



Critical empirical research in IS: an example of gender and the IT workforce

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Abstract

Purpose – This article aims to add to the growing number of critical empirical studies and to reflect on the process of conducting this type of research, thereby addressing the lack of exemplars for those engaged with critical empirical information systems research.

Design/methodology/approach – Applies the critical lens to a multi-year examination of variation in the career narratives of women in the American IT labor force. While an interpretive epistemology was initially chosen for this research project, over time, analysis of interview data took on an increasingly critical orientation. This, in turn, influenced subsequent fieldwork to become critical in nature.

Findings – One theoretical contribution is highlighting the role of power dynamics in understanding what sits beneath the surface of observations about these women's experiences in the IT workforce. The second theoretical contribution is helping to shift the focus away from predominantly essentialist theories that dichotomize men and women and toward a recognition of the diversity among women in the IT field.

Research limitations/implications – Future research should include additional critical empirical studies of women in the IT field in other countries.

Practical implications – This research project can serve as a useful example for other critical IS researchers about to embark on empirical fieldwork.

Originality/value – This paper provides a concrete illustration of the way in which empirical research is altered as the epistemological lens shifts from interpretivist to critical.

Keywords Research, Gender, Information, Technology led strategy, Women workers

Paper type Research paper

Introduction

Since the publication of the seminal paper by Orlikowski and Baroudi (1991) which noted the dearth of critical IS research, there has been a considerable shift in the research landscape. The last few years has witnessed a more explicit focus on critical research, as evidenced in an increasing number of books, conferences, and special issues of journals such as this[1]. Despite the increasing interest, a recurring criticism often leveled at critical research is the tendency to focus on theoretical issues at the expense of empirical work (aside from some notable exceptions such as Alvarez (2002), Klecun-Dabrowska (2002), Kvasny (2002), and Richardson (2003)). As a consequence,

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critical researchers have few exemplars to guide them when pursuing work of an empirical nature. The purpose of this paper is to add to the small, but growing number of critical empirical studies and, in doing so, reflect on the process of conducting this type of research.

Drawing on a multi-year field study of gender and the IT workforce we consider how alternative insights can arise from a critical IS research perspective. Just as Trauth and Jessup (2000) showed that different results emerge from an assessment of IT when the lens shifts from positivist to interpretive, we show how further insights can result from shifting the lens from interpretive to critical. We also add some reflections on methodological issues concerning the conduct of critical empirical studies. In particular, we pay attention to issues relating to power and the situating of the research within a broader context of overt and covert power exercise, highlighting contradictions and exposing taken-for-granted assumptions (Alvesson and Deetz, 2000).

The empirical study that we have selected concentrates on the under-representation of women in technological disciplines in the academy and the workforce. The topic of gender was chosen for both theoretical and empirical reasons. It was chosen for theoretical reasons because the notion of emancipation is fundamental in a range of critical intellectual traditions (Cecez-Kecmanovic, 2005; Hirschheim and Klein, 1994) with a commitment to freeing individuals from power relations around which social and organizational life are woven (Fournier and Grey, 2000). Feminist research shares with the critical perspective the ideal of emancipation[2] and the enduring inequalities in men's and women's relationship to technology require explication as part of the emancipatory project. The topic of gender and IT was chosen for empirical reasons because of the experience of the authors in the conduct of gender and IS research.

The next section introduces the background literature that will set the scene for the empirical study that follows. It begins by illustrating how the topic of concern – gender and IT – is viewed differently as the epistemological lens shifts from positivist to interpretivist to critical. It then outlines the underlying theoretical framework on power issues, before going on to discuss the methodology. This section is followed by presentation of the empirical work. The penultimate section is a reflection on critical outcomes and issues with the conduct of critical research. Finally, implications for research and theory are drawn.

The shifting lens

Two streams of literature are relevant to the present discussion. The first, which will be discussed in this section, is a consideration of how the topic of gender and IT changes as the epistemological lens shifts from positivist to interpretivist to critical. As this research project unfolded the analyses of interview data began to adopt a more critical orientation and this shift in orientation influenced subsequent fieldwork. During the process of shifting the lens from interpretive to critical, issues of power began to surface.

When the positivist epistemology – with its focus on the neutral and dispassionate scientist – is applied to the topic of gender and IT, the objective is typically to discover whether and where there are gender differences. The aim is to uncover gender distinctions, not to explain or theorize why these distinctions have arisen and continue to exist. Examples of this include investigations of women's vs. men's use (adoption,

acceptance, etc.) of IT (e.g. Gefen and Straub, 1997) and women's participation rate in the IS profession (e.g. Truman and Baroudi, 1994). Further, the theory underlying positivist gender research is often essentialist whereby observed gender differences are understood to arise from the dichotomizing of male/female roles that, in turn, are assumed to generally derive from bio-psychological differences[3]. Much of this research is predicated on negative assumptions about women (such as being less technologically competent than men) and is not typically informed by the gender literature, as Adam *et al.* (2004) point out. Further, this type of research often equates scientific quality with positivist methods and is motivated by a desire to advance managerial objectives. For example, it might be to consider gender as a factor of production in better harnessing diversity in pursuit of effectiveness and productivity (e.g. Igarria and Baroudi, 1995; Igarria and Chidambaram, 1997; Venkatesh and Morris, 2000). Since problems of inequality are presented as wasted resources, increased equality is promoted as a means of optimizing efficiency and enhancing corporate effectiveness. The main criticism of this approach is that the investigation remains on the surface of observable and documentable differences. In so doing, it offers an unproblematic treatment of the topic in which the observation of differential treatment in the workplace by gender has a tendency to become the explanation (i.e. that men and women are treated differently in the IT workplace because they are different with respect to IT work in some relevant, essential way).

