Engineering Studies

Doing gender in engineering workplace cultures. I. Observations from the field

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Doing gender in engineering workplace cultures.
I. Observations from the field

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It is frequently claimed that women who enter engineering have to 'fit in' to 'a masculine culture', but there is little systematic evidence on this. This article presents observations about gender dynamics in engineers' everyday interactions, drawing on ethnographic fieldwork in three companies. The overall picture is mixed. Engineers are generally respectful in their interactions, but there are subtle dynamics which make it easier for (more) men than women engineers to build effective work relationships and to 'belong'. Topics of conversation are generally quite wide-ranging and inclusive amongst close colleagues, but lean heavily on gender-stereotypical subjects with outsiders. Most engineers take some care not to cause offence to others, but in some workplaces the humour and chat are very sexualised and sexist. Engineering can accommodate a range of masculinities, but some are more influential than others. Throughout, we see that doing the job often involves 'doing gender'. Workplace cultures not only oil the wheels of the job and the organisation; they can also have a huge bearing on who stays and gets on in engineering. Part II of this article (in a later issue) takes this analysis further, by highlighting an 'in/visibility paradox' facing women engineers.

Introduction

The setting: A meeting room at the on-shore 'base' of an oilfield engineering services unit where the field engineers gather routinely at lunchtimes. The conversation bounces all over the place. Paolo mentions that a former colleague was a good staff development person, to which Jerry retorts, 'You've gotta worry about someone who's been at that for more than a year'. Jerry's comments probably reflect unwritten norms about the criteria and mechanisms for getting on in the company. They may also signal the view that 'soft' roles like training are not 'real engineering', perhaps not even very manly. His close friend, Drew, teases Paolo that 'Yours was a bullshit assessment project, man' – because it was strongly management, rather than technology-oriented. Another former colleague comes up in conversation later on: 'Sonja didn't count as a girl!' announces Jerry, and Drew tells how Sonja was once sick on a rig in bad weather and asked 'Is this a platform or a semi?' They laugh

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raucously at her ignorance – the upshot, it seems, is that Sonja didn't count as an engineer or as a woman. As I reread my field notes that evening I wondered why this particular story was told on the first day of a new woman colleague joining the unit. The only other woman engineer present, Leila, had retorted, 'Don't be cruel!' when Jerry raised the subject of Sonja, but still the story was told and still they laughed.

This article is about the everyday cultures found in engineering workplaces. I open with these two vignettes because they illustrate themes about gender dynamics I have observed repeatedly in these cultures. The story about Jerry and Drew illustrates how 'doing the job' often entails 'doing gender' also[1] – in this case, performing certain kinds of masculinities. The story about Sonja is an extreme case, but it highlights an underlying difficulty of 'belonging' for women in engineering.

It is frequently claimed that women who enter engineering have to 'fit in' to 'a masculine culture.'[2] Yet most of the evidence on this is anecdotal; there is little systematic or detailed research on the subject – not least because workplace cultures, as I am calling them, are very difficult to 'get at' empirically. You have to see them on an everyday basis and feel how different people experience them; and this demands ethnographic fieldwork. Studies of women in engineering have tended to rely on interviews and, with some notable exceptions,[3] ethnographies of engineers have tended not to address gender. Partly to redress these lacunae, I sought to bring a gender 'gaze' to an ethnographic investigation of engineering practices, cultures and identities in different sectors.[4] This study, entitled 'Genders in/of engineering', was founded on the conviction that we need to know more about the men and masculinities in engineering if we are to understand better the continuing poor representation of women in engineering, and the apparently enduring symbolic equations between masculinities and technologies.[5] Accordingly, the focus was not on women *per se* but on engineering as a community of practice – men as well as women.

The research design combined observation through job shadowing with interviewing. The observation took place over 2 months in each of three companies: in software development (1 US workplace in 1998), in building design (2 UK workplaces in 2003) and in oilfield services (2 UK workplaces in 2004). In total, 52 engineers (33 men, 19 women) were studied in these workplaces, 34 of whom were interviewed: 24 were job-shadowed and a further 23 were observed closely by virtue of this shadowing. A further 19 interviews were conducted with engineers from

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[1]This is a recurring theme in the now substantial literature on gender and work: e.g., Acker, "A Theory of Gendered Organizations," 1992; Halford et al, *Gender, Career and Organisations*, 1997; Collinson and Hearn, *Men as Managers*, 1996. The performative understanding of "doing gender" is associated with West and Zimmerman, "Doing Gender," 1987, and Butler, *Gender Trouble*, 1990.

[2]E.g., Carter and Kirkup, *Women in Engineering*, 1990; Cockburn, "Caught in the Wheels," 1985.

[3]Hacker, *Pleasure, Power and Technology*, 1989, and *Doing it the Hard Way*, 1990; Mellström, *Engineering Lives*, 1995; Tonso, *On the Outskirts*, 2007.

