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Revisiting Engineering, Masculinity and Technology Studies: Old Structures with New Openings

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ABSTRACT

In this article we draw broadly on two different research traditions, Gender and Technology Studies (GTS) and studies of gender equality policies in the welfare state, to explain gendered change and stability in the engineering work force in Sweden. Our results draw on a series of qualitative investigations of the engineering workforce over a period of twenty years, and verify change as well as stability. In particular, we locate change in relation to new parenting and fathering discourses. We argue that these discursive changes have profound consequences for work-life balance, and career and life preferences for a new generation of men in the engineering workforce. By revisiting some of the formative assumptions of GTS in regard to the conceptual triad of engineering, masculinity and technology, we also identify the slowness of change in the strong material and symbolic relationship between technology and masculinity.

KEYWORDS

Engineering; masculinity; technology; gender equality; fathering.

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INTRODUCTION

In this paper we revisit some of the formative assumptions of the conceptual triad of engineering, masculinity and technology in Gender and Technology Studies (hereafter GTS). We do this in the light of new empirical evidence within a Swedish national context of a strong gender equality discourse. We tap into current debates about how national contexts produce, reinforce, or reflect structural and normative gender relations (cf. Hook, 2010) at individual family as well as organisational levels. We compare and develop this new empirical evidence (Gonäs et al., 2009) in relation to the results and conclusions of previous investigations (Mellström**,** 1995, 2002, 2004). The aim is to inductively identify stability, change and transformation in gendered relations of the engineering workforce with a special focus on technology and masculinity. Our aim is furthermore to show how new and emerging parenting and fathering discourses in the Swedish society are indicative of more gender balanced productive and reproductive relations within the engineering workforce.

The paper has three substantial parts; 1. Theoretical backdrop and situating the cultural context including material, method, and analytical considerations; 2. Passing on gendered knowledge; 3. New analytical dimensions and openings of engineering, masculinity and technology studies.

THEORETICAL BACKDROP AND SITUATING CULTURAL CONTEXT

Engineering, Technology, and Masculinity

Throughout the history of GTS the strong material and symbolic relationship between masculinity and technology has been given a significant explanatory value in regard to the exclusion of women in science and engineering, and has become a key to understanding why and how men have come to dominate technical professions in general. Within GTS the relation between engineering, technology, and masculinity has been under scrutiny from the beginning of the formation of the field. In a number of sociological, historical, and anthropological studies (cf. Cockburn, 1985; Hacker, 1989; Wajcman, 1991, 2004; Faulkner, 2000a, 2000b, 2001; Oldenziel 1999) the "pervasive and durable equation between masculinity and technology" (Faulkner, 2000a:3) has been confirmed. In these studies, emanating from labour process theory and theories of patriarchy in women studies, we can observe how technology and the masculinization of power have been intimately connected. In other studies the individual importance that technologies have for men, has been verified (Mellström, 2002, 2004, 2010;, Schyfter, 2009). In these studies technology is shown to be an essential part of many men's upbringing and connects closely to definitions of what is masculine and what is not. Crucial for such identification is the early socialization with and the embodiment of different machines and technological knowledge and the pleasures derived from this. Such 'tinkering' pleasures have generally been codified as masculine, and as an object of men's passion because they have an embodied relationship with machines, and because a machine is often a symbiotic extension, of the person, of the man. In many cases a machine is given a feminine persona, thereby (re)producing both normative heterosexuality and gendered differences. This has been one of the

more significant ways in which the equation between technology and masculinity came to be so pervasive and durable.

As GTS is currently in a phase of reinvigorating theoretical foundations, opening up for intersectional and queer perspectives (cf. Bray, 2007; Landström, 2007; Magnet, 2007; Light, Fletcher, and Adam, 2008; Mellström, 2009), this also includes technology and masculinity studies. In this article we adhere to a critique of rigid gender conceptualisations by examining the role of embodiment in relation to diverse technologies, trying to diversify the often rather monolithic portrayal of gendered subjectivity in engineering and technical professions. In showing how embodied relationships with various forms of technologies constitute central components of various male and (female) subjectivities, we can also show how different positions progressively include men and women. We relate these openings to changes in the reproductive sphere transferring to work place relations.