In contrast, interpretive studies of gender and IT focus on understanding how these gender differences have come about (Howcroft and Trauth, 2004). The objective is to add context to the observations about gender and IT. This research typically invokes theories of social construction or individual differences (Trauth, 2002) in developing explanations that incorporate social influences underlying inequality between the genders. The motivation for this research is to advance our understanding of the relationship between gender and IT by understanding the point of view of the women IT users. Thus, an interpretive examination of gender and the IS profession might explore the influence of national culture on the social construction of gender identity as it relates to the IT workforce (Trauth, 1995; Trauth *et al.*, 2003). However, a criticism of the interpretive approach is that the focus is on understanding the societal influences, not questioning them. It is directed at coping with the dynamics of inequality, as opposed to challenging or undoing them.

In response, the objective of critical research about gender and IT is to investigate why gender inequality exists. The motivation is to understand and challenge power relations that reproduce inequality (Kvasny and Trauth, 2002). Critical social theory, postmodernism and feminist theory (Adam, 2002; Adam and Richardson, 2001), for example, are used to inform the search for the underlying causes of gender inequality. This moves the research away from themes of profitability, efficiency, effectiveness and gender identity and towards themes of control, resistance, and inequality.

Critical researchers also embrace the social and political influences on their research, rather than negate these assumptions and beliefs. They aim to balance their interest in the people being studied with an awareness of less explicit ideological and structural forces. This is in contrast to what Bhaskar (1979) has described as the "linguistic fallacy", the claim adopted by many interpretivists that subjects, concepts, meanings and accounts of their actions cannot be criticized. In critical research the spotlight shifts from an exclusive focus on individuals, situations and local meaning to

the systems of relations, which make such meanings possible. This is not to suggest that experiences are ignored; rather they are balanced against issues of an ideological nature that may frame the experiences and ascribe additional meaning.

The use of critical IS research to study the topic of gender and IT enables additional explanations and theories to become available. Essentially a political project, it considers power relations, marginality and dominant discourses in a broader organizational and societal context. In order to explore this further, we consider Lukes' framework on power in order to shed theoretical light on the subtle ways in which gender inequality is operationalized in technological disciplines in the academy and the workforce.

Power framework

The second stream of literature that provides the "theoretical scaffolding" (Walsham, 2001) relevant to our discussion is that which relates to power. In IS research the theme of power has been seen as an important yet elusive concept, often difficult to define, and studied from a variety of paradigmatic perspectives (Jaspersen *et al.*, 2002). Nevertheless, an understanding of both overt and covert aspects of power is crucial to critical research that is investigating themes about repression. For this reason, we employ Lukes' (1974) three-dimensional view of power in our analysis. His view of power challenges the dominant literature on power, which tends to focus on overt power. That is, power is perceived as something that is owned such that when two parties disagree, behavior by one of the parties is intended to influence the outcome. By contrast, Lukes considers covert issues, which entails looking beyond observable conflict to consider how power is used to prevent conflict from ever arising. This perspective rejects the assumption that the absence of resistance signifies consensus; rather, it problematizes consensus by specifically addressing how power is used to preempt discord. It helps us to understand how the powerful are able to act against the real interests of the powerless[4].

There are three elements of Lukes' framework. The structural exercise of power places stress on concrete, observable behavior, in terms of which groups or individuals have more power in decision-making processes and are able to secure their own aims. An example would be the creation of organizational structures and procedures that concentrate power among senior managers. The conceptual exercise of power is achieved by confining the scope of decision-making to relatively "safe issues" and creating barriers to the public airing of conflict. This view of power incorporates into the analysis the question of control over the agenda and the ways in which certain issues are kept out of the political process so that an open debate is avoided. An example of this occurs when the issue of equal pay in the workplace is not addressed openly because it is assumed that pay differentials are based on individual competences rather than structural inequalities. Since such a view of power also focuses on actual, observable conflict, the absence of such conflict leads to the presumption of overall consensus. Finally, the symbolic exercise of power occurs when grievances are not even formulated and never arise:

The most supreme and insidious exercise of power is to prevent people, from having grievances, by shaping their perceptions and preferences in such a way that they accept their role in the existing order of things, either because they cannot imagine any alternative to it,

because they see it as natural and unchangeable, or because they value it as divinely ordained and beneficial (Luke, 1974, p. 24).

An example of the structural exercise of power would be in evidence if a women in the IT workforce selected an employment position that was primarily centred on “communication skills” (such as helpdesk advisor) rather than “technical skills” (such as product development), regardless of her own technical abilities and the fact that the latter attracts greater pay rewards.

The first two types of power are concerned with defeating opposition in the face of conflict or disagreement. This type of power has been defined as overt power, whereby individuals are able to push through their own preferences when faced with competition from their opponents (Hardy, 1985). In these situations, actors mobilize their power resources most effectively, resulting in winners and losers. It is assumed that acts of overt power are intentional. The sources of such power are grounded in differential access to material and structural resources (e.g. access to education, child-care provision, expertise, and the control over rewards and punishment). The third type – symbolic – occurs when power is used to prevent opposition, when issues fail to arise at all and actors are unaware of their own interests.

Research approach

This paper examines the issue of critical empirical research by considering the use of the critical lens in a multi-year research project that is examining women in the American IT labor force. The under representation of women in the information technology (IT) sector has been a major concern of educators, practitioners, IS researchers and personnel studies (e.g. Adam *et al.*, 2002; Arnold and Niederman, 2001). A wide variety of issues related to female under representation has been investigated with regard to why women are under represented and how to narrow the IT gender gap. These include social contexts, media influences, gender stereotypes, education and work environment, and recruitment and retention. In the IS field, the ACM SIGMIS/Computer Personnel Research Conference has served as a forum for examining a wide range of issues related to IT personnel including gender issues. For example, one of the major objectives of the 2003 conference “Freedom in Philadelphia – Leveraging Differences and Diversity in the IT Workforce” was to examine gender issues in IT education, the profession, and the workplace (Trauth *et al.*, 2006a).

