Gendered constructions of space: Experiences and negotiations of ‘male spaces’ by women enrolled in IT degrees.

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This paper presents a descriptive analysis which looks at the gendered experiences of women studying undergraduate degree courses in a faculty of IT. The numerical make-up of male and female students on these courses reflects wider global trends describing women’s under-representation in IT, which have been well documented in the literature (Gurer & Camp, 2002; Lang, 1996; Panteli et al., 1997; Teague et al., 1996; Wright, 1997).

This work arises from a feminist concern with the relationship between notions of ‘femaleness’ and ‘technical competence’ which are discursively constructed as incompatible and problematic in dominant discourses of gender and technology (Gilbert, 2001; Stepulevage, 2001; Volman et al., 1995). How this is implicated in the relationship between women and politically powerful bodies of knowledge such as technology and the ways that women as active agents resist and negotiate such discourses is central to this research.

Adopting a feminist post-structuralist framework, interview data revealed that women who are studying IT courses view these spaces as gendered. The question central to this research was: How do individual women respond to such spaces and what identities do they construct in response to the gendering of such a context? This question forms the subject of discussion in the following paper.

Introduction
The following two sets of quotes were taken from an interview with Molly, a 20 year old computer science student from an Indian background. During her university course Molly gained IT work experience in technical support, on a university help desk and as a programmer for her university’s portal.

a) … I find the girls doing, my courses, like these courses, they’re very, tomboyish. I mean like um, like they, they have spazy hairdos and everything like that, you know, some of them. And ah, like, and the normal, the normal girls, like just the really feminine ones, they, you don’t really see, tend to see them that much in courses … … the other girls they’re very into programming and, very nerdy and, geeky

Me and my, like the girls, my girlfriends, we sit and do programming, we will like, do a bit of programming and then say, ‘oh look at her nail polish’ [laughter] or, ‘you’re hair’s done really well today’ and we go off track. Whereas the guys, they just sit there and they only talk, or they, all that they discuss, is all about programming, they’re so into it. And, I really um, found out that, girls have a bit of less attention span

b) … if I’m really into programming, I can just sit there, no one can disturb me, even if someone disturbs me I can just do it. It will be in the frame of mind too

…you can be sitting there for hours and hours and you would not, you would not think properly, and then suddenly at 2 o’clock in the morning, you would dream, ‘oh this is what I should have done!’ . I’ve had that happen to me sometimes … … like even at night, like, I’ll just be thinking of something else, and then that will, will make me think of my program, and what I haven’t done, when it doesn’t work. That’s the down side of being a programmer, because, you’re brain is always active [laughter]

In this interview, Molly is talking about herself in relation to her university course. What is interesting about the quotes are the contradictions are revealed in the construction of Molly’s course-based and gendered identities, in the way that she identifies herself as both a ‘technical expert’ and a ‘girl’. So how do we understand this within the context of IT as a male dominated space?
In this paper I aim to present a descriptive analysis of some of my interview data. In doing so I will firstly contextualise this study in relation to research in this area, outlining some of the limitations of such work. I will then go on to contextualise these concerns in relation to a major debate within feminism. Drawing on this debate I will then discuss the theoretical framing of the research and return to the specific research question before making sense of the interview data in relation to this framework.

**Contextualising the research**

**The bind of the gender binary**

Women’s position in society is both effected by and reflected in their relationship with politically powerful bodies of knowledge such as technology. In its broadest sense, technology is about control over one’s environment from the local to the global. Limited political power manifests as limited control over women’s material lives, from their physical environment to their own bodies (Harding, 1991). This then effects how women experience power (Walkerdine, 1989). I argue that this is connected with women’s restricted involvement in the production of such knowledges. While women have always used technology, political and social practices have excluded women from ultimate control over its development and production. Having said this however, women are active agents, resisting and negotiating such practices and it is this agency that forms the focus of this research.

Women’s under-representation in IT education and the falling numbers of female students, particularly in the more technical domains such as computer science, has been well documented in the literature (Gurer & Camp, 2002; Lang, 1996; Panteli et al., 1997; Teague et al., 1996; Wright, 1997). Meanwhile, the growth of the IT industry reflects the techno-scientific rationalism on which modern society is constructed. Wajcman has argued that such rationalism is integral to dominant forms of masculinity and that technical expertise is a source of men’s power over women (Wacjman, 1991). At the same time, femininity is treated as antithetical to such rationality (Walkerdine, 1989, 1998), by virtue of a conceptualisation of gender that embodies a male/female dualism. Such a dualism assumes that the identities of ‘male’ and ‘female’ represent opposite poles or categories that are defined in opposition to each other (Davies 1989). This conception of gender based on binary male/female difference plays out in various contexts such as IT, to maintain an unequal and gendered system of power, by aligning the fundamental nature of IT as ‘technical’ with male identity thereby problematising female technical expertise and authority.