[4]Faulkner, "The power *and* the pleasure?," 2000, indicates the thinking that led me to design the project. Some of the US material is in Faulkner, "Dualisms, hierarchies and gender in engineering," 2000, and Kleif and Faulkner, "I'm No Athlete," 2003; some of the UK material from building design engineering is in Faulkner, "Nuts and Bolts," 2007; and an early overview of the findings of the project is in Faulkner, "Belonging and Becoming," 2005.

[5]On the latter theme, see Lohan and Faulkner, *Men and Masculinities*, 2004.

across diverse disciplines and sectors. Analysis was based on repeated reading of extensive field notes, interview transcripts and reports.

I am using the term engineering workplace cultures to capture a rather amorphous collection of practices which characterise everyday interactions between engineers, as I observed and heard them. Specifically, my data concern four main types of practices: styles of interacting, topics of conversation, humour and social networks. Some of these practices are directly work-related, others reflect engineers' shared identities as engineers, and others reflect their out-of-work lives and identities. These three strands are inextricably interwoven in people's everyday working lives, which is why doing the job so often involves doing gender. And this is significant because workplace cultures are extremely consequential, in two crucial ways. First, they oil the wheels of the job and the organisation. Second, they shape who is included and who excluded at work. Getting on with one's colleagues is, after all, a huge part of how much people feel they belong – *and are felt by others to belong*. This in turn can have a subtle but significant bearing on whether one stays and progresses within a company or occupation.[6]

My work on engineering workplace cultures has therefore posed the question: to what extent and in what ways are engineering workplace cultures more comfortable to and supportive of more men than women? The study is in two parts, in two separate issues. This Part I provides an overview of my empirical observations about gender dynamics in engineering workplace cultures under the four categories listed above. This paints a mixed picture – of gender inclusive and exclusive dynamics – which indicates that engineering organisations must engage in 'culture change' if the retention and progression of women engineers is to be improved. Inevitably the observations reported in this Part I say more about the men and masculinities of engineering than the women and femininities, precisely because men are usually the large majority in engineering workplaces and so collectively shape the culture more than do women as a group. In the later Part II of the study, I extend my analysis of engineering workplace cultures to the perspectives of women in engineering. I propose the term 'in/visibility paradox' to capture their experiences of being a minority group within the profession, and argue that this concept is a key to understanding the gender dynamics in engineering workplaces and the difficulties women face in belonging as engineers.

Styles of interaction

Engineers do not generally work in isolation. Building design engineers collaborate with other engineers, CAD technicians, architects, contractors, suppliers and clients; software developers interact with other developers, integrators, testers and users. In both cases, I was struck by how quickly the engineers 'get down to business' in interactions with colleagues and associates they already know. Typically, there is a quick exchange of 'How are you?'s before getting down to the job at hand; if the topic shifts, it shifts to other work matters. Interactions between colleagues within the office are often initiated without social preamble. Occasionally, the engineers exchange some personal information or crack a joke. The overall impression is of work interactions that are cheery and respectful but strongly work-focused. This was true of women and men engineers alike, in all five workplaces.

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[6]Tierney's ''Negotiating a Software Career,'' 1995, provides a nice illustration of this point.

Where I did observe a gender-differentiated style of interaction was in the ways engineers address colleagues or collaborators. In one oilfield services base, virtually all the men use 'man' as a friendly greeting or adjunct, as in 'Hey, man!' or 'Thanks, man'. Elsewhere, the more colloquially British 'mate' and 'lad' play the same role. Between close or friendly colleagues, these labels signal common identity and bonds. Between colleagues who are not working so well together, they can help to build working relationships. And when working with a new colleague, client or collaborator, they invite familiarity. Whatever the context, these labels clearly serve as acts of bonding. But crucially, the bonding performed here is fraternal; within the common cultural register, the greetings 'Alright, mate?' or 'Hey, man!' are applicable only to men. They are *audible in their absence* when it is a woman engineer who is being addressed.

Similarly, the handshake was *visible in its absence* in the oilfield engineering company. There is a 'welcome back' ritual when any of the operator and technician crew return to the 'base' after a spell offshore or on leave. They seek out the chief engineer, shake hands and chat for few minutes, and then go around the other engineers in the office. Strikingly, men shake hands with men but not the women. This does not necessarily mean that the men are any less pleased to see, or any less bonded with, the women engineers in their teams than the men; there seems to be real affection towards the women too. What it does indicate is that two routine ways of signalling affection and bonds – the handshake and the labels – are not available to women.

Such subtle absences may be more critical when women engineers interact with new colleagues or associates who are men. I witnessed a number of such occasions. On every one, the interactions seemed to me entirely business-like, respectful and civil. But there is none of the 'craic'[7], nor the signalled familiarity, which the same men would frequently use when building working relationships with men they do not yet know. There is greater formality when a man engineer works with a woman engineer for the first time than with another man engineer. This suggests that bonding between women and men within engineering may be less automatic than between men and men, and that women engineers have to work harder to achieve the same level of easy acceptance with new associates.[8]

I saw hints of a similar phenomenon operating along race and ethnicity lines also. Unusually in one oilfield services unit I studied, four of the five field engineers are women: three are white (from Europe and the Americas), the other is a black African; the one man is from India. Whilst the all-white local crewmen here are entirely business-like and respectful in their dealings with the Indian man and the African woman – even exchanging friendly information about their out-of-work lives – it is in the offices of the white women engineers that they linger the longest and laugh the loudest. Similarly, in the building design company, where there are a handful of non-white faces, none of them Scots, the white Scots are cheery and respectful towards them, but I saw little evidence of close bonds.