Another dimension of predictable gender relations in GTS is what Landström (2007:8) calls "the customary reproduction of heteronormativity in gender and technology studies". Arguing that GTS has been oddly disconnected from debates around the constitution of gender, Landström (ibid.:19) advocates that we "move beyond the comfort zone of heteronormativity.", and problematise the 'black-boxing' of gender in gender and technology relations. Although we do not specifically address the semiotics of heteronormativity in this article, and we stay within the zone of a heterosexual imaginary, our aim is to open up gendered diversity and emphasise that gender in gender and technology relations are heterogeneous, distributed, made and unmade in complex ways. Still, to study the engineering workforce in Sweden over time is also to study an occupational group of overwhelmingly white, middle-class and technically proficient men whose professional status is ascribed considerable societal status. In many ways this is a core group in upholding a certain form of hegemonic, and heterosexual, masculinity. In other words, we are here cutting into what classically might be labelled as different forms of 'hardcore' masculinities. These are forms of masculinity that have resisted gendered change and reform, and cling onto traditional patriarchal core values in social communities that exclude women (Mellström 2011:2). Engineering has traditionally been such a social space.

Gender Equality and Masculinity Politics in Sweden

In this article we address issues of gendered diversity by adhering to current debates around gender equality, 'work and life' balance policies; stressing the importance of national frameworks in analysing gender inequality in modern welfare states (Lewis and Campbell, 2008; Lewis, Campbell and Huerta, 2008; Hook, 2010). In the emerging conceptualisation of how national contexts are constitutive of normative gender arrangements we can, according to Hook (2010:1484), identify two threads: "one focusing on how national context influences gender inequalities through access to concrete resources and opportunities and the other on how national contexts influence normative expectations about behaviour." National context has been differently conceptualised as the welfare state, cultural norms or specific family policies (Lewis, Campbell and Huerta, 2008; Hook, 2010). For our purpose we adhere to Hook's definition of national context: "as distinct practices and policies and focus on examining factors that are relevant to task segregation" (2010:1485), but we

would also like to stress the importance of looking at national context as something including historical and cultural particularities forming normative gender arrangements. In the context of the social (democratic) engineering projects of the Scandinavian welfare states we believe this is of extra significance since Scandinavian countries have, for instance, pioneered paternity leave since the 1970s. The shaping of gender equality policies through a feminist friendly state is consequently crucial for individuals in their pragmatic decision making as well as the normative context in which decision making is embedded (ibid:1484). In this article we argue that the cultural context of a strong gender equality discourse within the Swedish national context is of utmost importance in understanding new gender configurations in engineering work and education.

As part of a state feminist ideology and a corporative political vision of a gender egalitarian society the idea of double emancipation by way of equal parenthood has been central. In Sweden, the idea of gender equality and double emancipation came to have a huge importance in the development of the welfare state (Klinth, 2002). The general political vision is that male emancipation is to be achieved through men's active fatherhood and women's participation in the labour market. Today, Sweden is close to a full-time, dual earner family model supported by the state via paid parental leave and extensive formal care services (Lewis, Campbell and Huerta, 2008:21). According to current statistics (SCB, 2008), in 2007 81% of women and 87% of men were in the labour force, and 50% of employed women worked full-time.

Early on, fatherhood became a vital part of the gender equality politics of Swedish state feminism. This is what Klinth (2002) refers to as *daddy politics.* In a narrow sense this is the concrete political actions and measures that have been taken during the last forty years concerning men and family politics. In a wider sense it is a discursive set of attitudes and actions that characterise a political will and ambition, and that covers a wide range of political opinions.

Through the implementation of the parental insurance reform that has been phased in, in three different stages (1974, 1995, and 2002), men were made into a political category within the reproductive sphere. Through the parental insurance reform, a feminist framework for thinking around family politics has been established. Although Sweden is far away from having an equal state of parenthood between men and women, this is still a huge step forward in terms of gender equality. Active and involved fatherhood is today the norm in contemporary Swedish parenting.

