

# Gender in Academia in Finland: Tensions between Policies and Gendering Processes in Physics Departments

*Kristina Rolin and Jenny Vainio*

This article contributes to the growing literature on gender and physics by employing the concept of gendering processes to the study of physics departments in Finland. We show that gendering processes can have paradoxical and ambiguous outcomes for women. In order to understand gendering processes, we analysed two kinds of data: gender equality policies in academic organizations and interview data with 36 physicists, both male and female. On the basis of the interview data we argue that physics departments are gendered in the dimensions of symbols and images, interaction, and mental constructs. We also argue that there are tensions between policies and gendering processes in physics departments because policies do not fully succeed in identifying the processes that maintain inequalities between female and male physicists. The tensions explain why gendering processes have paradoxical and ambiguous outcomes.

*Keywords:* gender in academia, equality policy, physics

## Introduction

This article seeks to contribute to science studies scholarship by employing the concept of gendering processes to the study of gender in physics departments in Finland. In order to understand gendering processes, we analysed two kinds of data: gender equality policies in academic organizations and interview data collected in interviews with 36 Finnish physicists during 2006-2007. We demonstrate how gendering processes not only maintain and generate inequalities between female and male physicists but are also fields of *opposing forces and tensions* (see also Hearn, 1998). We use Joan Acker's (1990; 1992) concept of gendering processes

to identify different types of gendering processes in gender equality policies and the interview data. We argue that gender equality policies function as *symbolic* gendering processes insofar as they produce a certain kind of representation of discrimination in universities. In our analysis of gender equality policies we identify measures against three types of gender-based discrimination: *blatant*, *subtle*, and *covert*. In our analysis of the interview data, we identify not only symbolic gendering processes but also *interactional* and *mental*. By juxtaposing policies and interview data we attempt to shed light on how organizations both reproduce and act against gendering processes and the kinds

of tensions that emerge. Thus, the concept of gendering processes enables us to provide a more dynamic picture of gender than is found in other studies of gender in physics thus far.

Despite the various policies that aim at facilitating women's participation in academia, recent studies suggest that gendering processes can have paradoxical and ambiguous outcomes for women (van den Brink & Stobbe, 2009; Knights & Richards, 2003; Krefting, 2003). This paper aims to understand why tensions between policies and women's participation remain and argues that gendering processes play a key role in this understanding. Our study reveals how ambiguous outcomes unfold for women in physics departments in Finland.

Finland provides an interesting national context for studying gender in academia because of the country's gender equality profile. Finland has a high ranking in indexes that attempt to measure women's status in society. According to the World Economic Forum's Global Gender Gap report, Finland has the second smallest "gender gap" in the world when gender gap is understood as a quantitative measure of the differences between women and men in four outcomes: economic participation and opportunity, educational attainment, political empowerment, and health and survival (Hausman et al., 2009). Yet, paradoxically, while the differences between women's and men's attainment levels in education, politics, and health are relatively small, the labour market has remained gender-segregated both horizontally and vertically, and a 20 percent difference in income has persisted over the last two decades (Statistics Finland, 2007: 59; see also Tienari et al., 2009). The gender equality profile for academia in Finland is also uneven. In 2009 the proportion of female Ph.D. graduates in all fields was 52 percent and the proportion of female professors 24

percent (Ministry of Education, 2010).<sup>1</sup> A significant achievement in gender equality policy is a universal day-care service, which facilitates women's attempts to balance work and family life. Other achievements are the policy of guaranteeing at least forty percent representation of women in national research councils, and the policy of extending temporary research positions as a compensation for parental leave (Husu, 2005; 2007). Despite these achievements, women are severely underrepresented in some academic fields in Finland. In 2009 the highest proportion of female Ph.D. graduates was in veterinary medicine and health sciences (100 percent and 82 percent) while the lowest was in engineering (25 percent). The highest proportion of female professors was in veterinary medicine and the health sciences (52 percent and 61 percent), and the lowest was in engineering (8 percent) (Ministry of Education, 2010). Thus, the proportion of female Ph.D. graduates and professors varies substantially from one field to another.

Given that academia in Finland is characterized by horizontal and vertical gender segregation, we focus on gendering processes, especially as they unfold in one academic field, namely physics (see also van den Brink & Benschop, 2009). Physics is an interesting choice because the gender equality profile of physics is "surprising" (Barinaga, 1994; Hasse, 2008). It is "surprising" in the sense that the highest proportion of female physicists are not found in countries that offer public day-care services and have a high ranking in gender equality indexes.<sup>2</sup> For instance, women in Finland are severely underrepresented at all organizational levels in physics. The first time a woman completed a Ph.D. in theoretical physics was as recently as 1992. The first time a woman was nominated as a physics professor was in 2000. Today, women account for fewer than 10 percent

of the physics professors at the University of Helsinki, despite the fact that over 20 percent of the Ph.D. degrees in physics have been completed by women since 1996 at the University of Helsinki (Tala, 2006).<sup>3</sup> While many studies on women, gender, and academia in Finland are relevant for understanding women's status in physics (see e.g., Husu, 2001; Julkunen, 2004; Naskali, 2004; Raehalme, 1996; Saarinen, 2003; Wager, 1994), there are few studies that try to understand and explain women's low participation in physics (see e.g., Tala, 2006). Our study aims to fill this gap by analysing the role of gendering processes in physics departments.<sup>4</sup>

### **Gendering processes as fields of opposing forces and tensions**

Acker's framework of gendering processes in organizations provides us with a more dynamic concept of gender than is found in other studies of gender in physics. Many studies on gender and physics offer a static picture of gender because they focus either on the structural representation of men and women in physics (Barinaga, 1994; Ivie et al., 2001; Ivie & Guo, 2006), or on the symbolic dimension of gender by analyzing the masculine images of the ideal physicist (Barad, 1995; Bug, 2000; Hasse, 2002; Keller, 1977; Rolin, 1999; Traweek, 1988; Wertheim, 1995).

Acker explains gendering processes as "concrete activities, what people do and say, and how they think about these activities, for thinking is also an activity" (Acker, 1992: 251). Gendering processes may be readily apparent, as when a male leader of a research group selects only males for the group, or they may be hidden, as when an apparently gender-neutral practice such as sharing information informally turns out to have different consequences for women and men. Gendering processes are often

implicit in attitudes and behaviours that are understood to be sexual (Acker, 1992: 252).

Based on Acker, we distinguish four dimensions in gendering processes in organizations. (1) In the *structural* dimension, the production of gender differences takes place in the gendering of jobs, wages, hierarchies and power (Acker, 1992: 252; see also Acker, 1990: 146-147). (2) In the dimension of *symbols and images*, gender differences are produced by means of stories or pictures, which justify the gendering of jobs, wages, hierarchies and power (Acker, 1992: 253). Gender differences may be produced explicitly, as when a scientist is depicted stereotypically as male, or they may be produced tacitly, as when a job description is tailored for an apparently gender-neutral scientist who, on closer scrutiny, turns out to be male (Acker, 1992: 257-258). (3) In the *interactional* dimension, gender differences are produced in interactions, as when women are sexually harassed or when women are excluded from social activities because they are women. (4) In the *mental* dimension, gender differences are produced in the internal mental work that individuals construct in order to understand their place in gendered organizations (Acker, 1992: 253). For women in male-dominated environments, this may mean adapting one's identity to the perceived gender expectations, such as trying to be one of the boys (Powell et al., 2009). In this study we focus on dimensions two, three, and four.