Also subtle but by no means trivial is the near universal use, at least in the UK, of the 'generic he' when engineers refer to other engineers. This can take two forms.

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[7]"Craic" (pronounced crack) is a Scots-Irish colloquialism for friendly banter, as in "what's the craic?," or "the craic was good".
[8]Another factor here is that women engineers generally have to work harder than men to prove their engineering credentials to a new associate. I pick up this point in Part II.

One is the use of 'he' rather than 'he or she' when referring to an engineer who is not known. The other is the widespread use of masculine terms – 'men', 'boys', 'guys' – when referring to engineers *en groupe*. Fraser describes himself as 'a nuts and bolts person' but talks of 'man management' even though he has women working on his team. There is little awareness of the potential impact of gendered language, even amongst engineers who would wish to encourage and support women engineers. Many would probably argue that 'mere words' make no difference to achieving this. But when a company director says, 'We put our key men forward', he is sending a quite powerful message to both men and women engineers present. At best, expressions like 'He's the best man for the job' and 'Talk to the electrical boys' render women engineers invisible; at worst, they render the very category of woman engineer a non-sequitur.

In contrast to the generic 'he', swearing was identified as a gender issue by several informants in the UK. Men often apologised for swearing in front of me. There is a rather quaint sense that women would be offended by swearing or have to be protected from it. In the event, the oilfield services company was the only workplace where I really noticed swearing. 'Fucking' is used as punctuation by many if not most of the crew, engineers and managers. By all accounts, the swearing is at its most lurid offshore. For North African Leila, this is one of the things that make the job hard to bear: 'The swearing – I'll never get used to the swearing!' Similar reactions were expressed by two Middle Eastern men. One tells me that his wife doesn't like him swearing at work when he would never do so outside; he tells her 'It is a different world,' implying, I sensed, the stress of the job and the particular mix of people involved. In this industry, it seems, swearing serves as a marker for belonging – one that signals a 'preferred' masculinity – but not one all men are comfortable with.

Perhaps for the same reasons, the style of management in oilfield engineering workplaces is blunt and confrontational. Paolo comes up to Terry one Wednesday morning: 'It was Saturday you came back, man. The client is paying $200,000 for this data and they're screaming for it! Why haven't you delivered it?' Paolo then has a phone conversation with the lead engineer on the rig, in the course of which he says accusingly, 'So you still have missing data, even after a second pass?!' Then in a more placating tone, 'It's just 'cause [his boss] is going to come in through the door in 20 min screaming!' Sure enough, Paolo's boss does harangue him about the data later that afternoon, saying, 'This is crap!' Both Terry in the first exchange and Paolo in the last fall silent, face impassive, under the attack. One sees very plainly at such moments (and I witnessed many) the hierarchy and the pressures operating in this sector: everyone has someone above them 'giving them shit', and so hands it down the line. Exchanges between the staff (at all levels) also reveal short fuses and quick flare ups. These aggressive interactions may act as a test and demonstration of manhood.

By contrast, the overall flavour of interactions in the building design and software development offices I observed is more genteel and respectful than those in oilfield services. Aggressive displays are considered 'bad form', and work-related tensions or conflicts are generally handled carefully, or at least in private.

Topics of conversation

When engineers' conversations stray beyond the immediate task in hand, they often reflect shared subjectivities around technology and the work. In an earlier US study, Judith McIlwee and Gregg Robertson identified an 'engineering culture' in which

men engineers engage in 'ritualistic displays of hands-on technical competence',[9] and found that this culture can impede the career progression of women engineers. I found echoes of this phenomenon, but in different forms. Although I saw no ritualistic displays of hands-on technical competence, I did meet many men engineers who cleave to a 'nuts and bolts' identity, even where the job requires no tool use. As I show in Part II, women's perceived and felt membership as 'real engineers' can be more fragile than men's, for this reason amongst others.[10]

Every engineer I have met – women as well as men – takes pride and pleasure in the technologies they help create or work with. Building design engineers frequently have animated discussions about publicly visible buildings like the Scottish Parliament. Software developers typically share their excitement about what they achieve at work with colleagues, because outsiders don't understand.[11] And oilfield engineers often exchange stories celebrating their oilfield expertise and technology. Paolo describes a job where they were 'getting some formation pressure from the well'. The client's representative – the 'worst ever company man'[12] – said it was 'tool failure' (therefore the services company's fault), but Paolo said, 'No, the well's kicking.' And it did, and it sheared the cable, lost the tool and aborted the job. Some time later, there was an internal email from senior management in the client company saying, 'We pay [the oilfield services company] X dollars because they're competent. So we have to rely on them. When they say "the well's kicking", take heed!'.

