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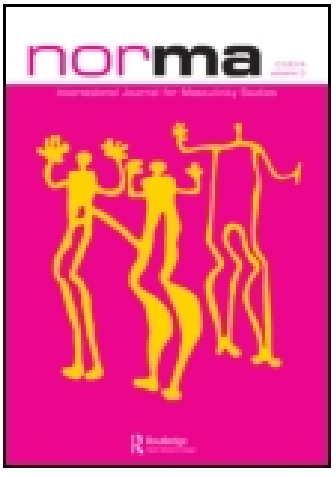

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Passionate men and rational women: gender contradictions in engineering

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Passionate men and rational women: gender contradictions in engineering

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The dualism of rational/irrational and its relationship with masculinity and femininity has for a long time functioned as a process of including men in and excluding women from the fields of technology and engineering. This article highlights individuals, life stories, and everyday practices that deviate from this stereotypical division in order to pave the way for more diversified perceptions of the gender practices performed in engineering, specifically in relation to the place that technology has when women and men choose a career in engineering. Contradictory examples may thus serve to undermine the processes and the generalization perpetuating the stereotypical and prevalent perceptions of women and men and serve to challenge essential assumptions of gender and technology. The findings show that there are significant differences between the gender stereotypes of the engineer and engineers in reality, and that the ideology of rational men and irrational women in engineering is mistaken. This underlines the fact that neither gender nor technology is a constant or a given, but that it should continuously be reinterpreted. The empirical data consists of the life stories of 46 computer and mechanical engineers, 26 of whom are women and 20 men.

Keywords: technology; engineers; dualism; stereotypes; career choice

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Introduction

The rational/irrational dichotomy has for a long time characterised and differentiated constructions of masculinity and femininity in engineering. Berner (1996, 1999) and Oldenziel (1999) underscore the gendered notions of rationality versus irrationality as formative forces among engineers, and in engineering. Such binary systems are often used as explanatory models that account for women's exclusion from the field of technology (Berner, 2004; Wajcman, 1991), even though gender and technology research has been addressing women's exclusion from technology for a long time (Lagesen, 2005). The present study displays contradictory features related to gender stereotypical dichotomies when engineers informally talk about their experiences, showing that engineering also encompasses rational women and irrational men despite the traditional portrayal of a group of collected and rational men.

This article deals with 46 computer and mechanical engineers, 26 of whom are women and 20 men. The way in which technology has represented social continuity in their lives is central to the study. The concept of social continuity refers to the individual's career throughout life as characterised by continuity or discontinuity in relation to his/her social origin (Humphrey, 1993). The findings show that men are emotionally geared

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towards engineering due to the self-evident and expected continuation of a passionate interest in technology during childhood. Women's discontinuity in relation to technology and their experiences of it have made engineering a non-expected career; in contrast to men's emotional choice, women's choice is based on rational career considerations and individual, rational strategies.

Landström (2006) criticises feminist technology studies (FTS) for not having sufficiently questioned or problematized either the stereotypical notion that technology is masculine or the gendered binaries following on from that. A number of researchers in the field (cf. Bray, 2007; Haraway, 1991; Lagesen, 2005; Landström, 2007; Mellström, 2009) have challenged, however, in various ways, the symmetry on which constructivist analyses rest in this area in order to avoid reproducing gender binaries. My contribution is in line with this argument as I problematize the stereotypically gendered rational/irrational construction in relation to engineering and, specifically, in relation to the place that technology has when women and men choose a career in engineering. The aim of the article is to show that manifestations of rationality and irrationality are gender differentiated in unexpected ways, thus indicating how varied existing interpretative flexibility is in relation to gendered categorizations of how women and men 'are' as engineers. By focusing on individuals and narratives that deviate from 'stereotypical' gendering, women and men are problematized in terms of career choice and profession.

The following section provides a theoretical framework of previous research into dichotomy as a constitutive principle in technology and engineering. The material and method are then described, followed by the analysis and results in two sections headed 'Passionate men' and 'Rational women', respectively. Concluding remarks end the article.