While the concept of gendering processes is not novel in organization studies, it can be used to develop a more dynamic understanding of gender than is provided by the interdisciplinary literature on gender and physics. In this literature gender is often conceptualized as an ideology that consists of associations. Associations have the general form "x is masculine in context c" or "x is feminine in context c" where x can stand

for a number of things such as professions, professional activities, and virtues (Rolin, 2008: 1113). Gender ideologies make it possible for scientists to “do gender” as they do other things (West & Zimmerman, 1987). In this view, to say that gender is a socially constructed phenomenon means that things understood as masculine or feminine (or gender neutral) are not necessarily masculine or feminine (or gender neutral). They are gendered for some people in some culturally and historically specific context insofar as these people behave as if they are gendered. For example, the “anomaly of a woman in physics” (Keller, 1977) is often explained in terms of two underlying associations: the association of masculinity with the mathematical nature of theory in physics, on the one hand, and the association of masculinity with the technological nature of experimental practice in physics, on the other hand. Some studies emphasize that the masculine associations of physics are due to its close connection to military technology and the special status physics had in cold war politics (Cohn, 1987).

The kind of masculinity that underlies the ideal physicist is sometimes characterized as the “high priest” image of the scientist (Wertheim, 1995). It is legitimized by claiming that physics is the most “fundamental” of natural sciences (Bug, 2000; 2003). At other times, the ideal physicist is characterized as the “playful boy” (Barad, 1995); it is legitimized by claiming that physics requires a special talent for “creativity” (Hasse, 2002). Given the playful aspect of masculinity in physics, it is not surprising that Sharon Traweek depicts high energy physics as a culture in which “social eccentricity and childlike egoism are cultivated displays of commitment to rationality, objectivity, and science” (1988: 91). In her autobiographical essay Evelyn Fox Keller (1977) suggests that the alleged “hardness” of physics is

enforced by a culture that values arrogance and masculine toughness. As one informant in Traweek’s study puts it, it is only “blunt, bright bastards” who can make a successful career in high energy physics (1988: 88).

The construction of the ideal physicist is subject to some degree of variation among national cultures. Whereas in Estonia the ideal physicist is akin to a “blacksmith”, a down-to earth scientist who is not afraid of getting his hands dirty (Velbaum et al., 2008: 178), in Denmark the ideal physicist is a Herculean character, a competitive individualist with an air of self-confidence and arrogance (Hasse & Trentemøller, 2008: 100). The Herculean ideal is similar to the Olympus, the ideal scientist as a lonely hero who is far removed from daily practices (Benschop & Brouns, 2003). Despite this variation, the shabby image of a “genius” in physics is widely shared and continues to be a thoroughly masculine image (Traweek 1988: 102-105).

While we are interested in understanding how the ideal worker is constructed in physics departments in Finland and the extent to which this construction privileges some physicists over others, we also aim to understand the interactive and the mental dimensions in gendering processes. The interactive and the mental dimensions are of special interest because we want to find out how physicists cope with the images of the ideal worker. Moreover, we aim to understand not only how individuals resist and oppose gendering processes but also how organizations do so by means of their gender equality policies. Thus, we suggest that gendering processes are understood as fields of *opposing forces and tensions*. This means that gender consists not only of relatively stable “associations” and “images of the ideal physicist” but also of other gendering processes and counter-active forces.

In our view policy documents can be understood as gendering processes that aim to identify other gendering processes in organizations and define guidelines for acting against those believed to maintain and generate inequalities between women and men. Insofar as they succeed in identifying such processes, they function as opposing forces. When they fail to address other gendering processes, tensions are likely to emerge. We also argue that policy documents are *symbolic* gendering processes because they produce a representation of the university as an organization that aims to be inclusive, fair, and progressive.

Policy documents can have paradoxical and ambiguous consequences for women in organizations. If they do not succeed in identifying those gendering processes that maintain and generate inequalities, then they can promote a false image of the organization as more equal than it is and make it even harder to identify the gendering processes. As David Knights and Wendy Richards (2003) argue, meritocratic systems can have contradictory outcomes for women. While they can be used to campaign against gender-based discrimination, they can also be used to pass the responsibility of unequal outcomes on those who are disadvantaged by the gendering processes.

In the next section we explain how we have studied gendering processes as fields of opposing forces and tensions.

### **Methodology: discovering tensions between equality plans and gendering processes in physics departments**

Many countries and organizations have reformed their gender equality policies during the last two decades. This is the case in Finland where so-called equality plans have become the main tool of gender

equality policy in academia. Since 1995 the Act on Equality Between Women and Men (609/1986, amended 206/1995 and 232/2005) has required that public authorities, such as universities and state funding agencies for research, produce equality plans every three years in order to prevent discrimination on the basis of gender and promote equality between women and men (Academy of Finland, 2005; University of Helsinki, 2007). Equality plans are to achieve these goals by reporting on the relative numbers of women in teaching and research personnel, other staff, and the student body and by formulating recommendations, guidelines, and policy measures.

As our main research problem is to understand the *tensions* that emerge in the field of opposing forces in organizations, we have analysed two kinds of data: gender equality plans and interview data with 36 Finnish physicists. We discuss two equality plans, the Academy of Finland Equality Plan (2005-2007) and the University of Helsinki Equality Plan (2007-2009). The Academy of Finland and the University of Helsinki are important agents in formulating gender equality policy in Finnish academia. The Academy of Finland is one of the major providers of public funding for scientific research (The Academy received 16.5 percent of the government's total research and development spending in 2008). The University of Helsinki is the oldest and largest research university in Finland, and its gender equality policy has been an example for many other universities in the country (Husu & Saarikoski, 2007). The Finnish equality plans are also of international interest because the model of monitoring, reporting, and implementing open and transparent procedures is believed to be the best practice in tackling "post-civil rights era" discrimination in academia (Wylie et al., 2007). In the next section,

we analyze the equality plans as symbolic gendering processes that produce a certain kind of representation of gender-based discrimination. In this way, we wish to understand to what extent the two equality plans succeed in addressing the gendering processes that emerge from our analysis of the interview data.

The interview data were collected during 2006-2007. The data consist of 36 in-depth interviews with physicists working in the metropolitan area of Helsinki. Even though women are underrepresented in physics departments at all levels, the group of interviewees was selected to include an equal number of women and men. The interviewees were chosen so that they represented a wide range of different academic positions (from graduate students to professors), different age groups (29-57 years), and diverse fields of physics (astrophysics, atmospheric physics, astronomy, geophysics, materials physics, meteorology, nuclear physics, particle physics, theoretical physics, and X-ray physics). Eighteen interviews were conducted with persons working in academia (“stayers” in Table 1 & 2) and eighteen with persons who had left academia (“leavers” in Table 1 & 2). In order to find physicists who had left academia, we consulted university departments

and their web-pages. The majority of the leavers left academia after completing their Ph.D. degree and all but one had left fewer than ten years before. The leavers had moved to research or management jobs in corporations or public institutions. Some interviewees had left the university to assume teaching positions in polytechnics.<sup>5</sup>

The tables below show the Finnish interviewees according to academic degree, status as a university employee, and family status (children/no children).<sup>6</sup>

In our analysis of the interview data, the aim was to understand the variety of gendering processes that take place in physics departments as well as resistance to these processes. To this end, the interview guide included questions on career path, reconciliation of work and family, international mobility, working environment, changes in the universities, identity, and professional future. The interviewees were asked whether they thought that their careers would have been different had they been men/women. Otherwise, the interview questions were formulated so that they did not mention gender explicitly.

