UNIVERSITY OF CALGARY

A Discourse Analysis of Women's Accounts of Their Professional Lives in Science

by

Minji Kang

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE

DEGREE OF MASTER OF SCIENCE

PROGRAM IN CLINICAL PSYCHOLOGY

CALGARY, ALBERTA

May, 2006

UNIVERSITY OF CALGARY

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "A Discourse Analysis of Women's Accounts of Their Professional Lives in Science" submitted by Minji Kang in partial fulfilment of the requirements for the degree of Masters in Science.

L. Radtke

Supervisor, Dr. Lorraine Radtke, Department of Psychology

Co-supervisor, Dr. Hank Stam, Department of Psychology

Dr. Susan Boon, Department of Psychology

Gillian Ranson

Dr. Gillian Ranson, Department of Sociology

April 28, 2006

Date

Abstract

Using the theoretical and methodological framework of discourse analysis, the present study explored multiple ways in which women negotiate their participation in science. By constructing versions of gender differences and by denying personal disadvantage, the participants legitimated themselves as scientists, therefore creating a place for themselves and other women in their profession. The hesitation and tentativeness in their talk also marked the arguments as problematic because they can be used not only to legitimize women's places in science but also to deny them. In order to effectively address the issue of women's under-representation and under-participation in science, collective actions that work toward changes in the socio-political context of science were proposed.

Acknowledgements

I would like to thank Dr. Lorraine Radtke for supervising me for the past three years. Your guidance and support have helped me to pursue my goals and aspiration in psychology. I am grateful to you for all your help.

Thank you to my co-supervisor Dr. Hank Stam for your guidance and helpful suggestions on the earlier drafts of my thesis.

I would also like to thank you to my defense committee, Dr. Susan Boon and Dr. Gillian Ranson for their time and efforts in reviewing my thesis. Your input is greatly appreciated.

A special thanks to my husband and my parents who provided me with endless love and support. You make me a better person everyday and remind me of what is most important in life.

I would also like to thank Paige Marshall for your assistance in some of the transcribing work.

Thank you to all the participants in the study, who volunteered to share their valuable stories. Without your help, the project would not have been possible.

TABLE OF CONTENTS

The present study explored multiple ways in which women negotiate their participation in science. Using the theoretical and methodological framework of discourse analysis, the study focused on various discursive strategies the participants used in order to make places for themselves and other women in the scientific community. To address the issue of women's under-representation and difficulty advancing in their profession, the study explored women's accounts of their lives within science and its practices as well as their implication for women in the profession of science.

What is the problem?

Although women are entering science programs in increasing numbers, they continue to be underrepresented and have difficulty advancing their careers in science (Bebbington, Athena Project, & Equality Challenge Unit, 2002; Cronin & Roger, 1999; Rosser, 2004; Wyer, 2003). In particular, the natural sciences are still largely considered to be male-dominated areas of study. Under-representation or under-participation of women in science is reflected in the smaller number of women compared to men science students and scientists; the ideal then would be roughly equal proportions of women and men. For example, at the University of Calgary, there are five natural science programs: Biological sciences (biochemistry, biology, botany, ecology and zoology), Chemistry (applied chemistry, chemical physics, and chemistry), Geology and Geophysics (applied & environmental geology, earth science, geology, and geophysics), Mathematics and Statistics (actuarial science, applied mathematics, general mathematics, general mathematical education, pure mathematics and statistics) and Physics and Astronomy (applied physics, astrophysics and physics). The percentage of female student enrollment at the undergraduate, graduate and doctoral levels is as follows: Biological sciences (61%, 62% and 39%), Chemistry (51%,

47% and 39%), Geology and Geophysics (45%, 49% and 25%), Mathematics and Statistics (44%, 37% and 30%) and Physics and Astronomy (23%, 28% and 26%) (see Appendix A). Undergraduate under-participation is evident in only three of the five programs (University of Calgary, 2004). At the graduate level, however, the number of women is still small, reflecting a striking pattern of attrition across the disciplines. In the United States and Europe, similar patterns of women's under-representation and attrition in science have been documented (Bebbington et al., 2002; Cronin & Roger, 1999). Cronin and Roger (1999) characterized the underrepresentation of women as both progressive (i.e., worsening over the course of higher education) and persistent over time. Despite efforts to increase women's participation in science on the parts of both researchers and policy-makers, women's underrepresentation and patterns of attrition consistently result in fewer women reaching the highest levels of the scientific professions (Bebbington, et al., 2002; Clewell & Burger, 2002; Cronin & Roger, 1999; Steele, James, & Barnett, 2002).