Gender stereotypes and dichotomies in technology and engineering

This article takes the view that gender and technology are co-constructed categories, meaning that they are both flexible and relational phenomena created in social relations and in relation to each other during identity-creating processes (Berner, 2004; Faulkner, 2003). This perspective is also the basis of the dominant explanatory model of the strong symbolic and material correlations between men, masculinity, and technology that have been documented in a number of studies (cf. Cockburn, 1996; Faulkner, 2003; Lagesen, 2005; Mellström, 1995; 1999; Wajcman, 1991). The 'pervasive and durable equation between masculinity and technology' (Faulkner, 2000a, p. 3) is also a basic explanation of why women do not see engineering as a suitable career. Faulkner (2000a, 2007, 2009) has coined the concept of *gender in/authenticity* in order to capture 'the gender normative pressure of the way things are' (in a non-essential sense!) in engineering; an engineer is 'expected' to be a man, whereas a female engineer is a deviation, both professionally and as a woman. On a gender symbolic level, different versions of engineering identities are 'done' in relation to available masculinities, thus excluding women (Faulkner, 2007). Women cannot, for example, relate to the male role models available, e.g. the stereotype image of the nerdy computer engineer, who has a more intimate relationship with technology than with people (Håpnes & Sørensen, 1995; Lagesen, 2005; Turkle, 1988), or the 'nuts and bolts' identity resulting from the long and practical experience typically lacking in women (Faulkner, 2007). The engineer as a man is also a statistical norm that shapes our stereotypical expectations (cf. Lagesen, 2007); we think of a man when we hear the word 'engineer' because most engineers are men (Faulkner, 2009). Previous studies have also described the relationship between men and technology, not only in

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terms of strong ties, but also in terms of passion and pleasure; my results are in a similar vein as the framework is used to illustrate the extent to which having a passion for and taking pleasure in technology affect men emotionally when choosing a career in engineering.

Engineering as a male bastion has deep roots in history and dates back to the twelfth century. The profession emerged in the nineteenth century when technology was established in higher education and occurred in close relation to the emerging bourgeoisie, who 'naturalised' gender differences, thus making the gender complementary view an important element of the masculinised knowledge cultures of the science community (Berner, 1996; 2004). The image of the engineer as a 'man of modernity' emerged within the institutes of technology and became the symbol of the rationality-based meritocratic middle-class ideal that played a key role in building the Swedish welfare state (Hirdman, 2000). Up until the 1920s, women had been excluded from an education in engineering; when later admitted, certain patterns were set which resulted in gender segregation in that field. Women chose, for example, to become chemists or architects, areas resembling their traditional roles and competencies in the domestic sphere (Berner & Mellström, 1997).

In medicine, the differences between the sexes were defined in terms of non-comparability: men and women were neither physical nor moral equals, but complementary opposites (Schiebinger, 1989). A firmness of character and the ability to control body and soul, according to moral principles, were the hallmarks of the autonomous and male individuals. The woman was the man's polar opposite, firmly anchored in social relations, traditional mental patterns, body and nature (Larsson, 2002). In the prevailing gender complementary ideology, the qualities of intellectual ability, objectivity, and rationality were attributed to men, while the ideal qualities of women were subjectivity and humanity. This approach impacted upon the expanding engineering field and has since informed the formal occupational rules of inclusion and exclusion, roles, career paths, and reward and penalty (Berner, 2004).

The historically-formed gendered dichotomy of engineering is rooted in oppositions such as technological/social, hard/soft, rational/irrational, and masculine/feminine (Faulkner, 2000a, 2001). Technical competence has been constructed as a part of what it means to be a man, and of masculinity; in the process, women and femininity have been constructed as non-technical (Faulkner, 2000a; Hacker, 1989; Wajcman, 1991). Masculinities and femininities are set up as opposites and mutually exclusive, and they can be exemplified in the technological/social dichotomy and in the idea that women are socially-inclined and hence non-technical, while men are technically-inclined and therefore seen as non-social (see Faulkner, 2007, 2009). This is a part of the cultural distinction between women's presumed emotionality and men's presumed instrumentality (Berner, 2004; Faulkner, 2003).