There are two phenomena of significance for the study of the under representation of women in IT. First, although women comprise a significant portion of the labor force in many countries, they are not only under represented, they are a declining part of it. For example, in America the Information Technology Association of America’s (ITAA, 2005) Blue Ribbon Diversity Panel revealed that in 2004 women represented only 32.4 percent of the US IT workforce. Further, this statistic has been decreasing over the last decade. For instance, in 2002 women accounted for 34.9 percent of the American IT workforce and 41 percent in 1996 (ITAA, 2003). The declining participation of women is further indicated by the fact that men are far more likely than women to return to the IT workforce as the market recovers from the dot.com bust. This is evident in the fact that the unemployment rate of skilled men is decreasing much faster than that of skilled women. For example, from 2003 to 2004, the number of unemployed skilled male IT workers dropped 34.4 percent while the number of unemployed skilled female IT workers dropped only 5.15 percent (ITAA, 2005). Thus, the under representation of

women in the IT workforce continues to grow and appears to be compounded by differential gender-based re-entry patterns of workers after the dot.com bust.

The under-representation of women in the IT workforce is not an isolated career stratification gender issue. For example, Kam (2005) explains that the percentage of women in the medical and legal fields was very low prior to the 1970s, but has dramatically increased over the past several decades. For instance, in 1971 women account for 9.5 percent of US lawyers, but this number has climbed to 44.4 percent in 1996. Furthermore, Schiebinger (1999) argues that the IT gender gap is not a phenomenon significant to IT alone; rather it is a small piece of a larger problem in the sciences.

The goal of the research project that is the topic of this paper is to investigate the social shaping of both gender identity and IT as it relates to the under representation of women in the American IT labor force. This investigation is guided by a theory – called the individual differences theory of gender and IT – that focuses on the individual variation in women’s responses to group-level societal influences on them. Thus, the objective is twofold:

- (1) to develop a better understanding of those socio-cultural factors that serve as barriers to women’s recruitment and retention in the IT field; and
- (2) to develop a better understanding of those individual factors that enable some women to overcome these barriers.

The intended contribution of this research is both theoretical and applied (i.e. supporting empirical-based theoretical refinement as well as developing recommendations for proactive responses by public policy makers, employers and educators) (Trauth, 2002; Trauth and Quesenberry, 2005; Trauth *et al.*, 2004, 2006b).

The research design is based on previous interpretive field studies of women in technical careers in Australia, New Zealand and Ireland (Trauth, 1995, 2002; Trauth *et al.*, 2003; von Hellens *et al.*, 2001). In this research project, open-ended, in-depth interviews, lasting, on average, 90 minutes in length, were carried out by the first author between 2002 and 2006 with 123 female practitioners and academics in the American IT workforce. During the interviews each woman described her introduction to information technology, her educational experiences, her decision to enter the IT field, her experiences as a woman working in a male-dominated profession, and people and events who influenced her personal and career development.

Purposive sampling techniques were used in order to recruit women who represent a range of geographical locations, ages, demographic backgrounds, educational backgrounds, levels of management and job classifications, relationship statuses and family compositions. The women work and live in three different geographical regions of the US: the Northeast (Boston, Massachusetts), the Southeast (Research Triangle/Charlotte, North Carolina) and the Mid Atlantic (central Pennsylvania). Thirty-two of these interviews were conducted in Massachusetts 30 in North Carolina, and 30 in Pennsylvania. In addition, 31 interviews were conducted with women academics working in IT departments at American universities throughout the country.

The women range in age from 21 to 65 with the median age of 44 years. The racial/ethnic identity of the participants includes European Americans, African Americans, Black/West Indian, Asian Americans, Hispanics/Latinas, Jewish

American, Chinese and Middle Eastern women. A total of 79 of the women are married to men, ten indicated they have partners, 22 are single, 11 are divorced/not remarried, and one is a widow. A total of 99 of the women were identified as heterosexual, seven identified as lesbian/bisexual and 17 did not convey their sexual orientation. A total of 70 of the women have children and 53 do not. The degree concentrations range from traditional management information systems, information science, computer science and engineering programs to psychology, nursing, communications and liberal arts. In addition, job titles include chief information officer, vice president of IT, program/project manager, systems integrator, software architect/engineer, quality assurance engineer, IT administrator, web developer, IT trainer, consultant and small business owner.

Transcripts of the tape-recorded interviews were coded using an open coding technique based on the interview guide and oriented toward further theoretical refinement[5]. Interview data are supplemented by participant observation data. Themes examined to date include: work-life balance (Quesenberry and Trauth, 2005; Quesenberry *et al.*, 2006), social networking (Morgan *et al.*, 2004), and socio-cultural influences (Trauth *et al.*, 2005, 2006a, b)[6].

An interpretive epistemology was initially chosen for this research project as a means of identifying and exploring the manifestation of individual differences in the women's work-life narratives. However, over the course of this research project, the subject matter of the research led to analyses of interview data that began to take on a critical orientation. This, in turn, influenced subsequent fieldwork to become more critical in nature. In the following section, we consider the process of employing this critical lens for both the conduct of fieldwork and the subsequent analysis of narratives.

A critical examination of women in the American IT workforce

Conducting critical fieldwork

When the critical epistemology was applied to the conduct of fieldwork, the focus shifted from exclusive emphasis on eliciting the participant's subjective representation of her career history to encouraging reflection upon her experiences as she recounted them. Sometimes this was achieved by providing a space for the woman to articulate her feelings; other times, it was achieved by encouraging development of awareness of the contradictions between a woman's accounts of her behavior, on the one hand, and her self characterizations on the other.