The domestic responsibility model is the most commonly offered explanation for the continuing lack of women's participation and advancement in science. It suggests that the demands of family and motherhood burden women who pursue careers in science (Rossi, 1965; Morgan 1992; Bebbington, et al., 2002). In her study, Rossi asked female college and university graduates why they thought few American women entered education and careers in science. The major reasons identified by the participants were the difficulty of combining professional work with home and child responsibilities and women's desire for part-time work rather than full-time commitment to a career. In 1992, Morgan replicated Rossi's 1965 study and found similar results. Specifically, having to juggle between career and domestic responsibilities posed a problem for the women in Morgan's sample. The model is limited,

however, because it cannot explain why women with different life styles (e.g., single women) also experience difficulty advancing their careers in science compared to their male counterparts (Bebbington, et al., 2002; Rosser, 2004). Moreover, based on a survey of women professionals in science and engineering, Rosser (2004) reported that a considerable number of women scientists postpone childbearing to coordinate their professional and personal lives, thereby modifying their life styles to accommodate their careers in science academia. The burden of home and paid employment dual responsibilities does not adequately address the problem of women in science, and therefore we need to explore other issues. Before discussing these, however, the importance of addressing the continued lack of women's participation and advancement in science will be examined.

Why is it important to have more women in science?

The current literature investigating the lack of women in science does not explicitly provide explanations for why having more women in science is important. However, there seem to be at least three reasons why the current status of women in science poses a problem and is worth investigating: 1) loss of talent, 2) gender equality, and 3) implications for knowledge production through diversity.

First, at the level of societies there has been a concern that many women's talents go unidentified, undeveloped or underdeveloped. The argument is that society can benefit from these talented women, who, for some reason, do not choose careers in science or choose to discontinue and leave science careers. The concern about the 'leaking' talented students of science has stimulated research on how to attract more female students into science (Wyer, 2003).

Secondly, at the level of institutions there has been a concern about possible systemic barriers that hinder women's participation and well-being in science. If this is the case, the obstacles need to be identified and removed, so that women can pursue their careers and thrive without having any disadvantage due to their gender. Thus, the focus on structural obstacles and overt discrimination within institutions aims to promote women's advancement in science by achieving gender equality.

Thirdly, having more women in science may potentially produce different knowledge and have implications for diversity. As Hare-Mustin and Marecek (1990) and other critics have noted, the process of producing scientific knowledge is deeply intertwined with the researchers' perspectives and values. Because scientific knowledge has potentially significant implications for the people of the world, ideally it should apply to all of humanity which is made up of diverse individuals. Hence, scientific research needs to have varied individuals in mind, reflecting the interests of diverse people in the world. In this sense, achieving diversity in terms of gender as well as social class, race, and ethnicity is of importance. In other words, increased participation on the part of women and other minorities seems crucial in achieving diversity in the production of scientific knowledge.

One example is Barbara McClintock, a molecular biologist who made revolutionary discoveries about genetic transposition and approached her scientific research with a reverence for nature that set her apart from male scientists of the time, who saw nature as something to dominate and control. Discussing McClintock's work and life, Keller (1983) shows how McClintock's attempts to understand the organism through deep emotional investment enabled her to make innovative discoveries. Different from the traditional notion of objectivity requiring scientists to be distant from their object of inquiry, McClintock tried

to be intimate with, and emotionally connected to, biological forms such as cells, which became a source of her creativity. Thus, McClintock's fresh vision and achievement are partly attributed to her open-mindedness and her 'feeling for the organism' (Keller, 1983).

In addition, Schiebinger (1999) has pointed out how feminism has changed some of the content of scientific knowledge. For example, in Cell Biology, the notion of the sperm being active and the egg being passive, with the active sperm penetrating the passive egg, was the prevalent understanding of conception. However, according to the theory of 'the energetic egg', based on a feminist perspective, the egg is an active agent directing the growth of microvilli, small finger-like projections on its surface, to capture the sperm. Once the sperm is oriented in the right direction by the egg, its tails and digestive enzymes allow it to enter the egg. Therefore, both the egg and the sperm are portrayed as partners working together as a team for successful fertilization. Thus, a feminist perspective contributed an alternative view and new understanding of conception. In other words, women can bring different perspectives to the ways in which nature is perceived, the research questions posed and the metaphors used to understand natural phenomena (Schiebinger, 1999).