Technical artefacts have also mainly been associated with men (Cockburn, 1985) and seen as part of masculine identities (Wajcman, 1991). The technical artefacts traditionally associated with women, e.g. the sewing machine, have not achieved, unlike their male-encoded counterparts, the status of 'real technology' as they belonged to the domestic sphere and hence were valued less than the technology used in public sphere production by men (Berg, 1996; Cockburn, 1996). Likewise, technical artefacts have been categorised as 'hard' and 'soft' and associated with different stereotypical modes of thinking. The hard masculine mode of thinking is symbolically associated with emotional distance, objective rationality, and abstract reductionist problem-solving. The soft feminine mode of thinking is symbolically characterised by emotionality, subjective rationality, and concrete

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empirical and holistic problem-solving (Faulkner, 2003). Subjective rationality is defined as something grounded in personal preferences and not necessarily rational to anyone other than the individual in question (Jackson & Carter, 2002). The gendered stereotypical view of women as emotional and irrational has been deemed incompatible with technological development (Berner, 1999), and has contributed to women's exclusion from the technological sphere (Berner, 2004; Wajcman, 1991). Rational intellectual thinking and abstract reasoning have symbolically formed the ideal of the engineer as the knowledge-seeking subject described in terms of a collected, calculating, and rational man (Berner, 1996, 1999; Oldenziel, 1999).

In her ground-breaking book on typesetters in England, Cockburn (1985) observes that 'men have always been in control of key technologies' (p. 12). Technology, masculinisation, and power have been closely connected and a recurring theme in many studies. Men's relationship to technology is not, however, merely an issue of power, control, and dominance, but also one of feelings, pleasure, and passion (Mellström, 2004). Men's identification with technology and the significance of technology has been verified in a number of studies (Holth & Mellström, 2011; Kleif & Faulkner, 2003; Mellström, 1995; 1999; 2004). Early socialisation, social continuity, homosociality, and the embodiment of machines and technological knowledge are key elements of producing experiences of intimacy and passion. As mentioned above, my focus here is specifically on the emotional way in which a passion for and taking pleasure in technology has influenced men's entry into the profession.

Ruth Oldenziel (1999) describes 'men's love affair with technology' in her historical account of the American engineering profession during the period 1870–1945. In her study of US telephone and telegraph companies, sociologist Sally Hacker (1989) describes men's experience of sensual, spiritual and emotional well-being, as well as the aesthetic, erotic, and pleasurable dimensions of technology (cf. Florman, 1976). In his book *Män och deras maskiner* [Men and their machines], Mellström (1999) describes how passion, feelings and lust for technology are key to understanding the relationship between men and technology, claiming that there is a link between the ability to solve problems practically and technical skills, on the one hand, and a long and pleasurable interaction with technology, on the other. Mellström (1999) gives an account of three prominent masculinity types based on an approach to and an interest in technology: the 'Gearhead', the 'Engineer' and the 'Computer Nerd' (based on Wajcman's categorisation, 1991). The 'Gearhead', constructed on the basis of physical strength and mechanical skills, represents traditional masculinity, and is highly valued by working-class men. The 'Computer Nerd' has a passionate and intellectual relationship with technology. The 'Engineer' is characterised by a professionalised and calculating rationality, sharing similarities with both the 'Gearhead' and the 'Computer Nerd'. These masculinities are combined within engineering in terms of childhood conditions, education, and work (Mellström, 1999).

Kleif and Faulkner (2003), in their study of amateur robot builders and professional software engineers, have identified striking similarities between these groups with regard to how technology is experienced. They share the joy of creating, pride in their technical skills, and a sense of wellbeing and intimacy in hands-on technical execution. There is also a similarity between the groups as regards continuity in relation to technical skills. Both groups played with technical toys during childhood and many of the men taking pleasure in technology as a hobby are also engineers; the line between 'play' and 'work' is blurred. Kleif and Faulkner (2003) also show that male and female software engineers

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behaved very similarly, but talked differently about their relationship with technology. Most of the men, but few of the women, expressed enthusiasm and passion, with the men's shared emotions creating social belonging and becoming an important part of the culture, as well as a way of demonstrating technical skills. For the women, however, this difference in emotional expression hampered their chances of gaining membership of the engineering community and being seen as 'real' software engineers. Clearly, expressing pleasure in this context is gendered and works towards excluding women. On this topic, Cohoon and Aspray (2006) show that the relationship between passion and technology has not only been stereotypically gendered, but has also been dichotomized so that men's technological passion is contrasted with women's passion for social relationships. Women's technological passion is often portrayed as feeble and inadequate, and transformed into a feminine 'techno-passion' gap (Margolis & Fisher, 2002).

