in astronomy, photons and neutrons and theoretical physics with a female representation of 14%, 15.4% and 7.5% respectively. Both astronomy and theoretical physics are fairly popular with 64 and 67 starting students, which can be compared to the 13 students which chose photons and neutrons. Only one specialization manages to have a gender balance at the entry level of their program which was Chemistry/physics with 44.8% of the total students being female. In addition to the general specialization, meteorology is also regarded as moderately unbalanced with a female ratio of 70%.

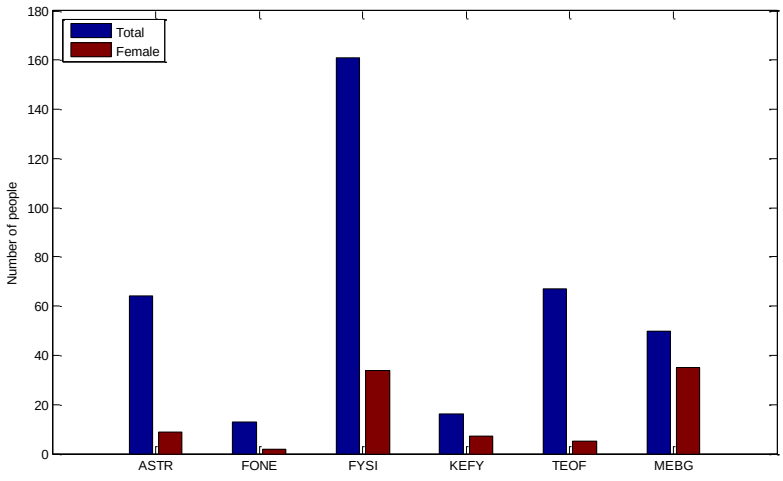

Figure 2: Total number of students first time registered between 2010 and 2013 on the different bachelor's program *Astronomy* (ASTR), *Photonics and Neutrons* (FONE), *General physics* (FYSI), *Chemistry/physics* (KEFY), *Theoretical physics* (TEOF), *Meteorology* (MEBG).

For students that started their physics studies in the fall semester of 2010 (all specializations), the gender ratio is consistent for continued studies (table 1). First semester consist of 30.8%

females and at the registration on the second semester of the third year, 30.1% was females (figure 2.c).

Table 1: Number of total students continuing their bachelor's program in physics, starting fall semester 2010-

	Fall -10	Spring -11	Fall -11	Spring -12	Fall -12	Spring -13
Total	83	68	53	47	45	44
Females	25	21	18	17	13	14

When looking at the specializations *general physics* (figure 2.a) and *meteorology* (figure 2.b) for the students of fall 2010, 26 and 21 was registered on the programs, with a female representation of 23.1% and 66.7%. At the sixth semester (spring 2013) 13 and 14 students were registered with 38.5% and 57.1% females. Presentation of the rest of specializations was omitted because a combination of two reasons. Firstly they had very low sample sizes and secondly they had zero females registered after the first year.