In sum, the corporative political climate of the Swedish welfare state is believed to incorporate a certain moderate or modest form of masculinity which opens doors to feminist concerns and politics, and not least opens up for questioning the distinction between domestic and public spheres. In line with change oriented studies of new masculinities in a Swedish context (cf. Nordberg, 2005; Forsberg, 2009; Klinth and Johansson, 2010; Egeberg Holmgren, 2011), we argue that we now see a new generation of men who have integrated these long-term political visions of gender equality and reforms as part of their career choices and life preferences. As will be shown this also has effects on the engineering workforce and work-life balance, and on how parenting and fatherhood are perceived and conducted among our engineering informants. We draw our conclusions about the changing gendered relations in the engineering

workforce from the individual narratives and qualitative empirical data that are indicative of a change taking place on a wider scale.

Materials, Methods, and Analytical Considerations

This article is based on a series of engineering and technical profession studies conducted over a period of twenty years (Gonäs et al., 2009; Mellström 1995, 2002, 2004). These studies represent a continuum of research experiences focussed on the engineering workforce within a Swedish national context. The main bulk of data derive from interviews and observations in different work and educational settings. The data in the early studies by Mellström were collected through ethnographic observation, complemented with seventeen life-history interviews with MSc engineers, five women and twelve men. Of these seventeen engineers seven were mechanical engineers and eight held degrees in computer science. In these studies, nine months each were spent at two different engineering workplaces in the years 1989 to 1991. One workplace was a chassis department in the design and development division at a Swedish car corporation. The other workplace, Microchips, was a small, high-tech enterprise within the semiconductor industry that provided specified integrated circuits to the Scandinavian market. At the beginning of 2002, follow-up interviews were conducted with three male and one female participants.

The data for the contemporary study, conducted by Holth in 2009 and 2010, are based on life history interviews with MSc engineers from engineering programmes at Karlstad University, mid-Sweden. Graduates from two gender imbalanced programmes were interviewed; computer science and mechanical engineering. Twenty-four engineers were interviewed, out of which nine women and five men were computer science graduates, and six women and four men were mechanical engineering graduates.[1]

In the early studies as well as the contemporary one, the life history interviews have been structured with regard to the respondents' experiences and feelings in chronological order, focussing on social continuity in relation to technology, upbringing, education, occupational career, hobbies, family situation, and work-life balance. The analysis traces various forms of social continuity in the life experiences of men and women in these studies. The concept of social continuity here relates to that of *social career* (Humphrey, 1993) within which one's life career is characterized by continuity or discontinuity in relation to one's social origin. It follows that a life career of social continuity deviates little from the form of life that one has experienced during childhood and adolescence. In particular we have been interested in issues of embodiment, socialization, change and stability, and how and in what way artefacts and machinery have come to represent social continuity in their lives.

In our analytic procedures we have made systematic comparisons between the different sets of data with regard to the recurrent themes and questions related to an occupational career, family formation, educational preferences, and general work-life balance issues. This means that we have re-analyzed relevant and related sections of the previous studies in order to match the contemporary study. In this respect the results represent a partly new analysis of previous research in relation to questions that were evoked by the contemporary investigation, such as an increasing emphasis on parenting and fathering. Still, it

is important to stress that the work life balance questions of the contemporary investigation intentionally followed a very similar research design to the previous series of studies, with the concept of social career as the navigating analytic tool.

PASSING ON GENDERED KNOWLEDGE

Growing Up Male – Early Gendered Imprints and Memories

In the longitudinal perspective of our different investigations we can observe that certain formative aspects of the durable and pervasive relation between technology and masculinity are as valid today as they were twenty years ago. These socializing aspects are connected to how the 'male body' is an arena for discursive imprints, how embodied practices and tinkering pleasures are codified as masculine and performative aspects of the 'doing' of masculinity, and how technology and technical artefacts act as stabilizing objects, mediating and reifying experiences and knowledge between different generations of men.