This story was told over one of the lunchtimes the field engineers spend together. These gatherings provide some light relief, and serve to consolidate the group's shared work identity and wisdom. As Ulf Mellström discovered in his ethnography of Swedish engineers,[13] stories repeated within a community become part of its folklore, and so contribute to the socialisation of junior members. Another common theme of the storytelling I observed in this company is people's career progression or lack of it. This serves to signal what counts in the informal meritocracy of the company – as we saw in the opening vignettes. Mention of former colleagues often prompts verdicts like 'excellent engineer', 'very organised' and 'good guy too.' Notice how engineering and gender identities come 'packaged' in such statements.

Gender performances are more explicit in people's non-work topics of conversation. Predictably, some conversations reflect stereotypical men's interests – most obviously, in the UK, football [soccer], other competitive sports, and doing up cars. Of course, there are women engineers who share these interests, but many of those I spoke to bemoan the 'one track conversations', as do some men. By the same token, Ramesh, the only man in his unit, tells me 'I have nobody to talk to! [...] Sometimes the conversation gets too girly, so I just get out of the way. ' And indeed, one lunch I shared with three of these women was taken up with diets and boyfriends. Still, much of the non-work chat I witnessed in all five workplaces is quite wide-ranging and inclusive: common topics include hill walking, DIY, films,

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[9]McIlwee and Robinson, *Gender Power and Workplace Culture*, p 139, 1992.
[10]See also Faulkner, ''Nuts and Bolts,'' 2007.
[11]Kleif and Faulkner, ''I'm no athlete,'' 2003; Murray, ''A Separate Reality,'' 1993.
[12]This very term is another generic ''he'': I've been told of a women petroleum engineer who was referred to as ''the company man'' even when nine months pregnant!
[13]Mellström, *Engineering Lives*, 1995.

travel and family. In general, the better colleagues know one another and the more diverse the workforce, the more wide-ranging their conversations.

Less routine conversations with outside associates tend to lean more readily on stereotypically masculine subjects, as 'safe' points of connection. In Britain, football regularly provides the needed social glue: a supplier talking to a building services engineer he's hoping to gain business from has remembered the man's local team and commends him on how well it's been doing; another engineer, thanking someone for sending some useful images, closes the conversation lamenting Scotland's 'dismal' performance in the previous night's World Cup qualifying matches. Families provide another safe topic of conversations. A high proportion of the men engineers I encountered have children. Many have photographs of their kids by their desks, and talk readily about them when asked – be they young children at school or young adults embarking on life. Young women engineers often feel pretty marginal in this 'football and families' culture. Building design engineer Julie, not long out of university, nods to the photos on her man colleagues' desks and tells me having kids is 'another world' from her own. I'm sure there is much about her youthful social life she would not disclose to her older colleagues. Conversely, amongst the young oilfield engineers, very few of whom have children, stories about nights out abound and children are rarely mentioned.

The 'football and families' culture can have consequences for career progression. Many oilfield engineers become account managers by their 30s, where an important part of the job is building relationships in the client oil company. Jousef really enjoys this aspect of the job; indeed it takes up most of his out-of-work social life, including twice-weekly football and weekend socials like barbeques. By contrast, Léa is resisting this career move because 'I find the clients boring! It's all men in blue shirts talking about football all day. Tedious!' The clients are mostly older men with teenage kids. As a woman in her late-20s, Léa tells me, socialising with these men is hard – not only because she has little in common with them, but also because they tend to patronise young women colleagues. In effect, this step on the career ladder requires particular gender performances which don't 'fit' many young women. Gendered practices which mark one's belonging thus contribute to the 'glass ceiling'[14] impeding women's progression into senior positions.

Significantly, both the styles of interacting and the topics of conversation are influenced by the other occupational groups engineers have to work with, since they have to find *common cultural meeting points* in order to oil the wheels of collaboration.

Building design engineers typically move fluidly between two class registers: the predominantly working class culture of building contractors and suppliers, and the middle or upper class cultures of architects and clients. Thus, the two main topics of lunchtime conversation during a day-long concept design meeting with architects, reflect both professional and middle class identities – historic engineering projects (the Brooklyn Bridge and Hoover Dam), and travel to exotic locations in the Far East. By contrast, the winding down chat at the end of an on-site detailed design team meeting with building contractors is about the local football team's chances in the European League. Styles of handling conflicts at these two meetings are also somewhat class-marked: in the former these are handled in a very 'genteel' manner; in the latter the style is blunt and confrontational. I was struck by how easily the

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[14]Bagilhole, "Negotiating the Glass Ceiling," 1998.

same engineers adapt their accents, language and style when needed, even though some are clearly more comfortable and effective in one or other class register depending on their background. This fluidity may be a generalisable feature in the UK where engineering attracts more working class entrants than in other countries;[15] they must then learn to network 'up' if they wish to move into senior business-building roles.