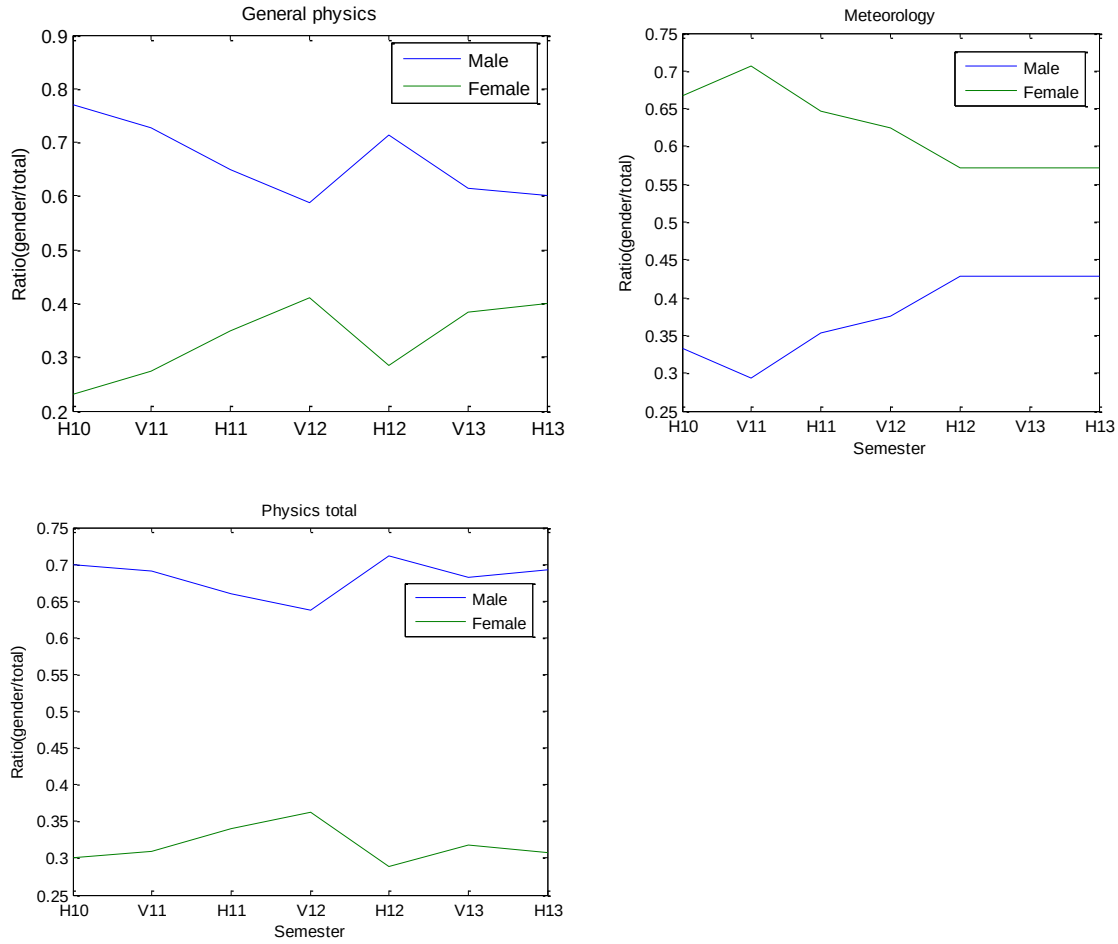

Figure 3: Number of student starting on the fall of 2010 and continue their studies. For convenience the numbers are normalized at each semester, giving the ratio of male/female. General physics (top left, a) meteorology (top right, b) and (down left, c) the total number of physics students starting fall 2010.

Discussion

The overall unbalance in the physics education is consistent with research done by Annika and it is also similar to how it looks in Sweden overall. From SCB (*statistiska central byrån*) the total number of students registered on a physics course 2011/12 was 12350 [9] and 30% of them was female. In the same year 33% of the bachelor's degrees in physics were given to females. So the initial imbalance in the physics department Lund University is nothing locally and recalling the introduction, the imbalance can be found on a global scale. The observed imbalance has been the basis of research exploring the connection between gender and physics.

When explaining the low entry of female into physics, it is perhaps easier to do that by discussing other fields in science too. For example a gender imbalance can also be observed in the first courses of biology and chemistry, but instead they are female dominated. This agrees with the notion that in natural science chemistry and biology are regarded as feminine

sciences and physics and mathematics as more masculine [10]. The masculine world of physics and mathematics is explained with the close relation to technology [11] and machines [12], males are introduce and starts to play with technology at a younger age, which is argued to make it easier to relate physics and mathematics. Even though chemistry and biology also contain technology, they are more nature oriented and they are not regarded as difficult as physics and mathematics.