The interviewees were asked also whether they would be surprised if any of their colleagues mentioned sexual harassment or discrimination as a problem

**Table 1.** Interviewees according to academic degree and status as a university employee

	Ph.D. student	Post doc researcher	Senior researcher	Professor	Currently employed at the university	Left the university
female	4	10	2	2	9	9
male	5	7	4	2	9	9

**Table 2.** Interviewees who have/do not have children

	female stayers	male stayers	female leavers	male leavers
have children	4	5	7	7
no children	5	4	2	2

in the work place. The concepts of sexual harassment and discrimination were not defined in the interviews. The reason was that we were not so interested in finding out the number of instances that could be classified as sexual harassment or discrimination (even though we discovered that 10 out of 18 female interviewees had experienced sexual harassment themselves or could cite a second-hand experience). We were more interested in understanding how the phenomena of “sexual harassment” and “discrimination” were constructed in the discourses used by the interviewees. Similarly, we were interested in understanding how “family” was constructed as a challenge for a career in physics. When analyzing the interview data in light of Acker’s framework of gendering processes, we investigated not only interviewees’ explicit statements about gender, but also the differences between male and female interviewees’ accounts of their daily working life.

### **Plans for gender equality: mapping the terrain of gender-based discrimination**

In this section, we endeavour to understand how the equality plans in the Academy of Finland (2005-2007) and the University of Helsinki (2007-2009) identify and conceptualize those gendering processes that are believed to maintain and generate inequalities between women and men. The equality plans assume that most people understand gender-based discrimination as the unequal and harmful treatment of people based on gender (see also Benokraitis & Feagin, 1995). In our analysis of the equality plans, we distinguished blatant, subtle, and covert forms of gender-based discrimination. We use the term *blatant* when we discuss discrimination that is intentional, visible, and easily documented

(Benokraitis & Feagin, 1995: 39). *Subtle* discrimination, in turn, is less visible and less obvious. Subtle discrimination may be unintentional. Indeed, it may not be noticed at all insofar as people consider sexist behaviour as normal, natural, or customary (Benokraitis & Feagin, 1995: 41). By *covert* discrimination we refer to discrimination that is purposeful and maliciously motivated, but hidden under gender-neutral rationalizations, and consequently, difficult to document (Benokraitis & Feagin, 1995: 42). As Liisa Husu (2001) argues, gender equality legislation can be efficient in targeting blatant discrimination because it is easily documented. A major challenge to gender equality policy is what she calls *hidden* discrimination, that is, the multiple forms of subtle and covert discrimination (Husu, 2001: 63-64).

The equality plans provide an opportunity to determine whether organizations recognize not only blatant forms of discrimination, but also subtle and covert ones. The two plans we analyzed identify three issues as potential obstacles to gender equality in academia: (1) difficulties in balancing work and family life; (2) discrimination and harassment; and (3) evaluation bias. As a response to the first obstacle, the equality plans propose several measures. First, they mandate that parental leave will not shorten the length of a researcher’s funding period (Academy of Finland, 2005). Second, if the researcher is working abroad and is the guardian of minors, the grant paid to him/her is raised by 20 percent (Academy of Finland, 2005). Third, they recommend that when granting research funding, research councils should take the applicant’s “academic age” into consideration, not their physical age (Academy of Finland, 2005). Fourth, they recommend that employees be allowed to work flexible hours and that meetings take place during regular working hours

(University of Helsinki, 2007). Fifth, they encourage universities to offer training in time management (University of Helsinki, 2007).

As a response to the second obstacle, discrimination and harassment, the equality plans lay out a division of responsibilities. Whereas in the Academy of Finland the Equality Working Group is responsible for handling cases of discrimination and harassment as well as for developing guidelines for handling such cases (Academy of Finland, 2005), at the University of Helsinki the Equality Adviser is responsible for these activities (University of Helsinki, 2007). The University of Helsinki also has a website that includes a definition of sexual harassment and provides guidelines for handling such cases.

As a response to the third obstacle, that is, the potential impact of evaluation bias on the evaluation of applications and funding decisions, the equality plans propose three measures. First, they emphasize the importance of clear and transparent criteria in application processes (Academy of Finland, 2005; University of Helsinki, 2007). Second, they recommend that equal numbers of women and men be appointed to hiring committees and evaluation panels (University of Helsinki, 2007). Third, the equality plans introduce the option of using affirmative action when the applicants are women and men of equal or almost equal merits and the underrepresented gender accounts for less than 40 percent of the group (Academy of Finland, 2005; University of Helsinki, 2007).

In these ways, the equality plans seek to address not only blatant forms of gender-based discrimination but also subtle and covert forms. The implementation of clear and transparent procedures and the requirement to have equal numbers of women and men on committees and panels are thought to make it less likely that

unconscious evaluation biases will have an effect on hiring and funding decisions or that covert discrimination will be practiced. The concern about balancing work and family life is targeted at subtle forms of gender-based discrimination. It is acknowledged that the structural features of academic work may discriminate against women without this being anyone's intention.

The equality plans are strategic documents that have been ratified by the governing bodies of the organizations. In Finland, universities and research funding organizations are obliged to report on the implementation of the equality plans. However, there is no systematic study of whether and to what extent the equality plans actually are implemented (Husu, 2004: 7). In our study the interviewees were not asked whether they were aware of the official gender equality policies of their organizations. Instead, the interview questions were designed to cover the issues addressed in the equality plans: work-life balance, international mobility, discrimination and sexual harassment. In the remainder of this paper we analyze the interview data with the goal of identifying gendering processes in physics departments as well as tensions between the equality plans and the processes emerging in our analysis of the interview data.

### **Analyzing interview data I: symbols and images**

In the dimension of symbols and images, masculine gender is often introduced tacitly in the disembodied and abstract image of the ideal worker (Acker, 1992: 257; see also Benschop & Doorewaard, 1998b). In this section we analyze how the interviewees construct the ideal worker when they discuss work-life balance and international mobility.

### Work-life balance

The equality plans identify women's difficulties in balancing work and family life as an obstacle to gender equality in academia. They pinpoint three aspects of the underlying problem: family is seen as a challenge to (1) the funding models of academia, (2) to the so-called "tenure clock", and (3) to an individual scientist's time management. In light of the interview data, the underlying problem lies not only in these three aspects but also in the culture of long working hours in physics departments (see also Ivie et al., 2001). In this culture it is taken for granted that a scientist who puts in long working hours has a competitive advantage in a competitive work setting. The long working hour culture contributes to an image of the ideal worker as a scientist without the burden of family responsibilities. This image cannot be addressed adequately by focusing merely on funding models and time management.

In the interview data, both male and female physicists identified difficulties in balancing work and family life as an obstacle to gender equality in academia. In their view, children demand more time from mothers than from fathers. Both male and female interviewees observed that becoming a top scientist demands long working hours because publications are the most important considerations for success in academia. Even though the output depends not only on the number of hours scientists put into their work, but also on their productivity during those hours, the physicists seemed to assume that the number and quality of publications depend mainly on the number of hours invested in work. Thus, they also assumed that the productivity of their working hours remained at the same level no matter how many hours they put on.