Non-work topics of conversations tell us a lot about whose out-of-work lives are visible at work, and what aspects of one's out-of-work identity it is admissible to share with colleagues. Gender norms are particularly evident in what is disclosed or not about people's personal lives. In all four UK workplaces, the cultures are heteronormative by omission: no-one I encountered is openly gay. By contrast, in the US software development workplace, the head of the department is an 'out' lesbian, and there is a general awareness that 'significant others' may be same-sex. Yet even here, the culture is gender normative, in that the stories people exchange about their private lives are heavily family-centred, and this can serve to silence and marginalise socially those who do not have children. Middle-aged Michael voiced this to me; I suspect that only the close men colleagues with whom he has lunch know much about his out-of-work life. And a young woman complains publicly that the company's strong family-friendly ethic means that colleagues without children end up working longer hours than those with, because they don't have an 'excuse' for leaving when there's a lot of work on.

Humour

Humour is a vital and often defining part of all workplace cultures.[16] Light-hearted joking and hilarity often intersperse sporadically the otherwise business-like tone of engineers' everyday interactions – a necessary means of releasing tension and bonding teams. I had expected the humour to reflect engineering identities, as in the way software developers displayed their favourite Dilbert comic on their office walls. There was also occasional taunting about hands-on technical competence. Jerry complains about the construction of the new magnetic tool he's been struggling to assemble, and Paolo retorts, 'Three pieces too much for you?!' On another occasion, Stefan makes a crack about Paolo being 'too long in a collar and tie' when Paolo is unable to solve a repeated testing failure. However, the subject matter of most of the humour I observed extends far beyond engineering.

The mainstay of engineers' humour in the UK is that very British style – the 'slagging' – where friends make a sport of teasing or 'putting down' one another. Slagging always demands a thick skin to some degree, and there is little tolerance for those who can't take the rough and tumble of this humour. In the oilfield services company, nothing and nobody is out of bounds. The unit manager greets technician Andy on his return from a job offshore saying, 'Long time no see', to which Andy replies, 'Long may it last!' Another returning crewmember is greeted with 'That's Kenny Brad, the fishing dude', when a technician pipes up 'No, that's Kenny Brad, the lazy dude!' Such taunts can hit a raw nerve, especially when work performance is the subject. While I was there, a radioactive tool had been lost down the well as a result of a broken cable, potentially damaging the company's reputation badly.

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[15]Whalley, *The Social Production of Technical Work*, 1986.
[16]E.g., Collinson, "Engineering humour," 1988.

A few days later, the engineer in charge of the job was addressed over lunch by the unit manager: 'Yea, Leila, what happened? Four years we haven't lost a [radioactive] source! You're going to be famous, put your name in the magazine!' Leila feels extremely vulnerable about the incident and retorts emphatically, 'It's not funny.'

Most of the ribbing is more playful than serious. It can help people handle potentially difficult situations. For example, Stefan describes how, if he's forgotten something he 'should' know, he asks one of the more junior engineers still in training: 'I can give him a hard time for not knowing it, and he can give me a hard time. So it's easy going.' Often there is a recurring theme for particular 'victims'. Paolo is unusually small for a man, and his size is fair game. Jerry is more fashion-conscious than most, which provides a butt for slagging him – as in, 'Get a grip of your fucking dress code, man – Hush Puppies and a lilac shirt!' When somebody comments on a new haircut, he responds brightly, 'I did it for you guys and you didn't notice!' Paolo and Jerry often seem to invite or initiate the jokes, perhaps as self-protection in the face of the fairly 'muscular' masculinity of the crew.

The tests and performances going on in these exchanges are clearly about gender, not engineering.[17] But they are not without irony. Indeed, reflexive irony seems to be a common feature of gender performances in many walks of life, as if one part is saying 'this is a game' while another has an investment in the storyline. Building design engineer Alistair tells Janice about a man colleague who returned home from a holiday with his friends to discover his wife 'sniggering' because she has just arranged to go to on holiday with her mother, leaving him with the kids. Janice exclaims, laughing: 'Shocking performance!' Alistair *is* shocked that the man's wife did this, but they clearly both accept that she too has a right to a holiday without the kids.

Such moments are interesting for what they reveal about changing gender norms and awareness. By contrast, the humour in some engineering workplaces can be quite coarse and offensive. Oil platforms and rigs offshore are an extreme case: the 'oilfield trash' or 'rough neck' culture includes frequent swearing, 'dirty talk', and sexist and racist jokes. In the words of technician Gary, 'Stuff goes on offshore you wouldn't dream of doing onshore [. . .] it's way beyond pub banter.' This can be difficult for the professional grade field engineers who are all very young and from privileged backgrounds. As Indian Ramesh discovered, the crew they rely on to get the job done 'won't welcome and teach you till you show you're a team member.' Showing you're a team member means not only earning their respect on the job, but also joining in their particular form of camaraderie – which in his case meant laughing at all their jokes about Indians. Like most of the men engineers and crew I spoke to about life offshore, Ramesh concludes by saying 'But it's harder for the women.'