The absence of historical female physicists can also make it difficult and less interesting as a female to enter physics studies. In addition textbooks used in physics have a tendency to more frequently portrait adult males, both in form of references to old physicists. It is common for textbooks to highlight famous physicists at the beginning of chapters which topics they have made significant contributions to. This creates very strong roles models for young physicists and this relation has been described by Traweek:

"They learn to devalue past science because it is thought to provide no significant information about the current canon of physics, but they also learn, from stories in their textbooks, that there is a great gap between the heroes of science and their own limited capacities". – Page 75, Beamtimes and Lifetimes: The World of High Energy Physicists.

The "heroes of science" (Newton, Einstein, Schrödinger, etc.) are almost always male and their scientific discoveries are often presented as individual achievements. Their genius status makes them to very strong role models and the fact that all are male, could make a contribution to the lack of females choosing to enter physics studies. When also considering the very male dominant teaching environment, it can be difficult for a female student to find inspiration in both past and present. One can question if the gender of a role model in physics is important, it is after all their physic achievements that should be the inspiration. The important thing is that the role models contributes to an already male dominant environment which then can give the impression of being excluding and here more effort needs to be done to promote diversity but also lifting up the importance of collaboration, which also was important in pre-modern physics.

From the result section we see that when looking at the "fine structure" of the physics education, a more nuanced image is showing. *Meteorology* has a gender imbalance with a female dominance, and *chemistry/physics* which is regarded as balanced. It should be noted though that it is based on a quite small sample size and so an high uncertainty, the low popularity may origin in that it is a specialization for those who are unsure if they want to

studying chemistry or physics, a feasible explanation is that the decision is done at gymnasium level. We should also further discuss the anomaly that is *meteorology*. During the period between 2010 and 2013 of the total 50 students starting 70% were female. This makes it opposite to the general physics program when comparing imbalance and it is also quite popular like astronomy and theoretical physics. If we try to explain the data using the aging belief that some sciences are better suited for females and males, then the argument should be that *meteorology* is female dominated because it is a discipline where you study the weather and atmosphere. So it is much closer to nature than the other specializations. The low female representation on astronomy and theoretical physics would then be explained by their connection to philosophy and mathematics, which have the notion to be more "male friendly". In reality there are probably more complex mechanics behind the gender imbalance that is observed in the bachelor's programs, but that is out of scope of this article and the limited knowledge of the author.

The gender imbalance was also investigated by looking at the students continuing their studies which started at the fall semester 2010 (figure 3) in a bachelor's program in physics. Data was available for seven semesters, which is one more than the length of the bachelor's program, but is will not be discussed because the difficulty of interpretation.

For general physics and meteorology, the diagrams seem to converge (figure 3.a and b) and the gender imbalance is constant when the total number of students are considered (figure 3.c). Thus no scissor diagram or pipeline effect is observed, which could be interpreted as no phases during the bachelor's program that are selective towards a certain gender, but further research needs to be done to make such a conclusion. No conclusions can be drawn the convergence shape of general physics and meteorology other than some possible pre-stage in the scissor model, but for that more research is needed on following studies at the advanced level.

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Sofie Trier Jensen

Investigating the Danish HPV Vaccine – Discourse with a Gender Magnifier

INVESTIGATING THE DANISH HPV VACCINE-DISCOURSE WITH A GENDER MAGNIFIER

Abstract: In 2008 the HPV vaccine is made available for Danish girls born in the period of 1993-95 and soon after it becomes part of the female children vaccination program. Today the Danish discourse of HPV and the HPV vaccine is still marked with a "girls only" and the vaccine is not offered to men. As a feminist and as a gender study student my alarm clocks ring when people are divided by gender. I decided to take a closer look at the Danish health and disease encyclopedias and public health authorities' webpages. Doing this I found that not rational medical arguments, but normative assumptions about gender and sexuality are used as tolls to rationalize the choice of a gender segregated HPV vaccination program.

Keywords: HPV, HPV-vaccination, health care authorities, herd immunity, gender, sexuality, heteronormativity, norms.

In this paper I want to investigate why the HPV vaccine is free for females and not for men in Denmark. In order to do this, I will clarify the mainstream discourses of HPV and critically examine whether gender bias are influencing who is and who is not being offered the HPV vaccine for free.