As with other gender and education research, particularly girls and women in non-traditional subject areas, much of the research on gender equity in computing has focused upon male/female differences. Such research draws upon the notion of gender as a male/female binary and therefore leaves the underlying discourses of gendered technical expertise unchallenged. Instead, much of the research looking at the under-representation of women in IT education has constructed the issue as the ‘woman problem in science’ (Harding 1986). The emphasis of such research has been two-fold. Firstly, it has focused on the identification of discrete factors of an individual and/or structural nature (Dryburgh, 2000; Preston, 1993). Although such research is useful and necessary, it is not the ‘answer’ to the question of why few women enter such a field and does not provide a solution on its own. Henwood argues that existing debates on the under-representation of women in fields such as technology and engineering, are limited by dualistic frameworks that separate individual from structural factors rather than examining the relationship between the two (Henwood 1998). Such an emphasis has tended to draw upon either a ‘deficit’ model of female participation, in other words what girls and women ‘lack’, such as computer experience, confidence and positive attitudes, or a ‘passive’ or ‘victim’ model of ‘what is done to women’, as a result of structural inequalities (Dryburgh, 2000; Gurer & Camp, 2002).
Secondly, this research has focused on ways of improving female participation by addressing these factors (Clayton et al., 1993; Gurer & Camp, 2002). However, the underlying ‘problem’ of ‘women and computing’ is not simply a matter of female participation, but, as has been suggested, the production and reproduction of a problematic relationship between gender and technology (Gilbert, 2001; Stepulevage, 2001; Volman et al., 1995). The notion of a ‘relationship’ implies the mutual interplay of agency and structure, and acknowledges how individuals actively negotiate and resist the conditions of their environment.

In order to contextualise the concerns with such a conceptualisation of gender, I turn now to a major debate within feminism.

**Identity and difference and the feminist post-structuralist perspective**

While the notion of collective female identity has currency in feminist arguments for effective political struggle, it has also been argued that such a notion has limitations in connecting with and representing the multiple and diverse experiences and perspectives of different groups of women (Alcoff 1988; Yates, 1993). This has constituted a major debate within feminism about whether we should refer to ‘women’ as a group or focus on ‘difference’.

More recent feminist theorisations of ‘woman’ have focused on difference, both between and within women, which reject both binary conceptualisations of gender and liberal humanist notions of the self (Davies, 1989; Weedon, 1996). A feminist post-structuralist theorisation of identity argues that identity is not a singular, fixed or static phenomenon, but is multiple and shifting, determined by the competing discourses in which the individual is placed (Weedon, 1996). In other words, gender is a construct of language and in this framework therefore rendered effectively redundant, as the binaries that define femininity/masculinity, female/male are collapsed (Scott, 1990).

Conceptualising identity in this way shifts the agenda away from differences between women and men, to the differences between and within women. This research is therefore based upon Davies position on gender who argues that:

the nucleus of sexism lies in the way each person has been constituted as one part of the male-female dualism (Davies, 1989).

In adopting a feminist post-structuralist framework, I draw upon the work of Davies and Kenway et al who conceptualise this notion of multiple and shifting identities as a site of active resistance and the work of Jones who examines the implications of post-structuralism for research (Davies, 1989; Jones 1993; Kenway et al., 1993, 1994). Resistance and assimilation are understood in this research in terms of rejection and adoption of particular identity positions offered to individuals in the terms of a given discourse. In her research on gendered identity, Jones argues that girls are not ‘unequivocally’ powerless and that a post-structuralist framework shifts the focus from girls as ‘victims’ to one in which active individual agency is central.

To effectively counteract dominant discourses or assumptions about women’s ‘lack’ of technical competence, we must deconstruct this dominant discourse of gender and examine the active investments individual women make in what Davies refers to as ‘gender correctness’, that is, being ‘correctly’ positioned on the correct side of the male/female binary (Davies 1989). These discourses and the particular investments individual women have in them are what give power to their
experiences and influence their responses to those experiences. Such investments are linked to patterns of individual desire associated with rewards and sanctions and so are very powerful. The power of ‘gender correctness’ is linked to its regulating effect, defining individuals as ‘normal’ or ‘weird’/ ‘deviant’, which have different consequences of rewards and sanctions/threats (Davies 1989, Jones 1994, Stepulevage 1997a,b 2001).