Early experiences of embodying digital as well as other forms of technologies are a common trait in the interviews, and generally kinesthetic experiences of machines constitute a common theme in the life histories of most engineers today, as well as in the early studies. The engineers testify to a technical interest that grew out of a childhood milieu, most often rural, where machines had been an integral part of the local setting. Memories of concrete, embodied practical skills and of close relationships with machines are recurrent. A common ground in these men's early experiences of embodying technologies is something that we can observe over time and something that is described in a very similar mode today as it was twenty years ago. Another recurrent aspect is the sensual delight and powerful emotions derived from interaction with machines as something highly important and formative for masculine self-esteem. According to our analysis, this strong symbolic and embodied connection seems to hold a similar strong value over time. In particular we can observe that this pervasive relation is related to male bonding and friendship, and generally confirms ideas and practices about manhood and 'true' masculinity in contexts important for nurturing technical interest and talent early on in life.

In addition there is also an interesting discursive understanding among some of the male engineers that essentialise masculine virtues in relation to technology in contrast to female ones. One example is Bertil, (age 35) a mechanical engineer who at the time of the interview was working as a manager of a large manufacturing company He is doubtful about practical abilities being second nature to women.

> I believe that somehow we don't expect or would be very surprised if these mechanical abilities were second nature to a woman. It is that thing about growing up with mopeds, cars and all that. I would be surprised if she proved to be very competent at such things.

In Bertil's understanding it is interesting to note how technological tinkering is transformed into an essentialised nature of men, and in a wider perspective, how seemingly mundane social practices such as the bodily learning of technological tinkering are transformed into 'facts' about the nature of men and masculinity. It

is also interesting because it gives us a hint about how technology has become an expressive part of a certain form of masculinity. This is seen in the way technical skills become a part of a discursive understanding of what it means to be a competent man, a man who can handle a variety of practical problems and harbor a wide repertoire of kinesthetic 'feels' for technologies of different kinds. In other words, a practical, embodied, multiskilled ability is part of a definition of 'true' masculinity.

In contrast, the female engineers we interviewed in the contemporary study have fewer distinct memories concerning bodily technical experiences in their formative years. They describe a permissive atmosphere where they were free to participate in technical projects if they wanted, but often found themselves on the periphery as observers. To us, this confirms that the cultural codification of the bodily sensations of tinkering practices and rituals still constitutes a formative component in the gendered gap in technical professions and practice.

Passing on Knowledge in and Between Generations

The passing on of gendered knowledge between generations is of crucial importance with regard to the gendered gap in engineering and technical professions. What is evident in the contemporary study as well as the early studies is the way men socialize with each other and in connection with machines of various sorts, and how that forms a bond with men of different generations and between men of the same generation. In our interpretation technology represents social continuity in a world of men. It is something that maintains a path back to adolescence. In all cases, the significant others that are referred to are male, and the father seems to be of special importance for establishing the participants way into the world of technology. A firm observation is that to enter into the world of technology means entering a world of men. A deft touch has generally been deemed a positive social and cultural value, and technical knowledge has literally been handed over between generations of men through the practical experience and sharing of embodied technical knowledge.

The men we interviewed describe their closeness to their fathers as a common understanding and curiosity about the mysteries of technology. The stories about fathers are, at the same time, stories about the joys of sharing technical knowledge. There is however a strong connection with the father for both women and men. Even so, women's and men's stories are significantly different. Unlike the men, when childhood and family relations are recounted the women do not describe their own early technical experiences as being primary. Their fathers were dexterous men, strongly encouraging their daughters' technical interest and talent. Fathers are described as role models and women engineers often describe their fathers' concrete homebound technical projects, expressing admiration for their fathers' skills. Elisabeth, (age 41) describes her father as follows:

> …my father was an engineer; he built and fixed and repaired everything. So technology was very much a part of my childhood, it was just the way it was…. He built a boat for two years, a huge boat in our garden, and he built and renovated houses. He was very, very handy. The knowledge was there the whole time and if you wanted to do something you just got started and did it! We were always allowed to try things.

In many cases this has triggered, and has generally been of great importance, in encouraging the female engineers to pursue a technical career. It is however evident that it was, and still is, a highly gender-segregated picture that emerges. Women are not mentioned as significant others in either the early or contemporary investigations. It is a world populated by men and where technology is an almost exclusive masculine social space.