In our interpretation, what is at stake in the culture of long working hours is not only

being productive, but also demonstrating one's commitment and dedication to physics. As Oili-Helena Ylijoki and Hans Mäntylä (2003) explain, long working hours can be interpreted as a scientist's strategy to gain a competitive edge by achieving visibility and a good reputation.

We also argue that the culture of long working hours is an example of how organizations become gendered on the level of symbols and images. Even though the culture of long working hours appears to be gender neutral, an ideal worker in this culture is typically a man who is able to dedicate himself to work without physical or social restrictions (Acker, 1992: 257). The following excerpt describes how a male physicist saw the situation in the department of physics:

P: I don't have a family, which I guess in this job is an advantage, you can put more time into it.

I: Right...Are there a lot of people here in the same situation as you?

P: I don't know about these days, but if you think about our former department, it was a pretty odd bunch.

I: In what way?

P: The older males...I'd say more than half of them were single...it seems to me that the family people... They do seem to have some sense of proportion. I don't know all of them, of course, but they do seem to work closer to the normal office hours.

I: You said you can spend more time here, do you exceed normal office hours often?

P: Well, what's normal. Is normal from 8 to 7? But, you'll never run out of work to do. *P223 MS*

Some female physicists with children specifically pointed out the tension between the demands of work and family life.<sup>7</sup> Some of them argued that full parental leave was not an option for them, because staying

away from research for several months would be a serious disadvantage for their careers.<sup>8 9</sup> Some female physicists also resisted the culture of long working hours by emphasizing that “efficiency” is a value for them, and not long hours:

P: Maybe I'll say that I do think that there's a difference between women and men, when they have families. It can be an obstacle for a woman. Although we don't think about it as an obstacle, because seriously, the child is the most important thing in the world, or if there are several, they all are the most important things in the world. But, so far, I've been doing research for all this time, and I haven't counted the hours or the trouble I've been through...Evenings and weekends and nights and vacations and free time. Long hours, long years, long weeks. But now that I have a child, I can't do that anymore. Maybe the fathers who have wives at home, or the young, or whatever age, who don't have children, they can give themselves over to the work much more. I claim that I'm as efficient in eight hours as many other people are in twelve hours, but damn it, I used to do fifteen hours. P 209, FS

Male physicists with children also mentioned long working hours and travelling a problem but they rarely expressed willingness to make compromises in their professional life in favour of their family.<sup>10</sup> Indeed, some male physicists who had successful careers admitted that their families had had to yield in favour of their work.<sup>11</sup>

In summary, we argue that physics departments are gendered in the dimension of symbols and images because an ideal worker is constructed as a person without the burden of family responsibilities. Those female and male physicists who

have children are disadvantaged insofar as they are not able or willing to live up to the construction of the ideal worker. The long working hour culture plays a key role in the construction of the ideal worker in physics departments.<sup>12</sup>

We also argue that there is a tension between the equality plans and the gendering processes which emerge in the interview data. Even though the equality plans identify the work-life balance as an issue to be addressed, they do not fully capture the gendering processes when they recommend meetings during normal office hours and training in time management. As long as the culture of long working hours prevails with its image of the ideal worker, many physicists continue to see “normal” working days and family related “delays” in career as impediments to their work. Even though the equality plans emphasize the difference between academic and physical age as well as the importance of making room for parental leave in the evaluation of academic accomplishments, these recommendations may not have an impact as long as the culture of long working hours is not explicitly addressed.

### **International mobility**

The equality plans also take it for granted that international mobility is part of a successful academic career. In this respect they follow an international trend found in the science, technology, and innovation policy in Finland (Research and Innovation Council, 2008). The majority of the interviewees agreed with the view that international experience is a *sine qua non* for a successful career in physics. Most interviewees had worked abroad at least during one period in their career, typically during their Ph.D. studies or post doctoral years. A male physicist saw the situation in the following way:

I: Could you do post-doc research here in Finland?

P: It's rare. Usually it's like...I don't know if it's actually written somewhere or if it's an unwritten rule, that not here.

I: Or is it just that there aren't any positions?

P: They could make positions. There are positions here, because we get post-docs from other countries. It's just somehow how it's done. You go abroad, you gain more experience than by staying in your home country. I think it's important for your development, you learn new ways of doing things, new research methods, you learn those differently over there. *P204, MS*

Those female physicists who had children or planned to have children did not consider working abroad to be an appealing opportunity.<sup>13</sup> They gave as reasons for staying in Finland such factors as their children's wellbeing, social networks, and their spouses' careers.

I: Could you imagine going [abroad] sometime?

P: It seems pretty difficult, I mean we sometimes talk about that if we both got a job abroad then we could go for a longer time. But I wouldn't want to leave by myself.

I: So you feel that taking your family with you...

P: It would be terrible. A huge operation. And our eldest daughter starts school this fall. That restricts us of course, we don't want to move continually. *P201, FS*

In our data one female interviewee challenged the view that going abroad is a *sine qua non* for a successful career in physics. In her view, new information and communication technologies make international collaboration feasible for

every scientist regardless of where she or he stays.<sup>14</sup>

The interviewees who were especially keen on working abroad were female and male physicists who did not have children.<sup>15</sup> Also, a number of the male physicists with children assumed that their families would follow them abroad.<sup>16</sup> Yet the interview data also included males who had decided against moving abroad for family reasons. The majority of these males had left academia.<sup>17</sup>

As of today, there is no systematic study of whether international mobility actually increases the productivity of scientists in Finland. We argue that even though the mobility requirement appears to be gender neutral, it is gendered because it is more easily met by physicists without children and by male physicists with children than by female physicists with children. The mobility requirement is an example of a symbolic gendering process because it perpetuates the image of a successful scientist as a worker who is flexible, not only in terms of working hours, but also in terms of the working site. Thus, the physicists who are not able or willing to move to another country may be considered less serious professionally or less ambitious academically.

We argue that there is a tension between the equality plans and the physicists' perception of the difficulties in mobility. The equality plans stress the importance of providing adequate funding for those scientists who have children and who wish to work abroad (Academy of Finland, 2005). Indeed, in the interviews with the Finnish physicists money was rarely mentioned as a reason for not going abroad. The most common reason for not going abroad that was given was the demands of family life. It is beyond the scope of our study to explain why, for example, children's schools are considered to be important factors in making decisions about careers in Finland.

The observation is in need of further analysis because it is not found in some other countries. For example, in Poland female and male physicists consider working abroad as an appealing opportunity for the whole family (Miazek & Vainio, 2008).

### **Analyzing interview data II: interactions and mental constructs**

In the dimension of interactions, gender is often constructed by means of gender-based discrimination and sexual harassment, whereas in the dimension of mental constructs gender is manifested in the internal mental work that individuals do when they cope with other gendering processes in organizations (Acker, 1992: 253). In this section we analyze the interactive and mental dimensions of gender in those parts of the data where the interviewees discuss discrimination and sexual harassment. Interactive and mental dynamics are difficult to capture by policies but, as we show, the dynamics play a significant role in how gendering processes manifest in physics departments, generating challenges for women.

#### **Discrimination**

The equality plans identify discrimination and sexual harassment as obstacles to gender equality in academia. Our interview data include also instances of gender based-discrimination, both blatant and subtle. An instance of blatant discrimination was a case in which a senior researcher refused to recruit women for his research group—a well-known and easily documented fact that has never been taken up as an issue in his department. An instance of subtle gender-based discrimination was a sauna evening during which women were instructed to go swimming without their bathing suits. According to their male supervisor, men and women in the research group were

considered so equal that everyone felt free to go swimming naked. In this case, an undoubtedly well-intentioned attempt to minimize the effects of gender actually resulted in moving gender to the centre of attention.