For many women engineers, the first encounters are indeed very shocking. African Ruth told me she became 'de-sensitised' to the sexual innuendo, adding (much like Ramesh) 'I hope they don't mean it – you mustn't take it personally; that would only run yourself down.' Most find ways to live with the culture.[18] North African Leila comments tellingly, 'This is me invading their environment – so I have

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[17]See also Tonso's "The Impact of Cultural Norms on Women," 1996, and "Student Learning and Gender Issues," 1996.

[18]Miller, "Frontier masculinity," 2004, investigates women's survival strategies in the Alberta oil industry.

to adapt and pretend I'm not hearing what I'm hearing.' Laurie, from the USA, finds the humour 'vulgar' but says, 'It's just friendly banter. I wouldn't be in the industry if I offended easily.' For some, however, the sex talk and the widespread pornography that seems to fuel it, are particularly difficult to stomach. And those who object can be completely ostracised.[19] Women are so outnumbered offshore that many of the men see it as their right to view pornography and 'talk dirty' in this very closed world.

Onshore, the strongly heteronormative culture extends to homophobic humour.[20] Some of this is metaphorical, as in, 'You've got a fuckin gay handshake!' Some of the homophobia is literal, however. In an animated discussion about how dirty they get offshore, and how much they dislike sharing showers with rough necks, Paolo taunts Jerry that he 'spends 3 hours in the shower' because he's 'picking up the soap for the guys.' A former unit manager, from Latin America, routinely addressed the men as 'You big homo!' A US American, Jim, commented on this to me: 'You just couldn't do that in the States. I can't make those jokes, because where I come from people are too sensitive about the politically correct stuff.' Leila also disliked the fact that this manager talked about prostitutes a lot. Yet neither of them challenged him. In this particular workplace culture it seems inadmissible to censure offensive talk – at least not on the subject of women, sex or sexuality. Any challenges are muted because opposition risks losing membership in the community. Most of the men oilfield engineers I spoke to value the humour at work – because the job is tough, and because they value the camaraderie expressed through the humour.[21]

I believe a key reason for the exceptionally coarse and sexualised humour in the oil industry is the need for the field engineers to find common cultural meeting points with the technician and operator crew. Not only must they all work closely together in often gruelling and potentially dangerous conditions, and under huge time pressures; the field engineers also rely on the (generally long-serving) technicians to 'teach them the ropes' when they arrive fresh from the training school. Yet the two groups could hardly be more different culturally: the engineers are all young, recruited from elite universities around the oil-producing world and include (as a target) 15% women; the crew are all working class men recruited locally.

The humour I observed elsewhere is less close to the bone. I heard no sexual jokes in the software development company, and only one in the building design company. Alison made a sexual innuendo about the 'tasty muffin' left over from a lunchtime seminar she'd organised, prompting shocked surprise from Brian – which many others clearly felt – that she'd made the joke at all. It seems likely that the men do not usually make sexual jokes at work *because there are women present*, although sexual subjects are occasionally alluded to. More generally, I sensed that most engineers take some care not to cross certain lines which might be offensive to others. In addition to this 'self-policing', I witnessed several women engineers challenge others for being potentially offensive. There is an explicit ethic supporting this in the software development department. At one large meeting, someone made a quip about handing out Prozac to the management and was immediately 'called' on it: 'You don't know how many people here are on Prozac!' Similar challenges in the

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[19]On Norwegian rigs the issue has been resolved by corporate fiat: there is no pornography.
[20]See Kimmel, ''Masculinity as homophobia,'' 1994.
[21]The role of sexist humour in bonding groups of men has been noted elsewhere: Lyman, ''*The fraternal bond*,'' 1987.

building design workplaces had to be couched in humour (in order to have an impact and for the challenger not to lose face). A sales rep giving the seminar Alison organised explains that a new heating control system has been set to re-synchronise so that, 'If a woman turned it down one afternoon, it won't be too cold the next day.' Alison gasps loudly and he immediately apologises, at which point someone else chips in 'A woman would turned it up anyway!'.

Social networks

Other studies have noted high levels of 'male homosociality' within engineering.[22] And certainly in all five workplaces, there are pockets of men socialising with other men. Where numbers allow, some women also seek out same-sex company. But much of the socialising I observed was mixed-sex. In all three companies, strenuous efforts are made to come up with organised social activities that will include everyone – meals out, sporting tournaments and the like. Only football sessions, where these occurred, are men-only. In the building design offices, as in oilfield services, colleagues generally try to coincide lunch breaks so that as many team members as possible can share 30 minutes of relaxed chat. Some engineers socialise with their colleagues outside of work-related gatherings; some of these friendship circles are same-sex, some mixed.

Arguably, the critical question here is not whether men socialise with other men, but the extent to which any men-only social groups are powerful. Studies of women in engineering often report that women engineers are excluded from the informal 'boys networks' that carry organisational power and influence; for example, over how the job gets done and who gets promoted.[23] The design of this study did not allow me to gauge this, but it did provide rich opportunities to observe what particular masculinities are being performed when men engineers interact at work. For example, four men in the software development office (Michael was one) routinely ate lunch together; the one time I was invited, the conversation was about the latest version of Microsoft Office. I read these gatherings as spaces for men who share identities important to the job – they are all passionate about computing – but who are otherwise somewhat marginal. None of these four men are high fliers in the organisation; nor would they be considered 'alpha men'.