Our argument is that these processes create bonds of male friendship in and between generations, and become a given part of masculine identity work and a masculine gender script. From this process of shared experiences and knowledge there are two significant dimensions to be noted in relation to the core of engineering knowledge and work; the ability to control and master technology; the care, pleasure and passion for technology. In the mundane language of the interviews it is rather expressed as learning about and understanding technology being important and some engineers refer to it as 'a philosophy of life' that is natural to pass on to your children and an important part of a happy childhood.

> My three-year-old daughter, she is naturally interested in gadgets, and it's easy to suspect that she gets this from her father. She wants to be included in everything, so when I'm involved in my things, I always show her what I'm doing and explain simply so she can understand. I thought it was fun when my father did that for me and I want to do that for her, too.

In this interview excerpt, Harald, a 38-year old computer engineer, also includes his three-year-old daughter in this philosophy of life as part of his explicit belief in gender equality. In his way of neglecting gender gaps he is also a representative for what is more evident in the contemporary study in contrast to the earlier ones: namely a generation of men that have to come to integrate gender equality into their philosophies of life, or at least profess that they do. We argue that this indicates a long-term transformative force in the gendered politics of engineering work in Sweden, and we will demonstrate our line of argument in the final section of this article.

To sum up, in passing on knowledge with regard to early experiences of technology, we still observe an overwhelming dominance of men. It is men, who are exclusively referred to as significant others in passing on knowledge, and all the stories we have collected of early experiences of 'tinkering' refer to men, whether from male or female interviewees. What this shows, among other things, is that the gender codification of technology starts early and runs deep, and that it is based on an early embodiment of machines. This knowledge is handed over between generations of men, although we can observe openings related to a strong societal gender equality discourse. Still, the deep gender segregated masculine socializing practices of technology have profound implications for how different worlds of technology are constructed in educational settings and professional life.

Gendered Knowledge Realms in Engineering Education and Professional Life

In this section we are approaching the age-old question of gendered exclusion in science and engineering. In order to limit our scope we are here interested

mainly in the social continuity of masculine socialising practices with regard to our informants in the early studies as well as the contemporary one.

Not surprisingly, the answers of our informants, both men and women, follow general patterns of explanation. The most recurrent ones are connected to processes of homosocial social practices that in different ways include men and marginalise women and some other men. The social continuity of such practices is at the heart of how and why there is also a clear connection between the early studies and the contemporary one. The long-term stability is overwhelming, and is also a key to the inertia of these gender segregated processes.

A few examples will illustrate this point. In particular the experiences of female engineers are illuminating. Berit, (age 48) in the contemporary study, attended a science programme in upper secondary school, but left after one year. She felt that the boys had an understanding, a hands-on tinkering competence and a common language.

> When we read about different materials, machines and engines, the boys already knew, and I had no idea. I had never looked inside an engine before [ ] that's when I realised it for the first time. They could talk with the teacher using a terminology that I didn't understand. It felt unfair that they had had a head start. I thought that I can't do this and I don't know what they are talking about.

Many female students witness to a continuous resistance from male students, and generally effectively operating male norms. This is seen today as well as in the early studies. Strategies to cope differ according to the interviewees. It is clear however that the career and life stories of the female engineers in the contemporary study represents a less laborious experience. The experiences of female engineers today indicate a less male-centered work practice. The open and sometimes discriminatory resistance that was documented among female engineers who graduated in the 1960s, 70s and 80s is not recounted today.

A lifelong commitment and interest in technology is also a strong feature in the contemporary interviews. The technology, social continuity, and occupational practice that links to childhood themes are as prevalent today as we saw in the interviews of the early studies. Technology still represents a pleasurable and essential part of the lives of the interviewees, an interest and a way of life that ties together work and leisure. Many of the men spend a major part of their time tinkering with technology, on and off work. Harald has been interested in technical problem-solving for as long as he can remember. He enjoys abstract thinking and says:

> It's a part of, what do you call it, my way of looking at life, where it's very important to try to understand [ ] not to take things for granted, but to understand why it is as it is.

This problem-solving attitude is a common theme among of the male participants. Their tinkering pleasures are an essential part of their lives and have given them experience and enabled them to solve practical problems in everyday life; e.g. to mend things that have broken, to keep a car running, to

renovate their own houses, etcetera. It is a dexterity that equates with independence and a certain sense of security, of being in control of practical realities, and taking pride in not having to "call a repairman".