We found that subtle forms of gender-based discrimination were not always identified by the physicists because of the prevailing ideology that academia is gender neutral. Some male interviewees especially claimed that professional success is dependent mainly on one's personal abilities to conduct high quality scientific research.<sup>18</sup> Thus, they expressed Robert Merton's ideal of universalism, the view that the practice of science is independent of the scientist's personal characteristics (Merton, 1996).

P: I think, yes, it is very democratic. I feel that, no, gender doesn't matter. And that you're measured more according to your factual achievements. And I could describe that as more a boring, in a way, environment...So in many other fields, in the humanities, there has been women's studies, and now even men's studies. And here we are in the natural sciences. So here we don't have a word for male or female, it isn't part of our vocabulary.  
*P203 MS*

In this excerpt the claim to gender neutrality is justified by appealing to the special features of physics as an academic field. It is assumed that if the content of science does not include explicit references to gender, then gender is not relevant in the practice of science (see also Rolin, 1999; 2008).

Female interviewees also expressed the view that academia is gender neutral.<sup>19</sup> Yet some interviews reveal that gender neutrality was actually understood to mean that one is expected to play down one's femininity (see also Gherardi & Poggio, 2001; Sonnert

& Holton, 1995). In these cases, the female physicists understood their role in the work place to be one of the boys (see also Husu, 2001; Powell et al., 2009).

P: I think I was one of the men there. I slipped into that group. It wasn't really an important thing, I found. Well, there were some rare exceptions. We would go through periods when someone would develop a crush on someone else but, nothing very important. *P 202 FL*

A recent survey at the Department of Physics at the University of Helsinki, covering both graduate students and post-doctoral researchers, women and men, reports that female physicists often perceive themselves as outsiders in a male-dominated working environment (Tala, 2006). In our interview data, female physicists did not so much perceive themselves as outsiders, but rather attempted to downplay their femininity when interacting with their male colleagues.

P: It was really funny situation, he said it... and after he'd said it he realized...because that illustrates my position there, my role, because I was so neutral. He didn't even perceive me as woman, I was a good guy. He could say something like that to me, about not accepting women in his team, and only then he realized he was talking to me, a woman. He didn't perceive me as a woman. It was...it's hard to explain.

I: Why do you think you were so neutral?

P: I don't know, I guess because he'd known me for a long time, I'd gained some appreciation. So he could take it. I don't know what it was about. *P218 FL*

We argue that physics departments are gendered in the interactional dimension because a female physicist is expected to play down her femininity. In order to "slip into a group" or "gain appreciation" a female

physicist is expected to behave as if she were one of the boys. This is what we call the norm of masculinity. By the term norm we refer to a social expectation that give justification for punitive behaviour towards those individuals who do not conform to such expectations (Faulkner, 2009b). In her study of women in engineering Wendy Faulkner (2009a, 2009b) argues that the social expectation for a woman to behave as if she were "one of the boys" is a function of the "in/visibility paradox." The paradox is that female engineers are invisible as engineers but visible as women, and consequently, they balance between conflicting pressures to be "one of the boys" and "not to lose their femininity" (Faulkner, 2009b).

Even though the equality plans identify gender-based discrimination as an issue to be addressed, they do not address the norm of masculinity. When the equality plans address the evaluation bias as an obstacle to gender equality in academia, they focus on the processes leading to hiring and funding decisions. In light of the interview data, gender equality can also be promoted by addressing gendering processes in everyday interactions where scientists construct their credibility and reputation (see also Rolin, 2002).

### **Sexual harassment**

The interview data reveal also that female and male physicists have rather similar understanding of sexual harassment. However, verbal harassment, such as making rude jokes, was not always identified as harassment by male interviewees. The male interviewees rarely reported sexual harassment, and those who could emphasised that these episodes did not take place in their own unit, but somewhere else in the university (see also Korvajärvi, 2002). Some female physicists, on the other hand, told us that they had been harassed by their male colleagues through e-mail and on

the telephone. In many cases the harasser was the interviewee's close colleague or supervisor. Even though the female interviewees could identify these cases as instances of harassment, they thought that they were at least partly responsible for the events, assuming that the harasser had misinterpreted their messages. Some female interviewees attempted to understand male behaviour ("he was just drunk"), even though they did not approve.

P: Well, for instance, when I've been in a workshop for a week, with other people from here. When they got enough to drink, I got all sorts of propositions. But of course if you don't...I don't know. I haven't taken it that seriously. Or taken it anywhere. But somebody might be bothered by it. I can, maybe, take stuff like that a bit more than some.

I: What have you done in those situations?

P: Well, I've...I'm kind of quick-tempered [laughs], I've probably snapped at them. It's not...that stuff is never talked about afterwards. *P 206, FS*

Even though sexual harassment, by definition, includes verbal harassment, male interviewees tended to see work place jokes as harmless.<sup>20</sup> Bold humour and rude jokes were considered a normal part of social interaction in physics institutions, while being insulted by such jokes was not.

I: Right. Then we have a bit different kind of question. Would you be surprised if a colleague told you that sexual harassment was a problem here in your lab? Or some other kind of discrimination?

P: Would I be surprised? I think I would be, yes. People are very unreserved with each other here. There's all kinds of joking, sometimes pretty crude. Around the coffee table. If somebody doesn't want to participate in that, that's fine,

nobody will think twice about it. Or single them out in any way. Some physicists are talkative and quick-witted, some are quieter. But I think that physicists are, also here in our community, very tolerant people. *P234, MS*

The female interviewees had adopted two strategies in coping with harassment: either they tried to be one of the boys (i.e., being able to take coarse humour) or they tried to set limits and regulate men's behaviour (see also Husu, 2001). Especially some of the younger generation female interviewees claimed that they could take crude humour.

P: A more sensitive person might have thought that... I mean, there was a lot of pretty lewd joking going on. A sensitive person might take it personally. But I, for instance, never had any problems with it. I definitely never experienced anything like that.

I: Who made those jokes?

P: I, among others. We had quite a tight-knit community, it was everybody, both students and staff.

I: But it was both men and women?

P: Yes, both. There was no discrimination in that. *P218, FL*

Some female interviewees emphasized women's own agency in fighting back against sexual harassment.<sup>21</sup>

P: I think that those women who stay on this field are rather self-assertive people [laughter]. They know their place and... won't put up with indecent behaviour. I suppose you have to have a certain mindset already when you—since it is known that this place is like that. *P235, FS*

We argue that physics departments are gendered in the interactional dimension, not only because a female physicist is

expected to act as if she were one of the boys, but also because she is sometimes harassed. Moreover, physics departments are gendered in the mental dimension because some female physicists have adapted the strategy of being one of the boys in order to cope with a male-dominated working environment (see also Faulkner, 2009b; Powell et al., 2009). Even though many female physicists do not seem to mind being “assertive” and even take pride in it, we argue that on the whole this cultural expectation is harmful for women because it limits the roles that are available to them. Consequently, it can be identified also as a subtle form of gender-based discrimination.