Given the merits of encouraging women to participate and remain in science careers, it is therefore important to understand why women remain a minority within the scientific research community. Research on this topic has focused on problems at both individual and institutional levels.

Focus on individuals: Factors influencing women's career choices

At the level of individuals, researchers and policy-makers have focused on factors that are thought to influence women's choices and career decision-making (Madill, Ciccocioppo, Stewin, Armour, & Montogomerie, 2004; Dale & Rosemary, 2003; Steele,

James, & Barnett, 2002; VanLeuvan, 2004; Wyer, 2003). The rationale behind this line of research is 1) to understand why some women choose science careers while others do not and 2) to use the factors identified as influential in women's choice of science careers for the purpose of encouraging women's participation in the area.

Madill and her colleagues (2004) at the University of Alberta asked 123 young women in science, engineering and technology about the factors that influenced their decisions to pursue careers in these areas. The identified factors included family members, close friends and people in the field. Some specific examples included a participant with a brother and a sister who studied engineering, an exemplary Biology teacher who motivated a participant to develop interest in the area, and a positive volunteer experience in a lab. The researchers suggested that women's participation in science careers could be increased by developing mentoring programs in which established women in the discipline serve as role models and provide resources and support for younger women.

In an attempt to identify reasons that science and engineering majors choose to stay rather than leave, Wyer (2003) investigated how the following three factors are linked to undergraduate students' reported intentions to persist in their majors: perceived image of scientists and engineers, their experiences with race and gender prejudice in the classroom and their attitudes towards gender equality in science, engineering, and society as a whole. A positive image of scientists and engineers was solidly linked to a high commitment to persistence; whereas participants' attitudes towards gender equality and their classroom experiences were unrelated to persistence.

Examining women's perceptions of barriers in male-dominated areas, Steele and her colleagues (2002) found that undergraduate women in male-dominated academic areas (e.g.,

math, science and engineering) reported higher levels of discrimination and stereotype threat (i.e., fear of confirming negative stereotypes) than women in female-dominated academic areas (e.g., arts, humanities and social sciences). Thus, the researchers concluded that female university students continue to perceive gender obstacles in their fields and that the identified factors require further attention to accommodate more women in male-dominated academic areas.

Based on these research findings, recommendations tend to focus on women's cognitive change through enhancing self-efficacy and vicarious learning (i.e., having an opportunity to know and observe the accomplishments of other women). Such recommendations provide limited solutions by overemphasizing the role of individuals and are problematic in holding women responsible for finding solutions to the problem. Thus, some researchers and policy-makers have shifted their focus to possible structural barriers that hinder women's participation in science.

Focus on institutions: Structural barriers hindering women's advancement in science

The recent Massachusetts Institute of Technology's (MIT) equity project is an example of efforts to identify structural barriers women scientists face in academia. Based on the preliminary findings that there were only 15 tenured women faculty in the six departments of the School of Science, compared to 194 men, and that these numbers (8% women vs. 92% men) had remained virtually unchanged over the previous two decades, a consensus was reached that their gender-based experiences had negative impact on their professional lives at MIT. Thereafter, a committee was formed to deal with the status of women faculty in the School of Science. Interviews with women faculty indicated inequities in salary, space, resources and rewards as well as the marginalization women faculty

exemplified by exclusion from leadership positions and decision-making processes in their departments. Senior faculty reported initially thinking that gender would not create a problem and their achievements would be recognized as long as they were competent. However, after tenure, many senior women, including those who felt well supported as junior faculty, began to feel marginalized. Some of the recommended corrective actions included: 1) increasing the number of women in significant positions within departments and the administration such as members and chairs of key committees, 2) increasing the percentage of women faculty in Science (this was increased by 40% in 1999), 3) maintaining open channels of communication between the department head and women faculty, 4) collecting equity data and raising community consciousness about the need for equity, 5) seeking out women for influential positions, 6) making policy on maternity leave, and 7) relying on advice from appropriate women faculty regarding how to manage the responsibilities of home and career (Massachusetts Institute of Technology, 1999).

The MIT equity project prompted a number of colleges and universities in the U.S. and Canada to recognize the gender equity issue in higher science education and to start collecting data regarding salaries and resources provided to women faculty. For example, the University of Calgary launched its own gender equity project in May, 2003 in order to better understand the experiences of academic women in the Schulich School of Engineering and the Faculties of Kinesiology and Science. According to the report published in 2005, there are significant gender gaps in starting salaries for assistant professors and in rank at hiring, both favoring men. Also, it was reported that in the year 2004 men earned $2,643 more than women even after taking into account differences in rank, education, work history and years since obtaining the doctoral degree. A number of recommendations were made to improve

the experience of all female faculty at the university including annual collection of equity data, rectifying the identified inequity, and further analysis of the gender inequities so that contributing factors can be clarified (Wallace, 2005).