First I will demonstrate how it felt to navigate in the multiplex choices connected to the HPV-vaccine, at the time it became available. My starting point is therefor my own experience with being a young woman in exactly that situation.
Secondly I will look into the research that has already been done within this field and then use it to comment on and analyse my materiel, being Danish health and disease encyclopedias and public health authorities webpages.
My approach is therefor dual. On one hand it consists of a personal story of lived experience and on the other hand of a constructivist examination of gender in the context of HPV.

With this dual approach I hope to add something noteworthy to the understanding of the complex interplay between institutions, norms, science, marketing, politics and media representation, which I believe creates the discourses of the HPV-vaccine choices made in Denmark altogether.

Before I begin telling my story, I briefly want to clarify what HPV is and what herd immunity means since this is of great important in my paper.

WHAT IS HPV?

Human Papilliomavirus (HPV) is a DNA virus that attacks the keratinocytes of the skin and mucous membranes. In most cases HPV is a harmless virus that shows no symptoms and can be taken care of by the immune system. In a minority of cases HPV can lead to warts or cancer (A: cdc.gov). There are more than 120 types of HPV. Around 30 of them are transmitted through sexual contact. There are "high risk" and "low risk" HPVs. "Low risk" HPVs like type 6 and 11 can cause genital warts while "high risk" HPVs like type 16 and 18 can cause cancer (A: archivesofpathology.org). "High risk" HPVs can lead to cervical, anal, vulvar, vaginal and penile cancer, but has also been associated with oropharyngeal cancer (A: nejm.org).

HPV VACCINES AND HERD IMMUNITY

Most vaccines work according to herd immunity. The concept of herd immunity is built on the assumption that the entire population will benefit from vaccinating a smaller group. There is no cure for HPV. The elimination of it will therefore depend on our capability to reduce the number of infected people. Vaccinated individuals will not get infected and therefore they cannot pass on the virus, which will prevent the spread of it (Llewellyn, 2011, 8).

MY EXPERIENCE WITH THE HPV VACCINE:

I was halfway in my gymnasium-degree when the HPV-vaccine-wave struck me and the rest of Denmark. I remember that we talked about the vaccine a lot and that it was all over the media for quite some time. The first HPV vaccine was made free the 1st of

October in 2008, available for girls born in 1993-95. In 2009 it became a part of female children's vaccine program, which meant that all girls born in 1996 or later were offered the vaccine for free (A: Sundhedstyrelsen.dk). A massive health campaign consisting of posters and TV-commercials was conducted and executed by the Danish Health and Medicines Authority (Sundhedsstyrelsen), Denmark's supreme health and pharmaceutical authority (sundhedsstyrelsen.dk).

I was born in 1989 and was therefore not offered the free vaccine at that time. At first I was relieved, I had always been afraid of needles and the thought of vaccines alone made me dizzy, but the feeling was soon replaced by unease. The vaccine turned out to be a "virgin-vaccine". Some of my friends who like me were too old to get the free vaccine would pay for it themselves or their parents would. Some of them lied to their parents, whom all of a sudden felt they had the right to know if their daughters were sexually active or not. It would be a waste of money to pay for someone who was already infected. I felt a little bit deceived, I knew about other STD's (Sexual transmitted diseases), but why had no one told me that sex could give me cancer? It was not that any of my friends were judging me or the other girls, who did not get the vaccine, but still there was now something that separated "us" who did not get it from "them" who did get it. The vaccinated girls said that it was unfair that the vaccine did not work for us, that they felt sorry for us and that they had just been the lucky ones. I never talked to my parents about them paying for the vaccine, I knew it was expensive and money had always been a tensed subject in my family. I also thought I was not worth it, I was properly already infected, and lying so I could be a part of the virgin club was too ridiculous in my eyes.