As mentioned above, Landström (2006) has criticised FTS for not having sufficiently questioned the dualistic construction of the gender stereotypes constituting technology, rather taking it for granted. By not questioning the assumption that technology is for men and building on a gender complementary approach, the perception of technology as a domain for men which is not really fit for women is reproduced. Challenges to men's dominant position in the technology field have usually been mounted by positioning women and men in relation to technology, usually with counter-productive effects since gender is then set up as a dichotomy. A better approach is to pose the question how men and women relate to technology on the assumption that there are two categories of people with differing relationships with technology (Landström, 2006) and to study their statements in terms of constructing gender rather than reflecting a given, inherent gender category (Landström, 2007). Here, gender is understood as performativity, i.e. something that is enacted, including speech acts, on a daily basis by both women and men (Butler, [1990] 1999).

This study is limited to the issue of rationality and irrationality and to the contradictory expressions emerging against the backdrop of such dualism. It thus runs the risk of simplifying the descriptions of the paths to becoming an engineer. Thus, it needs to be stressed that the narratives emerging from my data include more diversified explanations than the strictly rational and irrational ones. As in other studies involving dualisms (e.g. Faulkner, 2000a, 2007, 2009), there are repeated mismatches between stereotypical notions of gender and actual engineers, and their practices, than noted here. I have also limited my analysis to the factors influencing the engineers' career choice, rather than to what deterred it. This approach is particularly relevant to the women's narrative since engineering is a symbolic 'gender-inauthentic' career choice for women (cf. Faulkner, 2000a).

Data and method

The empirical material consists of interviews with 46 engineers, collected between 2009 and 2010, for two different part studies of a project called Jämväxt – Equal Rights and Sustainable Economic Growth in Värmland. In the first part study, 24 computer and mechanical engineers who had graduated from Karlstad University between 2004 and 2007 were interviewed. There were nine female and five male graduates in computer engineering and six female and four male graduates in mechanical engineering. The two engineering programmes were chosen because they had the lowest proportion of women combined.

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In the second part study, 22 interviews were conducted with an equal number of women and men, all engineering graduates, employed for many years by a male-dominated IT consultancy. All have been promoted within the organization to level 4 of 5, according to an internal ranking scale for technological expertise, now being employed as managers, line managers, programmers, systems architects, and project or team leaders.

The interviews are life narratives and structured according to observations, experiences, and emotions in chronological order in terms of growth, education, career, and hobbies. There is a special focus on issues such as how and in what way technology has represented social continuity in the respondents' lives. Social continuity means that life as a whole does not deviate substantially from the way childhood and adolescence were experienced (Humphrey, 1993).

The data was reduced gradually by systematically processing the material. In my analysis, the categories of rationality and irrationality were identified and were in contrast with the expected career choices of both the women and the men. This finding led to further analysis in the form of a thorough pursuit of the statements and expressions related to the categories. This procedure has been termed selective analysis (Corbin & Strauss, 2008). The chronological order of the life narratives was regarded as time lines in the analysis, working as an analytical tool for identifying events of continuity and discontinuity in relation to career choice. In what follows, the analysis and results are presented in terms of 'passionate men' and 'rational women'.

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Passionate men

For most of the men interviewed, technology is and has been a key part of their formative years, life conditions, relationships, nurturing and identity creation; it also represents a clear social continuity from childhood to adulthood. The men return to technology when describing their childhoods and relationships, especially with other men such as fathers, brothers, and friends. These relationships are central and evoke memories of technology in their narratives. The early and continuing interest in technology has made engineering a 'gender authentic' (Faulkner, 2000a) career choice, which is also described as self-evident (Mellström, 1995), for all of the men but two. These two men, both IT consultants, describe their entry into engineering as motivated by an interest in science and mathematics; like most of the women, they made a rational choice based on good career prospects. Neither of them spent much time during their formative years doing technical pursuits; rather, they were into sports and fishing respectively. Most of the men interviewed said that they had not given much thought to their career choice; there is simply nothing remarkable about men becoming engineers because this does not make them special 'as men', there is nothing to explain or defend (cf. Faulkner, 2007). Erik, a mechanical engineer, describes how his interest in technology influenced his choice of career in an unreflected way:

> It was never a big deal. Can't remember if I even thought about doing something else. It was more or less a given to work with this. No, I didn't brood on it. I drifted along, guided by my interest.