The challenge was to encourage reflective thinking without pushing the participant in a certain direction. Like an interpretive interview, the focus of a critical interview remains the subjective representation of the participant's experience – only this time it is also the subjective representation of the participant's own critical thinking about her experience. In the following section, excerpts of discussions about three particular topics are used to illustrate this point.

Gender lens. The purpose of this line of questions is to encourage women to consider ways in which their gender might be a factor influencing their career progression. As such, the interviewer is eliciting the participant's subjective experience and reflection on being a women working in what is often perceived to be a male profession. For some women, the act of focusing explicitly on their gender as part of understanding their work history was an experience they had rarely articulated. Other women had been

sensitized to this throughout their careers. In all cases, the interviewer needed to be sensitive to the dynamics of the interview so that it flowed from the world of the participant, not that of the researcher. Consider the following interview excerpt with Rosalie:

Interviewer: Did you get much of a gendered message about your life, your future because you are female or was gender not part of your developing as a person or developing as a female?

Rosalie: You know, no. [I know] its disappointing you. . .[laugh]

Interviewer: [laugh] I don't have a preconceived idea, and nothing is going to disappoint me. . .

Rosalie: I was thinking gender is [among] some [of the] issues you focus on but I didn't have a lot of those at an early age.

Interviewer: Well I have to tell you. . .[across the participants the] consistency is that they did not think about gender, that was not. . .that there was an absence of gender messages. [So] if there is any expectation I have it would be the opposite. That I would expect the women who have made it through against the different barriers would be the ones who did not think about the fact that they were female, that they were oblivious to it.

Rosalie: I think I was like that. . .I wasn't aware.

Interviewer: Are you still like that?

Rosalie: No, I am totally changed. I'm wounded to gender.

In this segment Rosalie initially displays some discomfort in discussing the topic of gender. But as the interview progresses she reveals that while she didn't start out in life using a gender lens to interpret her experiences, by the time of this interview, her experiences had led her to see gender dynamics influencing her career. This interview also illustrates the care that the interviewer must take to reassure the participant that she is not probing for a certain, "correct" response. In contrast, Ivanna immediately spoke of her experiences using a gender lens. In fact, it was she who introduced the concept into the interview, not the researcher:

Ivanna: I was working for the IT managers and there [was] another girl who was pregnant, and she was going on maternity leave. So I requested to do her job in addition to mine, while she was out. And they gave me the chance, and I did two jobs for three months while she was out, and I got that exposure. It wasn't really what I thought it was going to be, but it was at least exposure to some computer fields. And then from then on, the next opportunity was that there was an opening there, and they offered it to me. I had to prove myself before I could even be considered probably.

Interviewer: And you're making a point in saying this, do you want to say something else about gender?

Ivanna: Oh yeah, it's men. Men rule it. And the reason I say this is because women have to work probably 100 times harder and more than a man before. . . I mean you never get the things a man gets, that's for sure. You never get promoted equally, that's for sure. I worked for – and I say this because the management that I had, I had a bad experience for about five years – I worked for someone who was a man, who was from the "old school". And by the "old school" I mean his feeling was that women should be home. . .And you know and I knew it, because he told me that a woman should be home, so you know, I wasn't in a good spot

there. But I worked for a lot of years and I did good work and I never got promoted into the IT world, to be honest. The only way I got promoted was because I complained after like six years working with this guy, he never promoted me, all the guys were at higher levels.

Coping. Of interest in this research project is the variety of ways in which women cope with the experience of being a woman in this male dominated field. Thus, the researcher invited the participants to reflect upon their own behavior and describe themselves. Sometimes, this flowed naturally from the accounts of the women, as the interview with Lena reveals:

Interviewer: Two things I want to pick up on [from what you just said] is how you reacted to the boys' club and how do you cope against stuff like that. When you come up against a blatant gendered experience or barrier, how do you tend to react to that?

Lena: I'd get very angry and annoyed. I don't hide my emotions. The fact that I wasn't willing to be subjected to the behavior that they were distributing made me even less of a favorite. I could see I wasn't going to go anywhere in this environment so I ended up going over to [another unit of the firm].

Sometimes the interviewer tried to provide support so that the woman was able to articulate her coping mechanisms, as the interview with Rebecca shows. This was done primarily by summarizing the dialog and asking the participant for confirmatory feedback. However, in doing so, care had to be taken. The researcher needed to be careful not to push Rebecca in any one particular direction:

Interviewer: [W]hen you come up against say, an uneven playing field or issues of sexism or whatever. How do you – where would you classify yourself on the coping continuum? The idea of oblivious is not ever using the gender lens. But I'd say you use the gender lens so you couldn't be oblivious. Where would you fit along the accepting to the angry?

Rebecca: Well, I don't feel – I feel like my job is not threatened, and therefore, because I work at [this company] and I think it's a great atmosphere, I don't worry about my livelihood, so I'm not angry. If I were worried about my opportunities and the way that I was treated at work, I would be angry, absolutely. And I would do something about it too. I mean, I would not be afraid to take action, like I used to be. Now I like to laugh about it. My coping mechanisms are definitely ridicule – just make snide comments to the right people.

Feminism. An intriguing issue that occurred in prior research conducted by the first author (Trauth, 2002; Trauth *et al.*, 2003) was that women who, despite recounting instances of unequal treatment in the workplace based on gender did not want to be labeled a feminist. Consequently, an explicit discussion of feminism was incorporated into the interviews in this research project. The purpose is to explore the women's subjective understandings of feminism. As the excerpts below illustrate, whereas Sibyl's thinking evolved over the course of the discussion, Francie's perspective did not change in the context of these contradictory processes:

Interviewer: Do you consider yourself a feminist?