In sum, throughout this section we have traced the experiences of social and socialising continuity in the lives of the participants. We have confirmed a longitudinal stability, despite the two decades that have passed between our different investigations. The world of technology, artefacts and tinkering stands out as a secure male point of reference in the lives of the informants of today as well as yesterday. The slowness of change is not least connected to how technical skills become part of what it means to be a competent man. With regard to the general explanatory strands of male inclusion and female exclusion in the world of engineering we can still observe the strong masculine image of engineering. Open discriminatory practices are far less evident today as well as general explanations of female deficits, although some men still refer to innate gendered differences as a cause for the gender gap of engineering. So far we have concentrated on findings that confirm gendered stability. We will now move on to signs of change.

NEW ANALYTICAL DIMENSIONS AND OPENINGS IN ENGINEERING, MASCULINITY AND TECHNOLOGY STUDIES

In spite of the slow progress with regard to the inclusion of women in engineering, due to the masculine social and socialising practices outlined in the previous sections, we do nonetheless identify indicators of change that open up the possibility of a more gender-balanced engineering workforce. In this we draw on our own investigations as well as parallel contemporary investigations (see Fostervold, 2009; Singstad, 2011) that speak to and confirm our observations. This concerns work life balance, new parenting and fathering discourses, and the normative value of an occupational career. As previously discussed these different indicative dimensions are closely related to a strong gender equality discourse that now, we claim, is anchored into the everyday life preferences of our informants.

Parenting and Fathering

In the longitudinal perspective of our investigations there is a clear and discernable difference between the early 1990's and the late 2000's. In our early studies few men took parental leave, although many expressed a wish to do so. We identified a reorientation in the attitudes of the young men and fathers, but there were few of these men that expressed any self-evident position vis-à-vis parental leave. We identified what Jalmert (1984:16) has labelled the "in-principle man". As such these fathers were distancing themselves from earlier generations of "leisure" or "Sunday-dads" (Åström, 1990; Plantin, 2001). A recurrent theme in the interviews from the early 1990's was that of a generational gap between themselves and their emotionally distant fathers. The ideal or rather anti-ideal was to not become like their fathers. They expressed a strong concern to be different, to be present, and actively involved in the upbringing of their children. In practice however, none of these men shared the parental leave equally with their female partners.[2] The gap between practice and ideals stood out as an important analytical feature of the early studies. As such they confirmed a fairly traditional gendered division of labour in domestic life as well as in the engineering work force. At that time several of the male engineers

'confessed' to an 'in-principle' gender equal attitude, wishing things to be different but they were in practice prioritising work and career. The reasons given for not sharing domestic responsibility and parental leave were mainly economic ones because the men generally earned more than their female partners. The career oriented male bread-winner ideal was still an identifiable feature in these interviews, and it was also a lived ideal of these heterosexual couples.

As we move forward in time, the theme of work life balance is as prevalent as it was twenty years ago, but the focus has changed gradually. In the contemporary interviews, the topic of negotiating time for family life has become much more prominent. The interviewees, men and women, describe constant negotiations, and co-ordination of the 'life and time puzzle' with the stakes being work and family time. A common expression is to be 'squeezed', to have feelings of being insufficient, and tormented by a guilty conscience for not fulfilling duties either at work or at home. In our interpretation, demands from these different spheres have gradually increased. The pressure of a competitive labour market is evident in the interviews. Many of our interviewees work as consultants and are part of a long hours work culture. Hannah, (age 40) who used to do consulting in a computer company, says:

> It didn't work at all [ ] at that time I had small children and it wasn't acceptable to go home after a normal day's work, but you were expected to work longer. I felt that they questioned the fact that I left earlier than they did.

As a consultant she was dependent upon a flexible labour market and the economic crisis has in the last couple of years meant an ever-increasing competitive edge. Many of the engineers express a deep-rooted concern that they could lose their jobs. The reality of being squeezed is also something that is noticeable in their lives as they compete in the labour market not only with their technical skills, but also with their availability.