Also clear is the influence of the specific interest in technology during childhood. The interviewed men who were interested in mechanical things at an early age chose mechanical engineering while the men with an early interest in computers chose computer engineering.

In answer to the question why he chose mechanical engineering, Caesar answers: 'Well, I grew up on a farm and always messed around with engines and stuff, drove a car when I was eight and stuff like that, so it was pretty obvious that I'd do something technical.' Oskar, on the other hand, highlights his early and passionate interest in computers (cf. Mellström, 1999), as well as his pleasurable relationship with technology, as the reasons for his consistency in choosing computers throughout his education, and in his profession:

> Yes, I remember when I started. I got my first computer in the 80s. It was my first major interest. Since then, there's been nothing else. I've always been a bit of a nerd. That's it. I chose computers as an elective subject during year 8, followed by computer engineering at upper secondary school. And then I stayed on for a fourth year of computers at Uddevalla. Yeah, it wasn't hard to choose what to study at university. One thing led to another.

Harald, a computer engineer, uses the word 'luck' to explain why he feels privileged to be working with what he enjoys most in life. In relation to his fellow students, who chose the engineering programme in order to get a job, he positions himself as someone who chose a career and planned his future based on preference rather than rationality and strategy.

> I've always done what I enjoy doing, more or less. I rely on my feelings, sort of. Then of course I've been lucky to be able to do what I enjoy […] So I haven't had to study anything just because I had to. I chose what I wanted to and it led to a job […] many others on my course chose the programme in order to get a job. Being involved and motivated is a different thing then. People like me are more interested, you see.

In order to understand the emotional bond with technology, questions like the following were asked: What does technology mean to you? What is the most rewarding and enjoyable thing about technology? Consistently, most of the men interviewed used vivid and positive words to convey the fact that technology gives them pleasure and satisfaction. Tobias, a computer engineer, says: 'understanding how things work and fit together gives me a kick, and that's the best thing I can think of' while David, a mechanical engineer, says: 'I feel alive when I get to test and mess around with mechanical things, and it's so much me, kind of [laughs]'. The men's descriptions indicate a strong identification with technology, but also feelings of love, passion, and lust. Their choice of career is based on this inherent emotional relationship, making it a subjective, rational choice propelled by feelings. The statements are approached as gender constructing acts rather than as statements reflecting an inherent gender identity. The subjective rationality and emotional drive are more characteristic of the historically-symbolic construction of femininity.

In what follows, I will exemplify gender-contradictory expressions, among men in engineering, that perform stereotypical notions of femininity. Björn describes how technology has always played a key role in his life. He says that he *loves* solving problems and that he is always involved in a technical project in his spare time. For him, the outcome of different projects is not the main thing, but the fact that he 'is happy just doing it'. Björn describes himself as a sociable person who likes to be with people and whose dream is to combine technology and people:

> The optimum situation is when I'm involved with technology together with others, my children, my mates, or my colleagues at work. I see technology as something important in

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> people's lives and my big dream is to teach the subject. I teach people as soon as I get the chance, even at work, and my colleagues tease me about it (laughs).

In terms of the social/technical dualism, Björn's holistic approach to technology, and his interest in people, can be seen as characteristic of stereotypical femininity. This contradicts Sherry Turkle's (1984) well-known study of 'hackers', in which men were more comfortable being intimate with machines than with people, leading to the concept of 'the intimate machine' (p. 216). In contrast, and in line with Björn's statements, Håpnes (1996) shows, in her study of hackers, that they were 'not *in* their machine' but had developed close personal relationships with colleagues and peers sharing the same fascination for technology. The example above shows that the technical and the social are not mutually exclusive in reality (see also Faulkner, 2000b, 2007, 2009).

Jacob, a computer engineer, describes his interest in technology as something which 'almost brings its own reward. It doesn't have to lead to anything.' This view is contradictory vis-à-vis both a 'utility perspective' and actual concrete rational acts and, hence, a view of technology representing the stereotypical conceptions of the irrational. The historical image of the engineer as a rational and determined man seems very distant.