The research identifying structural barriers is useful in addressing and potentially eradicating overt discrimination and obstacles against women's advancement in science, but it has some limitations. For example, some of the recommendations proposed in the MIT report seem superficial because the pressure is put on women faculty to give their colleagues advice on how to manage work and family. Moreover, it was recommended that women receive a voice at MIT, but the specific processes and context of marginalization of women faculty as well as the experiences of marginalization were not systematically examined. Another limitation of the research focusing on structural barriers at the institutional level, including the University of Calgary report, is that more subtle, covert forms of discrimination and differential treatment in everyday social interaction and conversation are not adequately addressed (Katila & Merilainen, 1999). In addition, Clewell and Burger (2002) argue that despite the contribution of intervention strategies based on the equal-rights approach to the achievement of equity, more fundamental change within the system of science is needed for the discipline to be more accepting and inclusive of women. Therefore, there seems to be a need to examine the system of science and its practices more closely.

In sum, previous attempts to address the problem of women in science at the level of individuals and institutions have their own limitations. On the one hand, research that focuses on individuals' perceptions and career choices tends to hold, whether intentionally or not, individual women responsible for ameliorating the current situation. On the other hand, research that focuses on the structural barriers is unable to address subtle, less visible forms

of discrimination that women might experience on a daily basis. In other words, there seems to be a need to look at taken-for-granted assumptions and practices in science that hinder women's participation and advancement in the discipline such as ways of thinking and communicating as well as the nature of "legitimate" research questions and ways to answer them. The feminist critique of science is informative in regard to suggesting such an alternative approach to examining the problem of women in science.

The Feminist Critique of the Culture of Science

Since the 1980s, many voices have arisen critiquing science from a feminist perspective (Ferreira, 2003; Kelly, 1985; Keller, 1987; Morawski, 1997; Rosser, 2004; Schiebinger, 1987,1999). One argument relevant to the problem of women's lack of participation in science is that science is a masculinized culture so that women may be alienated from its practices. In this context, culture refers to the basic assumptions and beliefs that are shared by scientists about the nature of science and scientific practice (e.g., Ferreira, 2003). In her book entitled "Reflections on gender and science", Keller (1987) argued that objectivity and reason have been historically associated with male characteristics and subjectivity and feelings with female ones. Thus, the current emphasis on the concept of objectivity as the complete separation between the knower (scientist) and the known (the object of nature) is gendered and reflects male biases. According to Keller (1987), the pervasive characterization of objectivity and scientific practices in masculine ways is partially responsible for the abundance of males and the lack of females in scientific disciplines.

More recently, Schiebinger (1999), in her book entitled "Has feminism changed science?" argued that domestic arrangements are part of the culture of science. She

demonstrates how the profession of science is based on the assumption that a scientist has a stay-home wife who takes care of all the domestic responsibilities. Thus, she proposes that science itself is based on a single-career culture rather than two-careers (i.e., home and work). The reality, however, is that many women scientists are unlikely to have a stay-home partner; instead most are likely to have partners who have full-time careers, and therefore must juggle between the responsibilities of home and career. Thus, science is not accommodating professional women who are more likely to be part of dual career couples than professional men. The fundamental division between working and private lives is one example of problems associated with the culture of science that particularly disadvantages women (Schiebinger, 1999).

Only a few researchers have investigated the processes through which the culture of science is masculinized. Using survey questionnaires and semi-structured interviews, Ferreira (2003) examined how graduate students in Biology and Chemistry perceive the culture of science. Some female students reported being told they were not aggressive enough and their preference for collaboration was incompatible with the competitive nature of current practices in science. Investigating "bad lab experiences", one of the most commonly reported reasons why women leave science, Conefrey (1998) observed that the conversational style in the science lab is more compatible with male than female forms of talk. For example, in an actual lab interaction involving a discussion of assigned readings, male members employed conversational strategies such as directives and interruptions more frequently than female members. In addition, male members often presented themselves as 'experts' by providing negative evaluations and critiques when introducing articles compared to females who often started by providing an outline of the article. Thus, like immigrants to a new culture, women

who enter science may have to learn a new way of communicating, thinking and interacting compared to their male counterparts. Furthermore, like immigrants, they may face challenges in finding acceptance by those for whom science is a "first culture" and integrating their lives as women with their lives as scientists. In other words, if what is expected of scientists (e.g., to be logical, non-emotional and competitive) reflects qualities and practices associated with the male gender, women scientists may experience a conflict between their identities as women and the masculine culture of science (Cronin & Roger, 1999).