Other groups of men engineers I saw gravitating together are not so marginal. In the oilfield services and building design workplaces, alpha men were easy to identify. These are alpha men in two senses: they were all reasonably successful (organisationally) and/or held to be 'good engineers'; and the masculinities they perform 'set the tone' of the workplace culture and act as models of masculinity for men colleagues. In the terminology popularised by Connell, the alpha men reveal which masculinities are *hegemonic* in these workplaces: they set a standard by which others are judged.[24]

The alpha men are in two main age cohorts. The older cohort in oilfield services are the 'men in blue shirts' encountered earlier. Like them, the older men in the building design company spend considerable time networking with potential clients

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[22]E.g., Mellström, *Engineering Lives*, 1995.
[23]This is often given as a key justification for setting up networks for women in technical and professional occupations. See McCarthy, *Girlfriends in High Places*, 2004.
[24]Connell, *Gender and Power*, 1987.

and associates, on the golf course and the like. They wear suits and ties to work everyday (where the younger ones don't generally bother with ties or jackets). Theirs is a genteel, middle class masculinity – less slagging humour here. The younger cohort in oilfield services displayed two identifiable masculinities. One is 'high adrenalin, high testosterone'. Leon, for example, joined the industry because he 'had energy to burn'; he and Jerry relished the extreme conditions of the Arctic where they worked for two seasons. This group are often loud and posturing when together, and relish getting up to boyish pranks such as throwing food at a company barbeque. These men are either single or have girlfriends without settling down, whereas the other, quieter group of young men tend to be in stable heterosexual relationships.

A similar split was found amongst the younger alpha men in the building services company. These are all respected engineers in their mid-30s who have been promoted to middle level management roles. Fraser is the most serious – the sober family man, very wedded to his job, though friendly. By contrast, Paul's persona is loud and his conversation suggests a wild lifestyle. One afternoon, Myra on the switchboard tells Paul there's a personal call waiting; he replies 'Tell him I won't bail him out!' to laughter all round. Brian lies in between these two: his conversation reveals he is both the responsible family man but also likes spending time 'with the lads'. In Scottish culture, socialising with men is one of the ways one counts as 'a real man', and this spills over to some extent at work. The laddish Paul organises a night out 'for just the electrical guys' with 'the lighting control guys' from a supplier. Like the golf course, drinking sessions cement working relationships *and* perform particular masculinities.[25]

There is always potential for in-group/out-group dynamics to be played out around particular masculinities. A telling moment occurred in one building design office concerning a young man from a different team who breaks with the unspoken dress code: he always wears a tie and, more unconventionally, braces [suspenders]. On one occasion when the man was passing, Fraser says under his breath 'They call him Wall Street!' but is immediately mortified when the man had clearly heard the comment – 'Oops, a bit loud!' His quip was not intended for the ears of the man with braces, but for his immediate colleagues – to affirm his team as the 'in' group.

Notwithstanding such demarcations and pressures to conform, I believe it is significant that workplace cultures in engineering accommodate a range of masculinities, even somewhat marginal ones – laddish blokes, family men, pranksters, macho men, nerdy men, shy men, urbane men, genteel men. To the degree that there is space for such diverse masculinities, engineering workplace cultures are likely to feel comfortable to the great majority of men. Though clearly, those who feel comfortable with, or conform to, the hegemonic masculinities operating are more likely to be seen as belonging in the community.[26] These processes are potentially very consequential. People generally find it easier to work with, and promote, colleagues they like and can identify with. To the degree that social networks of men are organisationally powerful, and hegemonic in terms of the gender(s) performed, women and marginal men are indeed likely to find it harder to 'break in' to the inner circles. They are also likely to find it harder to shape or challenge the workplace culture.

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[25]See Collinson and Hearn, *Breaking the Silence*, citation does not appear in references.
[26]It was less obvious that any of the femininities I observed in these companies were 'hegemonic' – a point I explore in Part II of this paper.

Conclusions

The 'problem' of women in engineering is not simply one of recruitment. The 'leaky pipeline' remains a major issue, as women entrants are lost disproportionately and often get overtaken by men peers in their careers. It is well known that the retention and progression of women in engineering is impaired by a range of structural barriers – especially those affecting women who have children, such as a lack of flexible work practices.[27] In addition, however, this study demonstrates how more subtle, 'taken-for-granted' gender dynamics in engineering workplace cultures can also have a bearing.

The overall picture to emerge from my fieldwork is mixed. The tenor of the everyday practices and dynamics I observed and heard in all five workplaces was for the most part inclusive, characterised by:

- Respectful styles of interaction
- Wide-ranging topics of conversation and humour
- Care taken to avoid, or challenge, potentially offensive jokes and talk
- Mixed-sex social networks.