All but three of the men interviewed also had technology as a spare-time interest. The mechanical engineers in the study took pleasure in 'screwing things together' while the computer engineers indulged in 'hobby programming' and designing their own software, their descriptions having elements of play and experimentation.

> From time to time, it's my spare-time interest. I write small programs. It might not be programming exactly, but it can be part of something else. I get something out of it in a personal sense. There's something creative about the whole thing and I get something in return that I've achieved something. It's a bit like playing. [laughs]

This quote shows that Alf has an emotional and relational connection with his computer as he obtains something in return. He describes the creative process in terms of 'play', something which is usually associated with children and activities performed for pleasure. Play justifies itself and children do it for fun (Huizinga, 1963). In Alf's description, play and the pleasure of technology are intimately connected.

Fredrik, who works as an IT technician at a large government agency, has observed that some men have a tendency to over-elaborate technical tasks and to fall for the temptation of 'playing' with their computers. He thinks that interest and passion take over emotionally and that men are unaware of this irrational pattern in the workplace. He also thinks that women do their tasks more rationally, and thus better; he expresses it thus:

> Sure, they might not have the same genuine basic interest as men […] but I don't see a difference in job performance except that, in many cases, they do a better job because they don't do as much extra work. They don't overdo it. Instead, they do it quickly. They do what they're supposed to do and that's it. Katarina is very good at that. She knows her priorities […] myself, I might play a bit just to see if there's something interesting there, so it'll take longer.

The fact that playing is linked to descriptions of solving technical problems at work shows, as in the Kleif and Faulkner study (2003), that the line between work and pleasure is blurred. The account of Katarina shows that other approaches than a 'passionate' interest in technology can also pave the way for performing well in engineering. It also

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demonstrates that women can be more rational than men in terms of efficiency and determination (and why not, indeed?) in a technological setting, and that they can obtain attention and recognition for their rationality from male colleagues. This contradicts perceptions of women as irrational and non-technical and will be further discussed in the next section.

Rational women

> I have a younger brother who has supported me in this. He has the same education as me but he made the right choice right from the start […] he took the straight road and I the winding one.

This quote is from the interview with Kristina, who started studying computer science in her mid-thirties, having worked as a payroll clerk for many years. At upper secondary school, she opted for the business programme, much to her regret, because later on she had to take the science subjects as a mature student in order to meet the university admission requirements for the computer science programme. Her reason for retraining was that she felt she had come to a standstill in terms of both personal development and career, and she wanted a challenge. Her co-workers encouraged her to move on to more suitable things. Her brother, who graduated as a computer engineer while still young, was both an inspiration and a role model. Kristina's road to her new profession was long and winding. This is an experience she shares with other women in the study.

These women's socialization process, in relation to technology, lacks the continuity of their male counterparts, and is more fragmentary. The women describe themselves as observers rather than as practitioners doing technical projects. Because of this, they have not acquired the same level of technical experience, practical competence, or confidence as the men. Their stories about their interest in technology and career choice are not homogeneous like the men's stories, but much more varied. In contrast with many of the men interviewed, the women in the sample *had a story to tell* (cf. Faulkner, 2007). This is best explained in Karin's words: 'I've often been asked to explain how I, as a woman, had the idea of becoming an engineer.' In other words, female engineers grow used to explaining and defending their career choice because it is gender inauthentic. However, like most of the men in the sample, the women were also interested in mathematics and the sciences during their early school years and they excelled in logical thinking, with several seeing themselves as 'practical'. In spite of this, all but two of the women testified that they had never considered making a career in technology until later on in life, as exemplified in Berith's statement: 'When I made my mind up many years later, I couldn't believe that I hadn't done it earlier. It wasn't an option at the time, even though it has always been in me in a strange kind of way'.

Typically, the women in the study chose the same upper secondary school programmes as their friends, usually the business, social sciences, or healthcare programmes (cf. Swedish Government Official Reports 2004, p. 43). The women were insecure about their interests and aptitude and, unlike the men, they could not identify with a future as an engineer. Sofia puts it like this:

> You don't know who you are or who you want to be when you're fifteen, so it was hard to make an educational choice. So, the question was more a case of who than what. Becoming an engineer was unimaginable.