In 2012 my age group was included in a HPV vaccine catch-up program, which expired at the end of 2013. I got my vaccination. The need for the virgin-club membership was long gone, but I felt that I was obligated to get it. Why would I not take a free vaccine that could possibly spare me or maybe someone else of cancer? Maybe it was just because I was older, because being sexually active was not really a question, but rather a fact or maybe the attitude of the HPV-vaccine had actually changed since I was doing my gymnasium-degree. Regardless of what, no one was talking about virginity anymore and no one was talking about how it was a waste vaccinating us. The vaccine was a matter of public health and getting the vaccine was the responsible thing to do.

Looking back at this with my new knowledge about gender and norms I see that my experience with the HPV vaccine program was far from gender-bias-free and I wonder, can it really be, that the Danish health authorities provide gender-biased knowledge about HPV and that the choices made regarding the HPV-vaccine program are based on these reasons?

WHY LOOK AT THE HPV-VACCINE IN A GENDER PERSPECTIVE?

During my youth I have had the discussion of double standards regarding male and female sexuality plenty of times. I felt that the focus on female virginity in the context of the HPV-vaccine was totally unnecessary, but I never questioned the Danish Health and Medicines Authority recommendations. If they recommended vaccinating only girls at a specific age then that was the right thing to do. Like a lot of other people in Denmark I thought that politics was biased in all sorts of ways, but not the politics of health care. To me the health system was the symbol of objectivity, logic and justice.

This assumption is wrong. Ever since the enlightenment, scientists have claimed that they were working from the privileged standpoint of objectivity. Western science was perceived as both methodologically and epistemologically "pure", all knowledge that derived from here was universal and neutral (Schiebinger, 1999, 107). However, science is not value-neutral. Gender, race, ethnicity etc. do have consequences for the content of science, the biased assumptions are embedded in those institutions that still produce knowledge today (Ibid).

As long as science has existed women have been the subjects of it. Women's physical, intellectual and moral character has been studied from head to toe, not so much for the sake of their health, but to solve the riddle of women's place in society (Ibid, 108). The difference between the sexes, whether it was placed in the genitals, in the brain, in the hormones or somewhere else, was of major importance in maintaining the gender order in society.

Much later in the middle of the second wave of feminism, researchers began to realize how influential studies neglected women as both objects and subjects of medical research (Ibid, 113). Taking for granted that the man is the norm, medical researchers often failed to test new medicine on women before it was put on the market. An American study from 1992 shows that only half the drug surveys had been tested for

sex-related differences, resulting in millions of women daily taking medical drugs in the wrong doses (Ibid 114). These kind of studies and liberal feminists' fight to get women's health a fair share of the research money, lead to women's right to inclusion in medical research into a part of the U.S. federal law and to the establishment of the Women's Health Office (ibid 116). Moving forward I will demonstrate that the HPV-vaccine is no exception. The complex interplay between institutions, norms, science, marketing, politics and media representation that forms our understanding of the HPV-vaccine is indeed biased.

ANALYSIS AND DISCUSSION

There has not been made any research particularly regarding the HPV vaccine and gender in Denmark, but there has been made very relevant research within this field in other counties especially in the US. In the following I will present and comment on some of the research that I find especially relevant for my research problem. Furthermore I will analyse my own material in the light of this research.

In one article "A Feminist Perspective on HPV vaccination Strategies" from 2011, the American sociologist Cheryl Llewellyn scrutinizes the basis that CDC (Center for disease control) made their recommendations regarding HPV-vaccination in the US. In 2006, Gerdasil, the vaccine against HPV, was approved by FDA (the United States Food and Drug Administrator) and soon after CDC recommended that it would be given to girls age 13-18. When the pharmaceutical company behind Gardasil got the vaccine approved for men too in 2009, CDC decided that the vaccine would not be recommended as a part of male vaccine schedule, but instead may be offered to those who wished, paid out of their own pockets of course (Llewellyn, 2011, 1). CDC's decision is based on several cost effectiveness analyses[1] made by experts appointed by CDC. All reports find that it is far more cost effective to vaccinate only girls. However, another report made by a researcher appointed by the medicinal company behind Gerdasil, Merck, finds that vaccinating both boys and girls would be cost effective too (ibid, 8). The recommendations made by CDC are very similar to those made by EMA

[1] An analyze method that tell us how much it cost for one healthy year of life. This is called the cost per QALY (quality-adjusted life year). What is good is a program that has a low cost per QALY (Llewellyn, 2011, 5).