The research question
In this research I explore women’s constructions of self in relation to technology as a site of gendered power relations. Specifically, I examine how women construct their identities and position themselves within the male dominated space of IT in higher education, particularly in relation to more technical aspects of course work such as programming. The notion of IT education as the new domain of female disadvantage and a developing ‘gendered male space’, is one which, is prevalent in the literature (Collins et al, 2000; Lang, 1996) and one which I have personally experienced in entering such spaces to recruit participants. But how do the women in such courses view these spaces? Interview data revealed that the women themselves either construct or view as constructed, such spaces as ‘male’. The next question I asked was: How do individual women respond to such spaces and what identities do they construct in response to the gendering of such a context?

This paper draws upon interview data taken from interviews with a group of thirteen women enrolled in undergraduate programming based IT degree courses from an Australian University. Women in these courses comprised 11-16% of the student enrollment. Four out of the thirteen women interviewed were International students and only three out of the local students were born in Australia, however differences between the women were not manifested in common ways such as ethnicity, cultural background, class, and so on, which may be symptomatic of the small numbers of women who enroll in such courses. Differences between individual women in how they positioned themselves within their course spaces and the identities they constructed were of prime interest however and these will be elaborated upon in the following section.

Responses to manifestations of male space. Identity construction.
On examination of the responses of the women to the manifestations of their course spaces as male, I identified three main groups which I classified on the basis of their relationship to ‘programming’, as representative of the knowledge/power base of the course. I use ‘programming’ as a metaphor for masculinity.

The three groups identified include: The ‘pro-programmers’ or the ‘experts’; the ‘empowered’ group; and the ‘ambivalent’ group. For the purposes of this paper I will focus only on the responses of the ‘empowered’ and ‘ambivalent’ groups as they best illustrate the notion of shifting identities. These groups are by no means definitive or even discrete and there are affinities between individuals of different groups, however they share particular features in their relationships to programming.

The ‘Empowered’ group
These women described themselves as competent at programming, however none of the women envisage themselves in careers where programming is a major part of what they do. Instead the emphasis is on what programming as a knowledge base offers them in a ‘gate-keeping’ sense as entry into and greater autonomy within the IT industry. While all the women in this group construct strong course-based identities, the way in which they do splits them into two groups, the ‘negotiators’ and the ‘individualists’. However within this paper I will only focus on the first group.
The ‘negotiators’
The women in this group explicitly refer to gender and in doing so reveal tensions in their constructions of particular identities. In constructing themselves as computer scientists or software engineers, they grapple with tensions between dominant understandings of gender and technical competency. In doing so, these women undergo a process of shifting, between an ‘insider’ and ‘outsider’ position in relation to their course spaces. The constructions of identity are therefore a result of assimilation and resistance (Kenway et al., 1994).

Zara, a 21 year old Software Engineering student, constructs herself as someone who has technical interests and is technically competent. However she qualifies such a construction by attempting to justify why she is like this, deferring to her younger brothers who are the ‘experts’:

So, I think also the fact that I’ve got two brothers. Like even now, like when I, you know I’ve gotta, really big interest in cars, and a lot of guys go, ‘like what are you doing? You’re not supposed to be interested in these sort of things’. And I’m like, ‘well I’ve got two brothers at home’ and I learn a lot of things off them

Her interest is described in relation to other males which gains her legitimately recognised entry into male space and access to associated knowledge. However, as it depends upon male ‘patronage’, she cannot assert autonomous interest and therefore access to a stronger position such as ‘expert’ is constrained.

At the same time, Zara acknowledges the discourses regarding the gendered difficulty of technical work for women. She has an awareness of how these affect female subjectivity, including her own and simultaneously utilizes and resists such assumptions. On the one hand Zara draws upon such ‘truths’ in order to enjoy the status she gains in being part of a minority group of women involved in such work, while on the other she resists such notions, using them to motivate and ‘prove herself’:

Z: yeah challenging because of the fact that, ‘oh my God you know’, like, imagine when you first work in, you’re gonna say, ‘oh it’s all guys and it must be really hard’ or stuff like that you know. But that sort of gets me even more motivated. Like you know, obviously it’s challenging for us so, you know, that gets me hooked even more
K: so, but why because it’s, there’s lot’s of males is it more challenging?
Z: yeah, like just again like men do, more harder work than females. Like I said like this whole old sort of stereotype and I sort of think of it as silly but, in a way, it’s sort of implanted, you just have that around you