In parallel to being pressured by a competitive labour market, we also note that a pronounced feature in the contemporary interviews is the emphasis that is being put on having a close and daily interaction with their children. It is considered as self-evident by both men and women, and parenthood is a theme that does engage both parents. A common wish is to reach consensus in the family organisation, and where the time spent with your children is often used as a yardstick of your parental ability. Both women and men express shared domestic responsibility as a desirable goal. As a consequence of the pronounced focus on shared responsibility they also report that the negotiated division of time between home and work is source of conflict in many families. Still, it is clear, that women are the main providers of family care. They take a substantially greater share of the parental leave[3] and stay home more often in case of occasional sickness in the family. Rational economic arguments are just as valid today as they were twenty years ago, with men still earning more and having seemingly greater career advancement possibilities. These structural as well as individual impediments are also visible in the contemporary data.

Nonetheless, we do identify an attitudinal change with regard to parental responsibility over time. There is a desire to achieve equality, although individual

family practices witness to the fact that motherhood is still the norm for parenthood, something which many of the male engineers are very aware. The attitudinal change is most evident with regard to the male emphasis on having a close relationship with their children. Harald, for instance, has shared two periods of parental leave equally with his wife. Harald regards this as a right he has been granted. He has not encountered any form of hindrance at his workplace.

> It's one of the advantages of this job because it's a large company. Everything is very formalized and you just have to fill in the right form. There is a high average age here and many have children. It's normal to be on parental leave…and we are so big so it's easy to cover a temporary vacancy.

In this we observe a parallel attitudinal change about working life where male parental leave has become non-controversial. It has, as Harald says, become normal. As also been documented by Johansson and Klinth (2010) this attitudinal change has happened in the last ten years. We can see here a normative change in the productive and reproductive sphere. This new form of normative masculinity in regard to fathering is that of a man who actively supports and practices gender equality. This is something that, for example, could be followed in the instructions from the Swedish National Board of Health and Welfare, or articulated in the contemporary parental counselling literature. In addition, many other researchers have witnessed such a gradual and progressive change (see Klinth 2002, Nordberg 2005, Johansson and Klinth 2010). This general reorientation of masculinity and fathering is, we claim, having general effects on gender relations in working life and in domestic life. We interpret this as a progressive change that continually puts a stronger focus on work life balance in a number of different ways and gradually challenges a traditional gendered division of labour. With regard to our investigations we see this as an opening, originating in the reproductive sphere but also having genuine consequences for how gender relations in the labour market in general, and the engineering workforce in particular, are being configured. As we see a relatively less gender-segregated society being formed where parenting and fathering has come into focus for young men's identity work, we also see a reorientation of career and life preferences. In our interpretation this indicates that actual change has occurred, and that gendered power relations have been destabilised in the productive as well reproductive sphere, at least in Sweden where this research was carried out (Nordberg, 2005).

Career Orientation and Work-Life Balance

Further drawing on the general idea of an ongoing reorientation of gendered power relations and new discursive sets of masculine practices in Swedish society, we will, in this section, relate this to individual career orientations, work life balance and gender equality.

In the early studies it was clear that the concept and idea of career played a key role as a cultural organising principle. In the way that the male engineers retold their lives, it was evident that lives were centred around occupational careers. From this followed a career-oriented form of life, in which an occupation was the central life interest and other non-work activities, in one way or another, were meant to complement the content and route of the occupational career. The

narratives of the male engineers were often recounted in terms of their relation to an occupational career. Individual achievements and important career transitions – or the lack there of – were given central weight. A similar principle was also true for the female engineers, but they also emphasised work life balance with regard to their occupational careers. This was especially so for the women who had recently become mothers. The narrative style of these stories closely followed a career oriented form of life, building upon an ideology of career commitment, anticipated career progress, and individualism.

In our contemporary study we have found a marked difference in the way that the engineers talk about and anticipate their occupational careers. The narrative space given to children, the family, the domestic and reproductive sphere is remarkably higher. Given that we believe in a certain ascriptive value of these narratives, there are good reasons to interpret this as indicative of change that is transforming gender relations. A few examples will follow.

For the last few years Harald has worked four days a week. Initially, he used his day off to work on his own computer and programming related projects and for training, which is another of his interests. After having his first child and starting the renovation of his house, the day off has been used for these. He said in the interview that he valued family and his own interests more than a career orientated life, and his family's living expenses are modest so they could afford to live on less.