(European Medicines Agency). EMA is a decentralized body of the European Union, whose recommendations the Danish health authorities most often follow.

It is possible that Merck's economic interests biased their analysis, but nevertheless it shows that the numbers can be "fixed" in a way so it is cost effective to vaccinate both boys and girls. Even though all analyses made by CDC-appointed researchers are made by so-called "neutral" parties, it does not mean that they are not biased (ibid 8).

ASSUMING HETEROSEXUALITY:

Since HPV is most often transmitted trough sexual contact the cost effectiveness analysis assumes heterosexuality. The analyses made by CDC- appointed researchers argue that by vaccinating females, men will also be protected, but what about those men who do not have sex with women but with other men? "What [These reports] really tell us is how to prevent HPV among heterosexual individuals, not among the entire population." (ibid, 9).

In my material information about male related HPV is very limited. I find that the HPV information is almost exclusivity connected to cervix cancer. The Danish organisation Against Cancer (Kræftens Bekæmpelse) who gain most of their income from membership fees and use 19% of the total income on information work (A: cancer.dk) have launched a web page called "vidunderlivet.dk" which is a wordplay between the Danish word for cervix (underliv) and the Danish word for wonderful (vidunderlig) (A: vidunderlivet.dk). Netdoktor.dk one of the most used disease encyclopedia in Denmark has 20 articles about HPV, nine of them are about HPV in general, one of them is about HPV vaccine in general, eight of them are about women and HPV (four out of these eight are about cervix cancer and HPV) and only two of them are about men and HPV (A: netdoktor.dk). Danish doctors vaccination service webpage about HPV vaccination (A: hpvvaccination.dk) does not mention the opportunity to vaccinate males with a single word and there is a misleading simplification of HPV-vaccine as only a genital warts- and cervix cancer-vaccine. SSI (Statens serum institute) (the State's Serum Institute) a state enterprise organisation that collects data for the Danish Health and Medicines Authority, do also offer very limited information about male HPV (A: ssi.dk). These webpages are some of the top hits on a Google search on "HPV" from a Danish computer. A survey from 2010 shows that up to 90% of the Danish population

prefer the Internet as source to sickness and health information (A: sundhed.dk). This means that online information is likely to be most people's main source to knowledge about HPV and HPV vaccines.

The absent of a free vaccine to men and the missing information about men and HPV in general, I see as a gender issue grounded in hetero-normativity that results in discrimination of homosexual men. Litterature on HPV is imbedded with hetero-normative hints. For example on Netdoktor.dk there is a text about HPV and genital warts that seems fairly gender neutral, but then a weird sentence shows up under a tab called "how does genital warts feel" (Hvordan føles kondylomer) it says: "For both men and women genital warts can occur in the area around and in the rectum" and then it continues "…the infection is not necessarily caused by anal sex. The virus can wander along the skin." (My translation) (B: netdoktor.dk). The last information about how the virus ends up in the rectum is so misplaced and completely unnecessary in this context. This I see as a distinction between "normal" STIs and homosexual STIs.

ANOTHER WAY OF REGULATING FEMALE SEXUALITY?

In the article "A tale of two technologies – HPV vaccination, Male Circumcision, and Sexual Health" Laura M. Carpenter and Monica J. Casper present an interesting comparison between the reaction on two STI preventing technologies, the HPV vaccine and male circumcision. Male circumcision has been studied as HIV preventive and even though researchers still disagree on the effectiveness of this technology, Carpenter and Casper argue that there is a basis for comparison. Comprehensive evidence-based research shows that if a circumcision was a vaccine it would produce immune responses in 30-50 % (Carpenter, Casper, 2009, 796).