Sibyl: I don't know.

Interviewer: You don't have any, you've never heard the word or if somebody said. . .

Sibyl: I've heard of the word.

Interviewer: Okay. If you hear the word . . . tell me what would come to your mind, because I really am interested in your understanding of it.

Sibyl: I heard of the word, but I don't know what it really means.

Interviewer: What do you think it means?

Sibyl: To be someone that is very serious about something. Like very. . . like I don't know. Like feminist. I think I definitely heard this word before. To be serious, to be good at something. Like, someone who is strong enough to achieve the goal. Like something like that, I don't know. . . That's my understanding. So what does it mean?

Interviewer: Alright, I just wanted to get your understanding, before I talked about it. A definition of feminism. . . would be the belief in equality, fighting for equal rights for women. And so the feminist movement has occurred at different points. In America, it was going on in the early seventies, and there would have been consciousness raising about gender and equality and that. And then there's a whole stream of work that people do on feminist methods and feminist theory. . . [A] lot of women will say to me, "I believe in equality but I don't want to use the label because the label sounds radical." And so they're reluctant to be associated with something that is [radical]. . .

Sibyl: Because, yeah, because people don't like this label, but in their mind, maybe they are.

Interviewer: So you'd be an ambivalent feminist. You're not sure.

Sibyl: Yeah, I think I'm not sure. Might be or might not. I'm not sure.

In her interview, Francie introduced the theme of discrimination and unequal treatment she has experienced as a result of her gender. She explicitly recounted experiences in which she received unequal treatment because she is a woman: she experienced both overt and covert discrimination, and felt she had to prove herself more than her male colleagues. Yet when asked if she is a feminist she replies "no" because she doesn't want to be treated differently than men in spite of being treated differently – to her disadvantage – because of her gender):

Interviewer: Are you a feminist?

Francie: I wouldn't consider myself a feminist.

Interviewer: Why's that?

Francie: I believe in equal rights, but my experience with. . . My fiancé took this feminist class, and just some of the attitudes and the way that some things are portrayed, just I don't buy.

Interviewer: Like what?

Francie: I don't really know. . . Like I don't feel that I'm treated any differently because I'm a woman.

Interviewer: But you were treated differently because you're a woman when you were at school and at your first job, at [company name].

Francie: Yeah.

Interviewer: And how did you feel about that?

Francie: It just made me more determined to succeed. To show other people that I could do it.

Interviewer: Do you think something should be done about that?

Francie: I've always gone on the theory that I didn't want to be treated differently than any of the males so I don't know that there should be special considerations for females in the IT industry.

Conducting critical analysis

Two themes are used here to illustrate how a critical epistemology introduces new elements into the analysis process. The first is empirical sensitivity to the data. This includes, among other things: a critical reading of the literal transcript; reflection on what was not said; analysis of nonverbal communication; and consideration of contradictions in the narratives. The second theme involves an analysis of the exercise of power experienced by the women and their response to it as manifested in their narratives.

Empirical sensitivity. By developing empirical sensitivity to the data, the critical analysis probes beneath the surface of the words of the interview. It compares the actual words to the non verbal messages. It searches for subtle and subconscious meanings conveyed by the participant. It compares a woman's statements about her life/career to the actual course of her life/career history. In this way, it produces additional insights and highlights contradictions, both of which motivate further analysis.

For example, empirical sensitivity to Betty's interview transcript revealed an interesting observation: she deliberately avoided mentioning the gender of her partner on the several occasions when the topic came up:

Interviewer: Can you tell me about your family status, do you have a partner, do you have kids?

Betty: Partnered, no kids. . .

Betty: I was at the time, I was actually dating somebody that lived down here in the [area where she now lives]. . .

Interviewer: But you said you were dating somebody.

Betty: I was dating somebody that lived down here, it's too long to go into that either, but you know, I was completely freakin broke. . .like I was trying to save every penny that I made. . .to save up a deposit for an apartment. And, I didn't have enough for that at that point. . .and came down here to visit one weekend. . .

Betty: . . . and I came down here to visit, and the clutch in my car went out, which was about a \$700 repair job, and I didn't have \$700. So guess where I was? I was staying with the person I was dating. "Hi, guess I'm staying," [I said.]

Critical analysis revealed that on four separate occasions Betty made reference to a significant other without mentioning the individual's name or gender. This was uncommon in that the participants in this study would typically state their partners' names at the beginning of the interview in response to the question about family status. It was particularly noteworthy that the fourth time Betty made reference to her

partner she seemed to go out of her way to avoid further specificity: "I was staying with the person I was dating." One interpretation of this narrative style is that Betty's partner is a woman, something she did not feel comfortable revealing in the interview. Thus, this example illustrates that empirical sensitivity also includes finding meaning from the words that were not used as well as those that were.

Critical analysis of the interview excerpt with Ivanna highlights two aspects of empirical sensitivity: contradiction and nonverbal communication. Two interviewers participated in this interview. Interviewer1 was the primary interviewer. Interviewer2 was there to observe the interview process and periodically participated the interview:

Ivanna: My husband does not have a college education, my husband works for this company, my husband is higher than I am. I can't, you know, he can't even explain it. I keep telling him, it's because of that [that he is a man]. I mean, you know, it's like, it's the truth.

Interviewer1: Is he working in IT also?

Ivanna: What my husband does, I've done inside-out, plus more. I do. It's unbelievable.

Interviewer2: Do you consider yourself a feminist?

Ivanna: No, I just want to be treated *like a lady!*

During analysis of the interview transcript we noted the tension between acknowledging unfair treatment based upon gender yet rejecting the label of feminism. Interviewer2 contributed additional critical insights from her participant observation of the vehement way in which Ivanna rejected feminism.