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Educational research has emphasized that young people's relationship with education should be understood in terms of identity formation and that students more frequently reject science and technology as these subjects are more difficult to identify with compared to subjects in the humanities and social sciences (Illeris, 2007). When the women in the sample finally decided on engineering, many lacked field-specific eligibility and had to obtain qualifications in adult education, or do a foundation course at university. The final decision-making processes of the women's choice of engineering are characterized by a rational and strategic approach. The following narratives display the necessary and logical reasoning behind decisive action and the centrality of the 'utility perspective' in assessing the labour market, working conditions, and salary. This represents an approach characteristic of the male stereotype, and not the feminine counterpart. Thus, the following narratives also exemplify the contradictions involved in the rational/irrational opposition.

Elisabeth, who first made a living as an artisan weaver before training to be a computer engineer, changed her career on the basis of rational arguments relating to her family economy:

> When I became a single mother, with two children to support, I calmly realized that I couldn't support a family doing weaving. I had to get a job, with good pay, to manage this on my own, and I wanted to have a good life. So I thought ok, what's on offer? Computers, I thought, perfect. I started in 1995. That's when there was a future in computers, before the IT bubble burst.

Elisabeth made a rational choice by opting out of artisan although weaving was a major interest and what she wanted to do. Then, she made another rational choice on the basis of her labour market prospects, although she had no computer experience. Today, Elisabeth is a key member of staff at the IT consultancy where she works and has a senior technical position, showing that it is possible to make a career in technology even when acquiring expertise later on in life. Karin, who is a line manager at a major paper mill, has a similar story to tell. She describes herself as a purposeful person and says that 'being somebody' has always been important to her. She worked as an assistant nurse for five years before applying for the engineering programme.

> You won't get very far without an education. I wasn't particularly interested in technology at the time, but I've always been good at maths. I thought that engineers do well on the labour market and, even though I thought it wouldn't be much fun, I was never afraid of not coping.

Karin regards her career choice as a future investment and adopts an instrumental approach by seeing it as a means of obtaining a profession (cf. Bogler & Somech, 2002). As a strategic subordination, she also accepts that she might not enjoy the education.

Hannah, currently a project leader in the steel and engineering industry, initially attended upper secondary business school before working as a secretary at a legal firm. When she no longer found this satisfying, which she attributes to developmental stagnation and a low salary, she decided to go to university at the age of 29. She felt that she wanted to do something completely different, reasoning that 'the computer thing is something we need to know anyway so why not study it?' Besides her certainty that the labour market was stable, she had no preconceived ideas about the education or about engineering. She expresses both astonishment and resentment at the dominance of men: 'I'll never forget the first roll call […] there were guys everywhere. I'd never have thought there would be so few girls. And then I thought: What have I done?' As Lagesen

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(2007) has shown, the numerical dominance of men has an impact on conceptions, in this case as regards training to be an engineer, and that this creates a feeling among women of having 'the wrong sex'.

Josefin, who works as a manager at a Norwegian oil-drilling firm, describes her road to becoming an engineer as 'unnecessarily long in retrospect'. She initially did the healthcare programme at upper secondary school because all her friends were doing it. She was pretty tired of school and hoped to make a living working with horses. When she was thrown off a horse and injured herself, she realized that horses entailed risks she was not prepared to take, and that it would be difficult to make a living. Encouraged by her father, she did the science foundation year at university, where she met a female lecturer who was a mechanical engineer and who made Josefin see that there was an attractive labour market for female engineers. Josefin remembers thinking: 'Perfect'.

The career choice of other women has been based on rational strategies relating to individual circumstances. Anna-Karin, for instance, chose mechanical engineering because she was dyslexic. Social science was not an option as she thought it would involve too much reading. Today, she is a Volvo designer and draws spare parts for buses.

Alma, from Lithuania, works as an IT consultant in Sweden. She earned her qualifications as an export engineer in her home country, which she says is very similar to mechanical engineering in Sweden. Her reason for choosing technology is that the courses were in German and she was mainly interested in that language.