HPV-vaccination and Male circumcision both require individuals to undergo bodily risks with only few or no personal benefits. Subsequently both technologies are based on principles of herd immunity, however the responses to these two technologies have been very different (ibid, 796). Even though HPV also causes anal, penile and throat cancer, Merck the medical company behind the vaccine chose to promote the vaccine as a cervix cancer-vaccine, avoiding the sexual and same-sex associations of HPV-infections (ibid, 799). Almost immediately the media started focusing on the dangers of the vaccine. Some thought that the vaccine was premature and that side effects were not

clarified enough, but the side effect that took up most space in the media was the imagined danger of risky sexual behaviour among young girls. The vaccine got nicknames as "the promiscuity vaccine" and "the slut vaccine" (ibid, 799). Male circumcision as HIV preventive got a very different response. Most of the research conducted within this field is made in Africa and some researchers did fear that vaccinating African men would increase the risky sexual behaviour among them, however this concern did not occur in the American context. The cons presented in the media was mainly about the right of children to choose for themselves if they wanted to undergo surgery, the risk of stigmatising men as perpetrators of infection, especially African men and that it is not cost effective enough (ibid, 802-805). As we can see the responses to the two technologies are deeply imbedded with cultural ideas about gender, sexuality and race.

> "Members of some groups – "fallen" women, racial of ethnic minorities, poor people, people in developing nations – are typically culturally positioned as unhygienic, with toxic bodies and transmissible "conditions," and thus in need of containment" (ibid, 809).

In other words the way these two technologies are developed, constructed and presented is not arbitrary, instead it is a result of the classic double standard that women are to be protected (read: regulated) whereas men are expected sometimes encouraged to carry out their sexual urges (ibid, 800).

In Denmark sexuality and chastity are not controversial political topics as such and therefore the Danish context is somewhat different. There is no political party that advocates against pre marital sex like the Conservatives do in the US and the general opinion is that knowledge and not chastity is the way to go when is comes to preventing unwanted pregnancy and STIs. The HPV-vaccine did therefore not trigger any noteworthy chastity-campaigns or resistance of that kind. Despite this the double standard was and still is influencing the Danish HPV vaccine-discourse. As I explained in my introduction most of us (including our parents) thought that the vaccine was useless if we had already had our sexual debut. It is a logical assumption that the HPV-vaccine is mostly effective before any contact with the virus, but the emphasis on virginity is misleading for several reasons. First of all the HPV-virus can be transmitted through secondary sources and you can contract it even without directly sexual contact,

secondly your body's immune system can fight the virus, get rid of it and still become infected with the same virus later on and thirdly according to the principals of herd immunisation the vaccination should be targeted at risk groups as well as non-risk groups to achieve effective results.

Since only females have cervixes the focus on the vaccine as a cervix cancer-vaccine is not only misleading and inaccurate it also allows a repetition of a historically well-known trend, which insists that females are responsible for the sexual health of both men and women. This trend is connected to a "… deeply gendered control and surveillance of bodies and bodily risk." (Mishra, Graham, 2012, 58). HPV-vaccine literature is both directly and indirectly connected to purity. The Danish webpages I have been looking at all recommend females to be vaccinated regardless of sexual debut which makes the mentioning of sexual debut absurd in the first place and only serves as a reminder of the female duty to self-monitor her self-inflicted risk (from risky sexual behaviour) or fail as females (ibid, 59).

CONCLUSION:

According to my examinations and experiences the choices made regarding HPV-vaccination and campaigning in Denmark is indeed gender biased. The HPV-vaccine is a good thing. I do not regret getting it and I will not hesitate recommending it to both men and women in the future. Yet I want to underline that this does not excuse the unfair distribution of responsibilities and privileges. We need to acknowledge as a society that medical science is not gender bias free and that the choices we make within this field have social consequences for the individuals involved and consequences for the social justice in the society as a whole. The Danish health authorities need to take full responsibility for their campaigning and make sure that they communicate accurate, just and thought through knowledge instead of mindlessly reproducing gender norms.

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