Exercise of power. Critical analysis of the narratives also reveals that the exercise of power over these women takes several forms, both subtle and overt. One way in which participants were asked to make explicit how male privilege is enacted is through questions about the participation of women in social networks. This theme grew in importance over the course of the project because it was first introduced by the women themselves, not the researcher. The interview with Ann shows the subtle ways in which she feels excluded from everyday activities in the workplace:

Interviewer: The comments you're making about that...you expect not to be included in networking, are these things that you experienced in your workplace?

Ann: Yeah. If you want to be part of the old boy's network, it helps to be a boy. [Laughs] Otherwise, you have to do a lot of extra work.

Interviewer: Can you give me some examples of this?

Ann: Well, the most common kind of thing is who gets invited to lunch, who goes to lunch everyday? Can you get invited to lunch? Sure. If you want to go with them, then they won't say, "No, you can't come." But do they think about inviting you? No. You're not one of the lunch buddies and, you know, they talk about all the department stuff during lunch. You just have to be somebody who keeps to their rules. So that's very common.

In response to recognition of exclusion, an uneven playing field and institutional repression, women in this study reacted with various forms of human resistance. While Lukes' framework on power is a useful analytical tool for understanding the role of ideology, it offers little explanation of resistance. What this study reveals is the active agency on the part of some of these women in the ways in which they resist these

institutions and choose to opt out. Pamela is an example of this. Her experience of discrimination, sexual harassment and hostile environments motivated her decision to leave her current position and move into business for herself as a consultant. However, even in this act, she continued to experience feelings of being marginalized as co-workers refused to acknowledge the real reason that she was leaving – to start her own business. Rather, they insisted upon imposing on her another motivation – to stay at home to raise her son – one that better suited their view of a woman's place:

Interviewer: Do you want to say more about what the work environment was like, how it affected you, or how you responded?

Pamela: Well, I work in. . . I would do support for the factory and the offices. And, like in the offices people would have like pictures of naked women hanging in their office. And I'd go out in the factory, and the men would be whistling at you and that kind of thing. I had some people who would unplug their. . . they'd call the helpdesk saying, "My computer doesn't work." And I'd go out there and find out the computer was just unplugged from the back. And then. . .

Interviewer: And they did this on purpose?

Pamela: They did this intentionally. Because they liked the fact that I had to bend over their desk, and when I figured this out, I started to climb underneath the desk to plug it back in. And the first time I did that, the guy's like, "Well, aren't you gonna bend over the desk?" And then, everybody's like shoving him to be quiet. . .

Pamela: Well, my vision is to do computer support for small businesses. There's consulting firms in the area, but they charge a lot per hour. And my target is the smaller businesses that can't afford large consulting firms but still need help, still need IT assistance. And I want to improve their businesses by. . . I guess, giving them access to the information that they'd have to pay more for at the consulting firms.

Interviewer: When are you going to start doing this?

Pamela: I got part-time at work. I was gonna just, I gave my two weeks' notice, but. . . they asked me if I'd be willing to do part-time for a while until they found a replacement.

Interviewer: Did you tell them why you're leaving?

Pamela: [Sighs]. My boss assumes it's to be at home with [my son]. Everyone assumes it's to stay at home with my son. That I'm gonna be a stay-at-home mom now, and they kinda say, "Oh, yeah, whatever, it's business. Right." My boss just went straight with, "Oh, good, she's gonna at home with her kid. You know, that's good. Women need to do that." I tell people, "Well no, actually, I'm going to be starting my own business." "Well, that's wonderful, you're going to be spending more time with your son." [Laughs]. They think it's like some kind of charade that I can quit and still pretend to be professional or something.

Another response is for women to remain in the job and continue to struggle with their everyday experiences. In the interview excerpt below Connie displays her frustration about the male coworkers at her university and the sources of mentoring from which she is excluded, deciding ultimately to avoid this type of social interaction:

Connie: And so I [never] even [thought] that way [using a gender lens] but I found strange things starting to happen. . . [S]o my colleagues, they also tended to invite couples over, so there's another colleague, he and I are good friends, he's new and so I've just gotten to know

his wife recently, and so I overheard him [talking about having] another guy and his wife over, you know, and he and I actually talk a lot but I wasn't part of that group. People would invite couples to do things. So that has been an isolating experience in that way. . . I was going to tell you about my first year. . . We're having a seminar we have a little break, time to go to the potty or whatever. All the guys are walking down the hall planning research projects and sharing data and "Oh by the way have you read this book?" I'm going to the other bathroom, where I run into secretaries and they're lovely people, we have some very lovely, but my conversation is social, which isn't helpful in terms of career at all. And the other guys are getting mentored, and they would go out to lunch as a group, if I went they didn't talk to each other, but if I don't go, I'd hear them and they'd chatter all the way out and chatter all the way back.

Interviewer: What do you mean they don't talk to each other if your there?

Connie: It's just like real quiet, they don't say anything. . . So I just I quit [trying to go] with them. I figured that time was better spent writing.

In the next example, we see how Sandra feels alienated in the workplace and frustrated by the masculine environment and the strong associations between masculinity and technology. In this excerpt we see the overt exercise of power as a qualified female applicant is not interviewed for a position. We also witness the covert exercise of power in the construction of the social network, which is based around predominantly male activities. This type of oppression is beyond the remit of policy, but operates on a subtle level that consequently excludes women from participating in this type of environment:

Interviewer: OK. You were saying some more about the atmosphere in the workplace. You said it is very male chauvinistic?