In our interpretation, the expectation that female physicists downplay femininity is not merely a reflection of the “gender-neutral gender” that is observed in some other work places in Finland (Korvajärvi, 2002). This is because female physicists stand out as women in a male-dominated environment, and they themselves emphasize the need to be tough with respect to transgressions. For this reason the norm of masculinity is a more appropriate term for the interactional and mental gendering processes in physics departments than the “gender-neutral gender.”

The interview data raise yet another concern for policies of gender equality in academia. The data reveal that physicists hesitate to contact the equality advisor, even when they have evidence of blatant discrimination and sexual harassment. As Husu argues, one explanation for this may be fear of retaliation (2001: 252-253). Another explanation may be a situational ambiguity that makes the victims blame themselves rather than seeing themselves as victims of discrimination or sexual harassment (Husu, 2001: 64). The interview data suggest that sexual harassment often takes place in social events that are more or less informal (e.g., having beer with

colleagues on Friday evening). As Saija Katila and Susan Meriläinen (1999) point out, the casual and easy-going atmosphere typical of some university departments in Finland can make it difficult to distinguish between professional and private contexts.

## Conclusion

We have studied gendering processes as fields of opposing forces and tensions in order to develop a dynamic account of how gender is socially constructed and contested in physics. We have used Acker’s framework to analyze not only the processes that maintain and generate inequalities between female and male physicists but also the counter-active forces. A dynamic understanding of gender enables us argue that gender equality policies have paradoxical and ambiguous outcomes for women in academia. They not only act as opposing forces to gendering processes in physics departments; they also reinforce some processes by advising women to cope with them.

In order to demonstrate this, we analyzed two kinds of data, the equality plans of the Academy of Finland and the University of Helsinki and interview data with Finnish physicists. On the basis of our interview data we have argued that physics departments are gendered, not only in the structural dimension in which women are underrepresented at all organizational levels, but also in the dimensions of symbols and images, interactions, and mental constructs. In the dimension of symbols and images, the norms of long working hours and international mobility contribute to the construction of the ideal worker. In the interactional dimension, we find discrimination, sexual harassment, and the social expectation that a female physicist should act as if she were one of the boys. In the mental dimension, we find

that some female physicists have adopted the strategy of behaving as one of the boys in order to cope with a male-dominated working environment. We have argued that these social expectations and strategies are manifestations of the norm of masculinity rather than the gender-neutral gender found in some other work places in Finland.

Finland is an interesting national context for studying gender and physics because it enables one to juxtapose gendering processes in fairly well-established equality policies and physics departments, which have low female representation. Despite the gender equality plans, the construction of the ideal worker in physics departments in Finland is surprisingly similar to the construction of the ideal worker in other organizations in other national contexts, reflecting the masculine norm of full-time availability and mobility. We say “surprisingly” also because the culture of physics abounds with attempts to rationalize the norms of long working hours, international mobility, and masculine toughness by appealing to those features that are thought to be specific to physics as an academic field.

The equality plans identify issues that are relevant in light of our interview data such as work-life balance, international mobility, gender-based discrimination, and sexual harassment. In this way, they function as counter-forces to the gendering processes in physics departments. However, the equality plans do not fully succeed in capturing the underlying gendering processes that emerged in our interview data, such as the ideal worker that conforms to the norm of long working hours and the norm of international mobility. While the equality plans give advice about how to deal with discrimination and sexual harassment, they remain silent about the norm of masculinity that is manifested in interactions and mental constructs. Hence, there are tensions

between the equality plans and gendering processes in physics departments.

The tensions explain why the equality plans have paradoxical and ambiguous outcomes for women. Instead of challenging the norms of long working hours and international mobility, the plans attempt to tackle the consequences that these norms have for women in academia, such as women’s difficulties in balancing work and family life. Thus, their message is ambiguous. The norms are perceived as problems, and at the same time, women are advised to cope with them.

We do not intend to imply that the equality plans have failed as a tool of gender equality policy. Instead, we think that they deserve to be developed further, keeping in mind that policies and gendering processes in university departments form a dynamic whole.

## Acknowledgements

We wish to thank Liisa Husu, Saija Katila, Susan Meriläinen, Reijo Miettinen, Salla Sariola, Janne Tienari and the three reviewers for *Science Studies* for their helpful comments on earlier versions of the manuscript. Our greatest thanks go to the coordinator of the UPGEM project Cathrine Hasse who has made this study possible. The interview data have been gathered by Jenny Vainio when she has worked for the UPGEM-project during 2006-2007. Kristina Rolin has served in the steering committee of the project. We are grateful also to the UPGEM partners Anna Maria Ajello, Merja Helle, and Endla Lõhkivi, and the research assistants Stine Trentemøller, Anne Bjerregaard Sinding, Lone Svinth, Katrin Velbaum, Mari-Liis Tina, Cristina Belardi, and Giulia Calafiore who have discussed the interview data with us. The UPGEM project has been funded by the European Commission contract #518048. Rolin’s work

has been funded by the Academy of Finland fellowship #00647.

### Notes

- <sup>1</sup> Both figures are above the average in the European Union. In 2003 the proportion of female Ph.D. graduates was 43 percent and the proportion of female professors 15 percent in the European Union (European Commission, 2006: 21 and 55-57).
- <sup>2</sup> According to the data collected by Jim Megaw in 1990, a relatively high proportion of female physicists can be found in Hungary, Portugal, and the Philippines (Barinaga, 1994: 1468).
- <sup>3</sup> It is difficult to find data about women in physics because physical sciences are embedded in the category of natural sciences in the database maintained by the Ministry of Education in Finland.
- <sup>4</sup> See Katila and Meriläinen (1999) for a study of women in organizational studies; Riska (2001) for a study of women in medicine; Ahlbeck-Rehn et al. (2006) for a comparison of natural and social sciences; Halonen et al. (2007) for studies of women in media studies; Vehviläinen and Brunila (2007) for a study of women in information technology; and Kantola (2008) for a study of women in political science.
- <sup>5</sup> Most of the interviews were conducted in Finnish and translated and transcribed into English. In two cases, English was used as the language of the interviews. All the interviewees were offered the opportunity to read and comment on the translations of their interviews. Software for the qualitative research data (Atlas.ti) has been used in categorizing and analyzing the transcribed and translated interviews. The code terms for Atlas.ti have been selected on the basis of the prior working hypotheses of the study.

The code terms central in our analysis are discrimination, maternity leave, harassment, stereotypes, self-esteem, pay, mentor, family responsibilities, abroad, administration, motivation, working environment, children, and publications.

- <sup>6</sup> The family status is presented in a separate table in order to protect the interviewees' identities and privacy.
- <sup>7</sup> P209, P200, P201, P205, P216, P202
- <sup>8</sup> P206, P216, P226, P235
- <sup>9</sup> In Finland paid maternity/parental leave consists of 105 days of maternal leave and 158 days of parental leave for either parent.
- <sup>10</sup> P204, P210, P217
- <sup>11</sup> P227, P234, P233, P208
- <sup>12</sup> In our interview data, it remains an open question of whether the long working hour culture contributes also to the phenomenon that Yvonne Benschop and Hans Doorewaard (1998a) call the "mommy track" in organizations, part-time jobs and less demanding job descriptions tailored for women with small children. Audrey Mayer and Päivi Tikka (2008) argue that if national policies on parental leave and childcare had a significant impact on women's representation in academia, one would expect to find a higher proportion of women in academia in countries with generous family leave policies than in countries with less generous policies. However, they report that there is no significant difference in the representation of women among academic staff in Finland and Sweden, on the one hand, and in the U.S., on the other hand, even though parental leave and childcare policies are significantly more generous in the Nordic countries than in the U.S. Their finding gives further support to our view: the underlying problem in the work-life balance is the

non-family-friendly culture of academia, and not merely national policies on parental leave and childcare.