But the fieldwork also revealed a number of gender exclusive dynamics and practices within engineering workplace cultures:

- Fraternal markers of familiarity and bonding
- The generic 'he'
- Conversation dominated by men's interests
- Offensive humour and sanctions against challenging this
- Heteronormative and sexualised culture
- Pressures to conform to particular masculinities
- Organisationally powerful networks of men.

Individually, these practices may not seem terribly serious or significant, but cumulatively they can amount to a dripping tap effect – with the result that it takes more work for those on the margins of the culture to build the relationships needed to do the job and to get on in the organisation. At the same time, the inclusive practices identified provide pointers to change, and to the kind of practices which can help to level the playing field in a diverse workforce – so that all present belong equally in the culture and all can contribute to their full potential on the job.

It should be apparent that the gender analysis emerging from this material is not a dichotomous one, where we can conclude in crude generalities about 'men' and 'women' as if these categories hold inherent explanatory power. Not all men are comfortable in engineering workplace cultures, and not all women are marginalised. Rather, the analysis reveals the doing of *diverse* gender identities and dynamics, albeit some more normative or hegemonic than others. In particular, this Part I of my paper has highlighted the performance of various masculinities and the everyday

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[27]E.g., Bagilhole, "Family-friendly policies," 2006.

dynamics which tend to support men's membership in engineering communities of practice more than women's.[28]

The 'doing gender' cultures in the workplaces I studied are also diverse. At one end of a spectrum, the oilfield services base described in my introduction often felt like a 'men's space', in which men are under pressure to conform to certain rather macho masculinities and women are often marginalised. At the other end, the US software development department generally felt quite inclusive; gender performances seemed relatively unimportant in the engineers' everyday interactions. Even *within* the workplaces, however, the cultures were diverse, with mixes of 'good' and 'bad' practices in each. For all the macho feel at the first oilfield services site, the field engineers here had a tremendously strong sense of team; they took pains to find social activities that everyone would enjoy, for example. The company has also been more proactive than most of its competitors in seeking to recruit and promote more women engineers. And for all its inclusive feel, the US software development department was gender normative in that colleagues without children felt marginalised, even exploited, by those with. Even here, there were signs of some women's careers being thwarted.

The point of my fieldwork was not to evaluate individual companies, but to reveal variety. Nonetheless, it seems to me there are two main reasons for the cross-company spectrum identified here. First, the relative numbers of women and men do make a difference.[29] It is no coincidence that one third of the software developers in the department were women, whereas on the offshore UK oil installations I heard about women can be outnumbered 50:1. As the latter case illustrates dramatically, the largest cultural group will tend to shape the workplace culture. The 'dilution' of women in the workforce, plus the mix of other occupational groups engineers have to work with, will therefore tend to influence how in/exclusive a workplace culture is. But there is a second factor here. The US software development company has an explicit commitment to nurturing an inclusive culture in its workplaces, as part of a long term commitment to equality and diversity more generally. This involves an ongoing programme of sustained and sensitive diversity training, which appears to have made a real impact on their staff. As an illustration of this, one integrator told me how shocked he was by the sexual jokes of a new neighbour from Australia, then realised that before he came to the company ten years earlier he would have found these same jokes funny.

In conclusion, then, engineering workplace cultures have to become much more welcoming, comfortable and supportive places for women – and indeed for other groups who are currently in a minority or marginalised in the profession – if they are to avoid losing or under-utilising their talent. There are signs of change. Some of this reflects wider gender changes. I was told of senior men who once actively stood in the way of women field engineers going offshore but are supportive now because their own daughters are beginning to enter the labour market. Others, who worked for years with only men colleagues, told me they appreciate how the office dynamics have changed now there are women present. So some shift in workplace cultures is

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[28]The perceptive will have noticed that I have been using the term "masculinities" to apply to men and, by implication, "femininities" to apply to women. Whilst the pluralising of these terms helps challenge a binary analysis of gender, it still does not escape entirely the dualising straightjacket of our linguistic heritage.
[29]I explore this argument critically in Part II. See Lagesen, "The Strength of Numbers," 2007.

happening because there are more women coming into the profession. But tackling the numbers *on its own* will not solve the problem. Awareness is a key issue, since most engineers (women and men) are oblivious to the more subtle gender dynamics described here, and many are resistant to equality and diversity measures.[30] There are real challenges – not least, how does one do diversity training effectively, without alienating the majority group and creating a backlash? How do organisations 'win hearts and minds', so that staff (and their managers) 'buy in' to helping make gender change happen, and so that men become part of the solution? In recent years, UK women in science and engineering initiatives have embraced the need for 'culture change', to shift both gender and organisational awareness and practices.[31] Culture change in this sense has to be a long-term, organisation-wide project – one which warrants well founded investigation by our field.

Acknowledgements

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[30]Lee et al., "Turning good policies into good practice," under review.

[31]This was signalled by Liff and Cameron over ten years ago in "Changing equality cultures," 1997.

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