Sandra: Yes, very. Yes. Anyway, the man that they hired all of a sudden he could get equipment that we could never get before. We could never get approved. All of a sudden, it's coming in the door, racks, rack mounted servers, all kinds of bells and whistles, and software, anything he wants he gets. He's a very smooth talker. He has a very strong personality, extremely loud and aggressive. And when I try to speak he will overpower me with his voice.

Interviewer: How does that make you feel?

Sandra: Just, just, I want to strangle him. I want to strangle him. He'll take my ideas, present them as his own. You know, typical story.

Eileen: If you tried to leave there and get another job, do you think you'd be able to?

Sandra: I would love to get another job and not work there anymore. . . [T]his new director wanted to hire two more people and they let him. He hired two more and even before he had advertised for the new job, he called it "the new guy." "The new guy is going to do this." He got maybe 55 applications, only one woman applied and he wouldn't even interview her. She had an OK resume. I did see her resume and it was OK. He wouldn't even interview her. The guys all go out together to lunch. It's all guy talk, fishing, hunting. They don't invite me. They have invited me a few times and I went and it was very. . . their discussions are just so yucky. I mean animal cruelty and everything that they think is funny that I don't think is funny. Every other word is the f-word. They smoke, they drink. If we get a user request, I'll go on the user request. Oh, they take smoking breaks. I stay in and do the work if there is a user request. You know, I go help the user, I come back, they're sitting with their arms on the back of their heads with their feet propped up on the desk just talking about airplanes or RVs

[recreational vehicles] or whatever. Things I couldn't even get into, you know sports, whatever. It's all guy talk. ALL guy talk. When the users come into the office, they talk to them first. I have been on user calls, where the user will say, "Can't Brian come down and work on this?" Or even when it's something Brian doesn't know about and I'm the only one who knows. The women in the office flirt with them. So, I'm pretty much alienated right from the start. And I feel like I don't have a chance.

In these excerpts we have seen examples of both overt and covert exercises of power. Given the existence of antidiscrimination legislation, overt discriminatory practices are becoming increasingly difficult to operationalise, although our analysis does reveal examples of sexual harassment and discriminatory selection procedures. Nevertheless, to challenge this type of behavior in what remains a predominantly male industry is no small undertaking and so – not surprisingly – this continues to take place and is often left unchallenged. However, the more subtle forms of covert exercises of power are even more difficult to confront. Had these women been deliberately excluded from, for example, decision-making committees or promotion, it is more likely that this type of omission can be questioned as part of illegal discriminatory practice. However, it is very difficult to invite yourself to social interactions and gatherings when you are clearly not welcome. Understandably, we see some women opting out in response, despite the potentially negative impact this may have on their career progression.

Discussion

In this section we offer some reflections on both the outcomes of critical research and the research process, itself. The choice of critical epistemology has clear methodological implications. One is for research reflexivity. Kvasny *et al.* (2005) have argued that this is a crucial aspect of feminist gender and IT research. The essential purpose of reflexive social enquiry is to incorporate the researcher herself – and her own experiences – to move the research forward. In this respect, the research process not only requires the researcher to reflect critically on the process itself, but also to be open to being changed by it. Both the researcher and the researched are situated in a common context and affect each other mutually and continually during the course of the project (Alvesson and Skoldberg, 2000).

Reflexivity can take a number of different forms in critical empirical research. It is used in this project during fieldwork as a mechanism for establishing a connection with the research participant as well as to provide examples in order to trigger thoughts. In order to do so, the researcher draws upon her own personal and career history, significant experiences and people, and other factors to provide both illustrations of the topic being discussed and to reinforce that she, too, lives in the world that is being studied. This develops a relationship of trust and mutual understanding, based on the sharing of the researcher's personal experience. In the example excerpt below the interviewer is establishing a connection with the interviewee who was discussing feelings of being apart from her male co-workers. The interviewer then related her own experience of feeling apart from the male group she was in:

Interviewer: I went to a talk... and there was a faculty person talking about sort of the subject area and kept making jokes about some student project that involved studying obscenity... And [he would say to the audience] "Hey, would you like to see the obscenity site?"... And I was sitting there in the audience feeling really uncomfortable, you know, and

I'm just sort of thinking about how I feel and why. And it's this. To me, how I experienced it was I was being excluded from the jokes. OK, so if somebody is making jokes that we could all be part of, I don't know, some kind of common student excuses – [like] “the dog ate my homework” – OK, so somebody is up there making a joke about students' common experience we all have. . .we all participate in that joke about students' behavior. But when it's sort of, you know, the obscenity site, and he made reference to it several times. And you could hear the laughter and the laughter in the room was male laughter, there wasn't any female laughter. You know, and it's that kind of thing. It's the subtle, subtle wearing away or just slightly feeling excluded. . .But it's that kind of thing. It's just making you in a very blatant way feel that you are not a part of this.

Reflexivity is also being used in the critical analysis phase of the research project. Here, the researcher makes explicit how she draws upon her own experience as a vehicle for critical analysis. This enables an opening up of the power relationship between the researcher and researched as the former makes herself vulnerable by displaying her own emotions and vulnerabilities. This type of disclosure is often criticized as subjective involvement. Yet making use of these experiences and showing that researchers themselves can also be excluded from these dominant groups, as they live these conflicts and contradictions, helps people to relate to us differently, just as we relate to them differently. For critical researchers, this process of engagement is seen as crucial (Walsham, 2005) given that in our role as academics we have the capacity to operate in a comparatively unconstrained way.