Most of the male and female engineers interviewed expressed doubts concerning managerial careers. The core of their argument is, and in particular for those with families, that they are not willing to spend the extra amount of hours on the job that a manager is expected to do. Of those interviewed, only one man, Bertil, expressed a desire for managerial career advancement. However, he and his wife had decided to share the upcoming parental leave, which meant that they would work part time for a year. His employer had not readily approved his request but he insisted that he would take parental leave.

The work life balance argument reappeared in different versions. Matilda, (age 28) works flexible hours and stretches her work-day beyond office hours:

> We have flexitime system so if things are slow I can go home early without problem and if there is a lot to do we work over-time and I'll bring my computer with me home.

Caesar, (age 28) is a mechanical engineer who lives close to the Norwegian border. He is certain that it would be easier to pursue a well-paid career in Norway, but organises his time flexibly according to his parental responsibilities.

> One week I have my son at home and the other week I catch up at work. I get a lot more done that week when I don't have my son. And I don't work as much the week that I have him.

In sum, as we compare the work life balance issues of our different investigations, with the time span of twenty years apart in mind, we notice that the focus on career in a normative sense has decreased. The engineers of the contemporary study, and in particular the male engineers, put greater emphasis

on family, non-work time and staying true to the core of their engineering background by avoiding managerial career advancement. We interpret this as a gradual reorientation of work life preferences. What is of special interest for us is how gradually changing gender relations relate to such a reorientation. We believe that such a reorientation also opens up the possibility of gendered heterogeneity and questioning traditional ideas of male and female in the engineering workforce.

CONCLUSION

Our aim in this article has been to revisit some of the formative assumptions of the durable relation between engineering, technology, and masculinity. We have done this by employing engineering studies from the early 1990's and a contemporary study of the engineering workforce in a Swedish national context. Our results confirm the strong relation between technology and masculinity, but are also indicative of new dimensions that point to changing gender relations. In the first empirical section we showed how and why masculine social and socialising practices are such a constitutive force in the formation of engineering skills. The early embodied socialisation and technological tinkering is still a male preserve, and a significant cultural code of masculine standards and manhood. This is also what we identity as the core of the long-term stability of our different investigations, and of the power-laden relation between technology and masculinity.

On the other hand we also observe change and openings due to a strong discourse of gender equality in Swedish society. Here we are aligning our work to contemporary gender and masculinity studies that identify new masculine gender configurations; emphasising men's fathering and parental responsibility as a key to a new balance between the productive and reproductive sphere. In the time span of twenty years that we cover in our work we can see how the male engineers we interviewed have come to put a considerably stronger focus on fathering in the way they recount their lives and occupational careers. Judging by our interviews we see a male reorientation in terms of career and life preferences. Women are undoubtedly still the main providers of child care, parenting and domestic responsibilities, but there is also a clear and discernable difference in the way that we see a new generation of men who have been affected by, and who have integrated, the long-term political visions of gender equality that has been promoted by the Swedish welfare state for over four decades. As the vision of gender equality is progressively integrated into the lives of our interviewees, we also trace a possible change in terms of career orientation. Family, children and domestic life occupy a considerably extended narrative space in comparison to the male engineers of our early studies. We believe that this reorientation, which is rooted in and originates from the reproductive sphere, also has consequences for the working life. As individual, occupational as well as general life preferences produce a less gender segregated imprint today, we can also anticipate change that eventually will challenge the ingrained assumptions that have been so formative for the engineering workforce. Sooner or later this might also allow a discursive space for all kinds of bodies to be socialised into the world of engineering and into the pleasures of an embodied tinkering practice.

ENDNOTES

[1] According to Swedish labour statistics "Engineers and technical professionals" are the most male dominated occupational group. In 2009 this group occupied in total 194,103 people, out of which approximately 80 percent are men. The total Swedish workforce in 2009 was 3 925 765.
[2] It needs to be pointed out that all couples interviewed are identified as heterosexual. As one of the reviewers commented, the responses might possibly been different if we had been interviewing same sex parents.
[3] 78 % of total parental leave 2009, source Försäkringskassan (regional social insurance office)

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