Molly, who was introduced earlier in the paper, negotiates a tension between her identity as a computer scientist and her ‘femaleness’. She grapples with constructing herself as a competent computer scientist on the one hand and a ‘successfully gendered female’ on the other by negotiating the dangers associated with the dominant dualistic positions. By constructing herself as a computer scientist, she risks being ‘gender deviant’ and ‘not normal’, like the ‘other girls’ who are ‘very into programming’ and who are ‘very tomboyish’. By being ‘girlie’, she risks being constructed as ‘technically deficient’:

… And the thing is I find the girls doing, my courses, like these courses, they’re very, tomboyish. I mean like um, like they, they have spazy hairdos and everything like that, you know, some of them. And ah, like, and the normal, the normal girls, like just the really feminine ones, they, you don’t really see, tend to see them that much in courses … But in, in the other girls they’re very into programming and, very nerdy and, geeky
On the one hand, Molly is anxious to be seen as ‘normal’ which is embedded in a notion of difference from males:

*Me and my, like the girls, my girlfriends, we sit and do programming, we will like, do a bit of programming and then say, ‘oh look at her nail polish’ [laughter] or, ‘you’re hair’s done really well today’ and we go off track. Whereas the guys, they just sit there and they only talk, or they, all that they discuss, is all about programming, they’re so into it. And, I really um, found out that, girls have a bit of less attention span*

On the other hand, a little later in the conversation, Molly constructs herself as a successful and competent programmer who is independent and in control:

*… if I’m really into programming, I can just sit there, no one can disturb me, even if someone disturbs me I can just do it. It will be in the frame of mind too*

*… you can be sitting there for hours and hours and you would not, you would not think properly, and then suddenly at 2 o’clock in the morning, you would dream, ‘oh this is what I should have done!’ I’ve had that happen to me sometimes …… like even at night, like, I’ll just be thinking of something else, and then that will, will make me think of my program, and what I haven’t done, when it doesn’t work. That’s the down side of being a programmer, because, your brain is always active*

In other words, Molly struggles to construct an identity as a legitimately successful programmer and a 'correctly gendered' woman, by not being too ‘girlie’ while not showing *too much* public interest and enjoyment in her programming and thereby veering too far away from what a ‘normal girl’ should be.

**The ‘Ambivalent’ group**

This is the largest of the three groups and is comprised of six women out of the thirteen interviewed. What identifies the women in this group from the other groups and with each other, is the ambivalent relationship they share with the programming knowledge base of their courses. Like the ‘negotiators’ from the ‘empowered’ group, all of these women qualify their experience, knowledge and expertise in relation to male others as a result of grappling with tensions between understandings of ‘femaleness’ and ‘technical expertise’. However, unlike the ‘negotiators’ they do not ultimately construct strong course-based identities for themselves and remain ambivalent about their positions in their course spaces. In this section, I will focus on Jane, as representative of others in this group.

Jane, a 21 year old Computer Science student, was interested in technology and computers from a young age. Tinkering and experimenting with hardware, Jane describes herself as “not an ordinary chick”. In year 10, Jane elected to take a VET programming an hardware course in a traditionalist girls school that didn’t offer the more technical IT subject options and also chose to do her school work experience in her Uncle’s IT company where she built and tested hardware systems.

Within her computer science course, Jane constructed herself both an ‘insider’ and an ‘outsider’, contradicting her sense of ownership over her technical knowledge, her experience and achievement, when framing this sense of self in the male dominated context of her course. In explaining her motivations behind her interest in IT as a career path, Jane describes her abilities, interests and technical experience with enthusiasm and confidence. She speaks with a sense of ownership and authority about her subject area and in doing so constructs herself as someone with ‘insider’ and specialist knowledge:

*I like gadgets, like I like to push a few buttons [laughs] and see what that does, if it breaks I’d enjoy it sort of thing!*
I liked opening up the computer, just opening it up and just looking at, all the bits and pieces in there. So, it’s interesting, pull that out and see what happens, stick that back in, sort of like, science, like cutting up stuff and that sort of thing, you know. Instead of dissecting animals I’m dissecting the computer. Yeah, so, that, I did, I like I like pulling them apart and, sort of, just by plugging things together, you know, and um. It was challenging to see if it was working. It’s not working, did I make that work, did I not make that work you know so, I like that, that sort of um, you know so, brought my interest into, getting into computer science sort of thing.