A second methodological implication of empirical critical IS research relates to the relationship between the researcher and the researched. For research that is essentially a political project and committed to social change, the researcher aims to diminish asymmetry between herself and the participants by minimizing formal procedures and methods as the research becomes oriented towards understanding the material forms of oppressions in different everyday experiences. This stands in contrast to constructions of methodological reporting in which power relations are reflected in the portrayal of the researcher as “academic expert” (Wray-Bliss, 2003). This results in the provision of rich information on the real conduct of research in the field, rather than constructing the process as either neutral or as a power-laden arena. As Adam (2002) points out, we must look towards the subordinate groups themselves for an expression of their own emancipatory values through their own knowledge, rather than assume that “we can emancipate them”.

A third implication relates to data analysis. If interpretive research must overcome the charge of bias, the challenge for critical research is even greater. The reduction of bias is given much attention by positivists, since it is assumed that such a reduction will move one closer to the “truth”. But another perspective sees all research as inherently biased with the only difference being that the critical researcher is more likely to acknowledge (or even defend) their explicit bias. As critical researchers we aim, instead, to declare our epistemological/ideological position up front (rather than assume we are non-partisan, objective reporters of facts), endeavor to reflect on the process and encourage other researchers to comment critically on our reporting as a way of advancing the critical agenda and allowing us to explore an engaged critical/political academic practice.

Oakley (2000) points out that all research is deeply embedded within a political context as research agendas are constructed in a way that attaches priority to particular issues or problems (Latour, 1987). However, since one of the explicit

objectives of critical research is to critique the status quo, the vested interests of the dominant discourse can be threatened. For example, this research project reveals power relations that reproduce inequality in the labor force and, in doing so, challenges these practices. This process of focusing on women as an under-represented and marginalized group in the IT labor force enables us to tell a different story and thus foster reflection on this. Throughout the study we witnessed ways in which both covert and overt exercises of power played out in organizations. However, we also observed instances of resistance, solidarity and support, which illustrate the potential to challenge and transform that which is taken for granted.

Finally, Wray-Bliss (2003) has commented that whereas researcher and researched are often constructed as independent (with the researcher critiquing the researched) it may be more appropriate to view this relationship as interdependent as the researcher co-constructs and contributes towards the life of the researched. In this respect, the challenge for the researcher has not only methodological but also ethical dimensions. It can be very problematic to elicit the kinds of data that further a critical investigation of the topic. In this research project the critical challenge was to provide a space for the women to think about issues they may have never before considered in any detail. For example, in the researcher's effort to elicit comments from a woman about oppression, she might be encouraging the participant to bring into consciousness comments about personally painful experiences or organizationally inappropriate behavior that the participant might prefer not to confront. But if this happens the researcher faces the dilemma of coping with the psychological and emotional aftermath of raising this level of awareness.

Conclusion

The use of a critical epistemology is intimately linked to the research topic, methodology and theory. The methodological implications were illustrated through examples from the fieldwork and analysis, and were analyzed in the preceding discussion of methodological implications. The theoretical contribution of this study derives, in part, from Lukes' framework on power as a means of drawing attention to the subtleties of power issues in the workforce, highlighting contradictions, and pointing to the difficulties of confronting them head-on. We used this framework in the analysis to reveal the potential for change as instances of resistance and solidarity were witnessed. Thus, one theoretical contribution of this research is emphasizing the role of power dynamics in understanding what sits beneath the surface of observations about these women's experiences in the IT workforce.

A second contribution to theory is that this research helps to shift the focus away from predominantly essentialist theories that dichotomize men and women and toward a recognition of the diversity among women. While gender is an easy classificatory framework to apply, this research shows that women, like other under represented groups, differ greatly among themselves in their responses to the exercise of power. This finding is consistent with Kvasny and Trauth's (2002) IT power framework which was used to document responses of women and African Americans to the exercise of power over them. In this way our objective is to reveal the multitude of women's experiences rather than attempt a uniform presentation of "all women". In doing so, this research provides further support for the individual differences theory of gender and IT by showing how different women experience repression and power in different

ways due to different socio-cultural influences, individual experiences, and individual characteristics.

The aim of this paper is to provide an illustration of critical empirical research by drawing on a study of gender and the IT labour force. This has been used to demonstrate how the epistemological lens changed from interpretive to critical as the project evolved and reveals the additional insights that arose as a consequence. It is also intended that this may serve as a useful example for other critical IS researchers about to embark on empirical work. While critical empirical research maintains the same degree of rigor (albeit, using different criteria) as any empirical research project, it also bears a political burden not typically borne by academic research: it is impossible, as a feminist, to do research on sexism and not be affected by the process. Therefore, we appeal to journal editors to move away from the “one model fits all” view of research and accommodate diversity in terms of presentation of research methodology, enabling critical researchers to provide a more reflexive account of the research process, rather than a sanitised account that meets more mainstream criteria. In the case of the project described in this paper, the research requirement is to understand women IT professionals within their work and life contexts, exploring the very nature of women’s oppressions. The political requirement is to facilitate change such that women in IT can pursue their careers on a more level playing field, to the ultimate betterment of the field for all concerned.

Notes

1. An example of books is Howcroft and Trauth (2005). Examples of conferences include the Critical Management Studies conference (1999, 2003, 2005), Critical Research in IS Workshops (2001, 2004), and a critical stream at the Americas Conference on IS since 2001. Examples of special issues of journals devoted to critical research include *Data Base* (2001/2002), *Journal of Information Technology* (2002), and *Information Systems Journal* (forthcoming) and *Information Technology & People* (forthcoming).
2. There are many varieties of feminism, which differ both epistemologically and politically (for an overview of these types, see Calas and Smircich, 1996).
3. See Adam *et al.* (2001) and Trauth (2002) for a discussion of essentialism in gender and IT research.
4. The notion of “real interests” is not without its critics; however this is beyond the focus of this paper.
5. Additional details about the coding scheme can be found in Trauth *et al.* (2004).
6. Prior to the interviews the participants were given a brief description of the research project but were not provided with copies of publications.

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