<sup>13</sup> P200, P201, P210, P216

<sup>14</sup> P216

<sup>15</sup> P203, P222, P235, P207

<sup>16</sup> P208, P212

<sup>17</sup> P221, P229, P232, P211

<sup>18</sup> P227, P217, P203, P211, P223

<sup>19</sup> P200, P201, P216, P219, P224, P218, P202

<sup>20</sup> P234, P227, P232

<sup>21</sup> P235, P222, P218, P213, P210, P209, P202, P206, P200

## References

- Academy of Finland (2005) Academy of Finland Equality Plan for 2005-2007. Available at: <http://www.aka.fi/Tiedostot/Tiedostot/Asiakirjat/Tasa-arvosuunnitelma2005kieli%C3%A43.pdf> (last accessed August 4, 2010).
- Acker, J. (1990) 'Hierarchies, Jobs, Bodies: A Theory of Gendered Organizations', *Gender & Society* 4(2): 139-58.
- Acker, J. (1992) 'Gendering Organizational Theory', in A. Mills & P. Tancred (eds), *Gendering Organizational Analysis* (London: SAGE Publications): 248-60.
- Ahlbeck-Rehn, J., A. Kovalainen & S. Poutanen (2006) *The Natural and Social Sciences-Gendered Epistemic Environments at Two University Departments in Finland*, Research Reports from the Finnish KNOWING Project 1:2006 (Turku: University of Turku and Turku School of Economics).
- Barad, K. (1995) 'A Feminist Approach to Teaching Quantum Physics', in S. V. Rosser (ed), *Teaching the Majority: Breaking the Gender Barrier in Science, Mathematics, and Engineering* (New York and London: Teachers College Press): 43-75.
- Barinaga, M. (1994) 'Surprises Across the Cultural Divide', *Science* 263: 1468-72.
- Benokraitis, N. & J. R. Feagin (1995) *Modern Sexism: Blatant, Subtle and Covert Discrimination* (Englewood Cliffs, NJ: Prentice Hall).
- Benschop, Y. & H. Doorewaard (1998a) 'Covered by Equality: The Gender Subtext of Organizations', *Organization Studies* 19(5): 787-805.
- Benschop, Y. & H. Doorewaard (1998b) 'Six of One and Half a Dozen of the Other: The Gender Subtext of Taylorism and Team-based Work', *Gender, Work & Organization* 5(1): 5-18.
- Benschop, Y. & M. Brouns (2003) 'Crumbling Ivory Towers: Academic Organizing and Its Gender Effects', *Gender, Work & Organization* 10(2): 194-212.
- Bug, A. (2000) 'Gender and Physical Science: a Hard Look at a Hard Science', in J. Bart (ed), *Women Succeeding in the Sciences: Theories and Practices Across Disciplines* (West Lafayette: Purdue University Press): 221-44.
- Bug, A. (2003) 'Has Feminism Changed Physics?', *Signs* 28(3): 881-99.
- Cohn, C. (1987) 'Sex and Death in the Rational World of Defense Intellectuals', *Signs* 12(4): 183-214.
- European Commission (2006) *She Figures 2006. Women and Science: Statistics and Indicators* (Brussels: European Commission).
- Faulkner, W. (2009a) 'Doing Gender in Engineering Work place Cultures. I Observations from the Field', *Engineering Studies* 1(1): 3-18.
- Faulkner, W. (2009b) 'Doing Gender in Engineering Work place Cultures. II Gender In/authenticity and the In/visibility Paradox', *Engineering Studies* 1(3): 169-89.
- Gherardi, S. & B. Poggio (2001) 'Creating and Recreating Gender Order in Organizations', *Journal of World Business* 36(3): 245-59.

- Halonen, I., I. Ruoho, T. Savolainen & H. Zilliacus-Tikkanen (eds) (2007) *Välittäminen tilassa – feminististä mediatutkimusta synnyttämässä* (Essays on Feminist Media Studies) (Jyväskylä: SoPhi).
- Hasse, C. (2002) 'Gender Diversity in Play in Physics: The Problem of Premises for Participation in Activities,' *Mind, Culture, and Activity* 9(4): 250-69.
- Hasse, C. (2008) 'Introduction,' in C. Hasse, A. B. Sinding & S. Trentemøller (eds), *Draw the Line! Universities as Work places for Male and Female Researchers in Europe* (Tartu: Tartu University Press): 9-15.
- Hasse C. & S. Trentemøller (2008) *Break the Pattern! A Critical Enquiry into Three Scientific Work place Cultures: Hercules, Caretakers and Worker Bees* (Tartu: Tartu University Press).
- Hausmann, R., L. D. Tyson & S. Zahidi (2009) *The Global Gender Gap Report* (Geneva: World Economic Forum).
- Hearn, J. (1998) 'On Ambiguity, Contradiction and Paradox in Gendered Organizations,' *Gender, Work and Organization* 5(1): 1-4.
- Husu, L. (2001) *Sexism, Support and Survival in Academia: Academic Women and Hidden Discrimination in Finland*. Doctoral dissertation, Department of Social Psychology, University of Helsinki.
- Husu, L. (2004) 'Naisystävällisempään yliopistoon? Tiedenaiset ja muutokset visioissa' (Toward a Female-Friendly University? Academic Women and the Visions of Change), *Naistutkimus - Kvinnoforskning* 17(1): 4-21.
- Husu, L. (2005) 'Tiedepolitiikka ja sukupuoli: Marginaalista keskiöön' (Science Policy and Gender: From the Margin to the Centre), in L. Husu & K. Rolin (eds), *Tiede, tieto ja sukupuoli* (Science, Knowledge, and Gender) (Helsinki: Gaudeamus): 58-83.
- Husu, L. (2007) 'Are Women Taking Over the Universities? The Case of Finnish Academia,' in R. Siemienska & A. Zimmer (eds), *Gendered Career Trajectories in Academia in Cross-National Perspective* (Warsaw: WN Scholar): 161-89.
- Husu, L. & T. Saarikoski (2007) 'Promotion of Gender Equality in the University of Helsinki,' in M. Sagaria (ed), *Women, Universities, and Change: Gender Equality in the European Union and the United States* (New York: Palgrave MacMillan): 113-31.
- Ivie, R., R. Czujko & K. Stowe (2001) *Women Physicists Speak. The 2001 International Study of Women in Physics*, American Institute of Physics. Available at: <http://www.aip.org/statistics/trends/reports/iupap.pdf> (last accessed August 4, 2010).
- Ivie, R. & S. Guo (2006) *Women Physicists Speak Again*, American Institute of Physics. Available at: <http://www.aip.org/statistics/trends/reports/iupap05.pdf> (last accessed August 4, 2010).
- Julkunen, R. (2004) *Hullua rakkautta ja sopimustohtoreita* (Crazy Love and Contracted Graduate Students) (Jyväskylä: Minerva Kustannus).
- Kantola, J. (2008) 'Why Do All the Women Disappear? Gendering Processes in a Political Science Department,' *Gender, Work and Organization* 15(2): 202-25.
- Katila, S. & S. Meriläinen (1999) 'A Serious Researchers or Just Another Nice Girl? Doing Gender in a Male-dominated Scientific Community,' *Gender, Work and Organization* 6(3): 163-73.
- Keller, E. F. (1977) 'The Anomaly of a Woman in Physics,' in S. Ruddick & P. Daniels (eds), *Working It Out: 23 Women Writers, Artists, Scientists, and Scholars Talk About Their Lives and Work* (New York: Pantheon Books): 78-91.
- Knight, D. & W. Richards (2003) 'Sex Discrimination in UK Academia,' *Gender, Work and Organization* 10(2): 213-38.