> My father has an MSc in engineering and my mother is a physician. Of course, I was pulled in two directions, but I never wanted to be a physician, for instance, because that never interested me. I wasn't particularly interested in technology either, I have to admit […] I was something of a humanist and strong in languages and I was always writing good essays, so I thought I could study technology that was taught in German and thus learn the language. I studied at a faculty specializing in engineering programmes in different languages. There were groups in English, German, French, and Russian. Women were in the majority in my German group. But on the regular engineering programmes, there were only boys. I don't think there were any girls at all [laughs] […] I think that the language aspect was a way of attracting women and they thought it would be a nice combination. They say that girls are better at languages and we had to do an admission test in German. There were almost only girls and I think we all became engineers. [laughs]

The technological subjects became increasingly interesting to the women in the sample and they gradually achieved higher grades, but it was their original interest in mathematics and science that had influenced their final choice of engineering. As one of the women puts it: 'My choice was not completely out of the blue'. The women see engineering as a successful investment and describe how their technical confidence has grown in professional practice, compared to their student days. This indicates the importance of time and experience. They even experience technology as enjoyable and interesting, but they still do not talk about technology with the same passion as men (cf. Kleif & Faulkner, 2003). The women interviewed do not pursue any technical interests in their spare time, with two exceptions, one of whom likes Meccano and the other fixes bikes. One explanation for this may be that their technological interest is not great enough to encroach upon their spare time. It could also be explained by the fact that women have less spare time than men (Deem, 1986). Yet another explanation could be that technology is 'gender-inauthentic' to women and that a pleasurable relationship with technology must be legitimized and justified to a greater extent than is the case for men.

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Although they work in technological and male-dominated organisations, they have not directly encountered the resistance that they experienced at university. The women describe their workplaces as male-dominated by virtue of networks of men and masculine ways of socialising and communicating; however, they still feel that it is possible to transcend these structures. The gradually growing interest in technology has contributed to the desire to develop technical skills in the future.

Conclusion

In this article, I have problematized gender constructions based on the rational/irrational dichotomy in relation to the place that technology has when women and men choose engineering. The findings show that the long-prevailing notion of rational men and irrational women in engineering can be inverted and construed instead as rational women and irrational men.

Like previous studies, my findings clearly indicate the socially- and symbolically-gendered dimension of technology (cf. Faulkner, 2001). The women and men in this study not only display different ways of describing their paths into engineering, but also widely differing experiences. The social continuity, the homosocial community, the strong identification with and the enjoyable experiences of technology that male engineers share all lend stability to their engineering careers; this is a key factor in understanding the inertia of the gender-segregating processes in engineering (cf. Holth & Mellström, 2011). This gendered asymmetry in the respondents' relationships with technology has resulted in a straight road into the profession for the men but a winding road for the women. In turn, such social patterns produce the symbolically-gendered dualisms associated with engineering and the notion of engineering as a 'gender in-authentic' career choice for women but a 'gender authentic' choice for men.

It is in relation to their engineering career choice that the women in this study emerge as rational and the men as irrational. The women had an instrumental and rational approach to their choice, which involved career prospects and job opportunities. In contrast, most of the men were emotionally driven by their love of technology, and the pleasure involved, seen here, in their choice, as expressions of the irrational. The dissimilarity between the women and the men in this respect reflects the differences in their relationships with technology, rather than different gender identities. This shows that the *ideology* of rational men and irrational women in engineering is mistaken. The proposed inversion of the terms is not intended to construct a representative example, but to produce a text that indicates interpretative alternatives at a particular time and place, thus emphasizing the changeable and re-interpretative potential of cultural conceptions regarding what constitutes a man and a woman. Different dualisms are gendered in potentially contradictory ways, but this is particularly evident in engineering since it is so marked by dichotomous thinking. Highlighting contradictions means challenging essentialist assumptions of both gender and technology.

The men in the study gave considerable narrative space to descriptions of their life-long passion for, and pleasure in, technology. On a gender-symbolic level (and beyond its role in career choice), technological passion *per se* can be seen both as gendered and as a tension between different masculinities since technology is symbolically-encoded as a masculine interest, defining technical skills as part of the masculine identity. Further, the passion and pleasure of technology is the result of men's long and varied interaction with technology, from childhood onwards. Considering women's discontinuity in relation to

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technology, it is clear that women experience difficulties being equal participants. In seeing the love and passion for technology as symbolically encoded as masculine, we cannot ignore that both the 'nerd' and the 'gearhead' function as gatekeepers in the engineering career choice.

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