In sum, the notion of science as culture seems to be useful in addressing the issue of women's participation in science. Exploring how science is currently practiced and how its practices are experienced by women in science (e.g., attitude and conversational style) might help to better understand women's lack of participation and the context within the issue arises. In addition, there has been a lack of empirical studies exploring the possible relationships between science as culture and how women scientists negotiate a place for themselves within scientific careers (Bebbington, et al., 2002; Morawski, 1997). Such research may offer new insights into the reasons that women's participation and advancement in science has been less successful than one might expect, given the efforts to recruit and retain more women in science.

Discursive approaches

Discourse analysis is a useful way of studying the culture of science through women's accounts of their professional lives in science. Because everyday interactions are the context in which women's marginalization is produced, a discourse analysis can be used to explore the social nature of professional lives in science where mundane, everyday experience and moment-to-moment social and discursive interactions between members may

become a source of women's difficulties and marginalization in science. For example, in the context of the research interview, the ways in which women in science tell their stories might shed light on discursive strategies they use to negotiate their place in the scientific community. In addition, in women's talk, the culture of science might be reproduced as discursive practices that are contested and negotiated. In analyzing the experience of female faculty in a business school, Katila and Merilainen (1999) argued that gendered organizational discourse and practices often create subtle discrimination, constructing women as being 'less' than their male colleagues. For example, women are often discursively characterized as 'lacking' some characteristics required for a professional identity and the masculine is taken as the norm and the feminine as marking difference (Katila & Merilainen, 1999). Thus, by examining how gender and science are discursively produced in conversations with women in science, the current research can provide insights into women's positioning within the culture of science.

Discursive approaches highlight the constructive feature of language. People actively use language to produce their stories and particular versions of their identities. How the story is told and what identity is being worked up will depend on the context and the purposes they serve. In discursive approaches, the notion of subject positions, which are multiple ways of talking about who we are, replace traditional notions of self and identity as fixed and stable variables. In conversation, many different and even contradictory subject positions may be taken up and used strategically. Edley's research (2001) in which men's construction of masculinity was explored illustrates the notion of subject positions. At different points within the interviews, participants positioned themselves as masculine heroes, ordinary men or gender non-conformists. In the process of constructing their stories, therefore, people draw

on resources or discourses that are available within a given culture (Davies & Harré, 1990; Potter, 1996; Potter & Wetherell, 1987; Wetherell, Taylor, & Yates, 2001). In constructing their stories and taking up subject positions, women are likely to draw on the available discourses about femininity and womanhood. Women in science may also draw on the culturally available notions about what science is and how science should be practiced (Wetherell et al., 2001). Taking individualism as an example of a cultural resource, women's accounts might be structured as a story of barriers and battles or of success and achievement based on individual merit. By exploring the ways in which women draw on cultural resources in constructing meaningful stories of their lives as scientists, we may develop a better understanding of how science and its practices are experienced, embraced or resisted by these women. Discourse can also provide a means for challenging and resisting the cultural resources that contribute to women's marginalization. Positive change might be facilitated by discursive action in which masculine conceptions of science are resisted and challenged. For example, resisting the notion that men have higher intrinsic aptitude for science than women, women might discursively facilitate a legitimate place for themselves in the scientific community.

Using the framework of discourse analysis, the current research aimed to explore women professionals' accounts of their lives in the natural sciences, looking at how women scientists negotiate a place for themselves within the scientific community. Specifically, how women construct the culture of science and its practices as well as the subject positions they take up and the implications of these constructions for women in science will be explored (Davies & Harré, 1990; Potter & Wetherell, 1987). By focusing on women who are participating in science currently, the proposed research has implications for understanding

what enables women to participate and fare well in science and conversely, what discourages their participation and advancement. In addition, women's accounts of their lives within science and its practices may be informative regarding the subtle ways in which the scientific culture constrains female members in the discipline.

Method

Participants

Participants were 25 women who are graduate students, instructors, professors or working-scientists in the areas of biology, chemistry, math/statistics, and physics. A varied sample in terms of age and length of studies or employment was sought. The age of the participants ranged from 21 to 60 years, and the length of studies or employment ranged from 18 months to 45 years. Graduate students in science were included because they constitute success stories in their own right and are closest to the social processes of science education. Women scientists who are employed in various science careers were included because their accounts offer descriptions of science workplaces and academia.