- Korvajärvi, P. (2002) 'Gender-Neutral Gender and Denial of Difference', in B. Czarniaswska & H. Höpfö (eds), *Casting the Other: The Production and Maintenance of Inequalities in Work Organizations* (London: Routledge): 119-37.
- Krefting, L. (2003) 'Intertwined Discourses of Merit and Gender: Evidence from Academic Employment in the USA', *Gender, Work and Organization* 10(2): 260-78.
- Mayer, A. L. & P. Tikka (2008) 'Family-Friendly Policies and Gender Bias in Academia', *Journal of Higher Education Policy and Management* 30(4): 363-74.
- Merton, R. K. (1996) *On the Social Structure and Science*, edited and with an introduction by P. Sztompka (Chicago and London: The University of Chicago Press).
- Miazek, M. & J. Vainio (2008) 'Reconciliation of Work and Family: Gender Differences Among Finnish and Polish Physicists', in E. Oleksy, A. Petö & B. Waaldijk (eds), *Gender and Citizenship in a Multicultural Context* (Frankfurt am Main: Peter Lang): 137-56.
- Ministry of Education (2010) KOTA database. Available at: <https://kotaplus.csc.fi/online/Etusivu.do?lng=fi> (last accessed August 10, 2010).
- Naskali, P. (2004) *Eihän meillä ole mitään ongelmia. Henkilökunnan ja opiskelijoiden kokemuksia tasa-arvon ja yhdenmukaisuuden toteutumisesta Lapin yliopistossa* (Staff and Student Experiences of Gender Equality and Discrimination in the University of Lapland), *Lapin yliopiston hallinnon julkaisuja No. 43* (Rovaniemi: University of Lapland).
- Powell, A., B. Bagilhole & A. Dainty (2009) 'How Women Engineers Do and Undo Gender: Consequences for Gender Equality', *Gender, Work and Organization* 16(4): 411-28.
- Raehalme, O. (1996) *Lahjakas nainen tohtoriopiskelijana* (A Talented Woman as a Graduate Student) (Tampere: Acta Universitatis Tampereensis A-509).
- Research and Innovation Council (2008) *Review 2008*. Available at: [http://www.minedu.fi/export/sites/default/OPM/Tiede/tutkimus-\\_ja\\_innovaationeuvosto/TTN/julkaisut/liitteet/Review2008.pdf](http://www.minedu.fi/export/sites/default/OPM/Tiede/tutkimus-_ja_innovaationeuvosto/TTN/julkaisut/liitteet/Review2008.pdf) (last accessed August 4, 2010).
- Riska, E. (2001) *Medical Careers and Feminist Agendas: American, Scandinavian and Russian Women Physicians* (New York: Aldine de Gruyter).
- Rolin, K. (1999) 'Can Gender Ideologies Influence the Practice of the Physical Sciences?', *Perspectives on Science* 7(4): 510-33.
- Rolin, K. (2002) 'Gender and Trust in Science', *Hypatia* 17(4): 95-118.
- Rolin, K. (2008) 'Gender and Physics: Feminist Philosophy and Science Education', *Science & Education* 17(10): 1111-25.
- Saarinen, J. (2003) *Naistutkijat tiedemaaailmassa: Kertomuksia tutkimusprosesseista* (Women in Academia: Narratives of Research Processes) (Rovaniemi: Acta Universitatis Lapponiensis 57).
- Sonnert, G. & G. Holton (1995) *Who Succeeds in Science? The Gender Dimension* (New Brunswick, NJ: Rutgers University Press).
- Statistics Finland (2007) *Women and Men in Finland 2007* (Helsinki: Multiprint Oy).
- Tala, S. (2006) *Tasa-arvon toteuttaminen fysiikan opinnoissa ja tutkijakoulutuksessa: Helsingin yliopiston Fysikaalisten tieteiden laitoksen tasa-arvohanke* (Gender Equality in Physics Education and Research Training in the Department of Physics at the University of Helsinki). Available at: [http://www.physics.helsinki.fi/common/henkilokunta/FTLnTa-hanke\\_2006.pdf](http://www.physics.helsinki.fi/common/henkilokunta/FTLnTa-hanke_2006.pdf) (last accessed August 4, 2010).

- Tienari, J., C. Holgersson, S. Meriläinen & P. Höök (2009) 'Gender, Management and Market Discourse: The Case of Gender Quotas in the Swedish and Finnish Media', *Gender, Work and Organization* 16(4): 501-21.
- Traweek, S. (1988) *Beamtimes and Lifetimes: The World of High Energy Physics* (Cambridge, MA: Harvard University Press).
- University of Helsinki (2007) *University of Helsinki Equality Plan 2007-2009*. Available at: [http://www.helsinki.fi/henkos/tasa-arvo/equality\\_plan.pdf](http://www.helsinki.fi/henkos/tasa-arvo/equality_plan.pdf) (last accessed August 4, 2010).
- van den Brink, M. & Y. Benschop (2009) 'The Dynamics of Gender Practices in Different Academic Contexts', unpublished paper presented at the 25<sup>th</sup> EGOS Colloquium, Barcelona 2009.
- van den Brink, M. & L. Stobbe (2009) 'Doing Gender in Academic Education: The Paradox of Visibility', *Gender, Work and Organization* 16(4): 451-70.
- Vehviläinen, M. & K. Brunila (2007) 'Cartography of Gender Equality Projects: Liberal Equality From the Perspective of Situated Equality', *Information Communication and Society* 10(3): 384-403.
- Velbaum, K., E. Lõhkivi & M. Tina (2008) 'The Estonian National Report', in C. Hasse (ed), *Draw the Line! Universities as Work places for Male and Female Researchers in Europe* (Tartu: Tartu University Press): 137-212.
- Ylijoki, O.-H. & H. Mäntylä (2003) 'Conflicting Time Perspectives in Academic Work', *Time & Society* 12(1): 55-78.
- Wager, M. (1994) *Constructions of Femininity in Academic Women: Continuity between Private and Professional Identity* (Helsinki: Academia Scientiarum Fennica B-275).
- Wertheim, M. (1995) *Pythagoras' Trousers: God, Physics, and the Gender Wars* (New York: Random House).
- West, C., & D. H. Zimmerman (1987) 'Doing Gender', *Gender & Society* 1(2): 125-51.
- Wylie, A., J. R. Jakobsen & G. Fosado (2007) *Women, Work, and the Academy: Strategies for Responding to 'Post-Civil Rights Era' Gender Discrimination* (New York, NY: Barnard Center for Research on Women).
- Kristina Rolin  
Aalto University School of Economics  
PO Box 21210  
00076 AALTO, Finland  
[kristina.rolin@aalto.fi](mailto:kristina.rolin@aalto.fi)
- Jenny Vainio  
University of Helsinki  
PO Box 9  
00014 University of Helsinki, Finland  
[jenny.vainio@helsinki.fi](mailto:jenny.vainio@helsinki.fi)