… I had a basis of programming and I like and I picked that up pretty easily so I thought oh ok, that that’s alright. And then I got into my uncle’s work experience, like, doing work experience with my uncle, in his business, and that was just building hardware … So that, because I did Pascal, that was programming and because I had, the work experience in hardware, so that covered that. And then, in, if you look at the specifications in and prerequisites and that sort of thing, for computer science, they mention software and hardware …

Jane goes on however, to contradict her own sense of expertise and ownership, qualifying and playing down her skills and knowledge, by describing her male peers as more knowledgeable and naturally talented. She becomes unsure not only of her abilities but also her position in relation to her subject area and reconstructs activities that she initially described as having a passionate interest in as explicitly and specifically male spaces. Her sense of space shrinks and she adopts an ‘outsider’ position:

… I’m scared to do it, like making that mistake, cos if I make a mistake, I don’t want them to think, God, you know, you’re just so, you know incompetent sort of thing you know.

we don’t want to get anything wrong or, or anything like that, we wouldn’t want to, disappoint them …

You know cos you know, that their knowledge is much more better than yours, like you know that they can do it

… the guys they just, actually live on this sort of thing

For Jane, technical spaces are a site of ‘desire and threat’ (Foster, 1998). While she desires to enter such spaces, her trespass into male space threatens her with male reprisal. Although she has valid prior experience and expertise, she queries her credibility. In doing so she limits the development of her own expertise, by deferring instead to the expertise of male students in group work projects, constrained by the fear of being labeled as ‘incompetent’ and receiving negative male attention or ‘agro’.

At the same time however, Jane is aware that such compromise entails a loss of autonomy which she desires:

I think that, if I was to work in a group of, just women, I’d actually take the initiative to actually, look out for codings, and actually you know, learn it myself

if I could do it, I would be interested …
Jane shifts between an insider/outsider position as do the women from the ‘negotiators’ group. However the purpose of this shifting is different. Jane’s positioning is a result of desire and threat, the latter having the strongest effect in the construction of her course-based identity. The negotiators, on the other hand, respond to the tensions of being female in a male space by using such shifting as a way to construct a legitimate position for themselves as technically competent computer users, within the terms of the dominant (and masculinised) discourse of computing.

**Conclusion**

In this paper what I have presented is a descriptive analysis of how women enrolled in computing degrees experienced their course spaces as male and responded to these in the construction of their course-based and gendered identities. The construction of course-based identities was classified based upon the relationship of the women to the programming knowledge base which is used as a metaphor for masculinity. As the research illustrates, these identities were influenced by how the women responded to the dominant discourse of gender, which describes binary male/female difference.

This study illustrates the relationship between women’s constructions of particular identities, how they identify themselves in both powerful and not so powerful ways within male dominated spaces, and the underlying discourses which construct and frame such spaces. In doing so, it reveals how the complexity of reading and understanding the responses of the women is related to the ways that individual women respond to the regulatory and normative assumptions of such discourses. It also suggests that we need to examine the investments women make in such discourses in order to understand the differences between women’s responses. Why, for example, do the negotiators construct strong positions for themselves while Jane from the ambivalent group does not? In this study the notion of difference was not evidenced in common ways such as ethnicity, cultural background and class, given the diverse range of backgrounds, resulting partially from the recruitment process and design of the study. However the interplay of these dimensions of identity deserves close examination.

Feminist post-structuralism recognises the complex interactions between structure and agency in relation to human subjectivity (Kenway et al., 1994). In other words, while it points out the ways subjectivity is structured and shaped by discourse, it acknowledges the agency an individual has in negotiating and resisting such discourses. Using such an approach, this research has attempted to challenge the deficit models of women’s participation in male dominated spaces by understanding the conflicts and tensions individual women actively negotiate as a consequence of competing discourses in relation to the multiple points of difference between them. In deconstructing common sense assumptions about gender, ‘regimes of truth’ (Weedon, 1996) are challenged revealing the complexity of women’s voices, the fissures of identity and the ongoing lived realities of negotiation and resistance. I would like to end this paper with a quote by Kenway et al, who describe, in their research on gender, the struggle for competing subjectivities:

Girls' voices represent the positions in webs of discourse that they are offered and their responses to such positions. Such responses amongst individual and groups of girls will include a variety of accommodations, contestations and resistances depending on what they bring to the exchange and the ways in which they read and negotiate the complexity and its inherent and competing relationships of power (Kenway, Willis, Blackmore & Rennie, 1993).