Participants were recruited from the University of Calgary and the Alberta Women's Science Network (AWSN) through personal contact by phone and by e-mail. For recruitment purposes, a recruitment script was created and utilized (see Appendix B). The Alberta Women's Science Network is a non-profit society, created to provide a network for women in science and engineering in Alberta. Information about the current project was emailed to individual members of the AWSN and was also made available on the society's website. In addition, I used the snowball method of recruitment. Participants were asked to pass along the project information to women they know who might be interested in the study.

Procedure

Participants were interviewed either individually or in pairs using a semi-structured interview format. The interviews were conducted either in a research lab at the university or in locations preferred by the participants (e.g., offices, labs and workplaces). At the beginning of the interview, participants were informed of the purpose of the study and the interview process. Then, they were asked to read and sign the consent form if they wanted to proceed (see Appendix C). To ensure anonymity, all the participants chose their pseudonyms to be referred to by in the interview transcripts. Participants were also asked to complete a demographic record indicating their age, ethnicity, area of study or work, and length of study or employment (see Appendix D). The demographic information was collected to establish that the participants studied or worked in the areas of recruitment, but to respect confidentiality such information will not be provided in the thesis. A series of questions were provided as a conversation guide to facilitate interviews and discussions (see Appendix E). The interviews and discussions were tape-recorded, transcribed, and analyzed according to the accepted convention of discourse analysis (see Appendix F).

Analytic Procedure

The analysis involved reading and rereading the transcripts to examine the ways in which participants tell their stories including various subject positions they take up and the cultural resources they draw on in constructing their stories. Through focusing on similarities and differences in the ways the participants talked about their lives in science, multiple ways in which women negotiate participating in science were identified. In the following analysis, excerpts that seem to best illustrate them will be presented and discussed. The numbers at the beginning of each line correspond to the excerpts' locations within the transcripts. The speaker is indicated by the first letter of her pseudonym and the researcher's contributions are

indicated by the letter 'I'. Numbers in parentheses at the end of quotations in the text are corresponding line numbers where the quoted materials are located.

Analysis

In the analysis, I focused on two specific discursive strategies identified in my participants' talks. In order to make places for themselves in science, my participants drew on cultural resources of gender differences and took up subject positions distancing themselves from other women who might be disadvantaged. The excerpts that best illustrate multiple ways in which women utilized the two discursive strategies are presented.

Talking about differences: Do women bring something different to the practices of science?

All the participants drew on culturally available notions about gender differences in constructing their stories. The arguments varied from those who claimed that women are more efficient and intuitive (Maria and Rhonda), to those who argued that gender did not matter in the natural sciences (Cathy), and those who avoided answering the question directly (Lee). Three excerpts were chosen because they illustrate the three different positions on gender that were taken up across and within research interviews. All three excerpts can be found in Appendix G.

The first example is a conversation between Maria and Rhonda, who knew each other before participating in the study. In response to the question asking whether women bring something different to the practices of science, Maria talked about women being "better workers than men" (737) as "women can be more focused and finish a task whole heartedly, rather than a man" (741-742), emphasizing at the beginning and end of this turn that her experience is the basis for this claim (736, 742-743). However, her claim of gender differences favoring women, was offered hesitantly as if anticipating disagreement, which

was indicated by phrases such as " I almost think" (736), "sometimes" (737), "I don't know" (741-742) and "it just seems" (741). When the interviewer restated Maria's claim as women being better workers (744), Maria backed away and instead used the word, "just (.) more efficient" (747). Interestingly, although Maria explicitly talked about gender differences, the use of "just" (747) minimized her claim in the face of potential disagreement. Therefore, her claim of gender difference was offered with hesitancy indicating that her claim could be a source of controversy.

Positioning herself as being experienced, i.e., having worked with "a lot of people" (750), Rhonda provided support for Maria's aforementioned position claiming even further that women "naturally" or "biologically possess" (754) the qualities such as "multi-tasking" and "being efficient" (753). However, Rhonda started out by saying "it's hard for me to say in that respect" (750-751) because her experience working with "a lot of people" (750) makes it difficult for her to make gender-based generalizations. Despite her claim that it is difficult to amalgamate all her experience into one conclusion, Rhonda "tends to believe" (751) there are the differences in efficiency that Maria proposed. Rhonda elaborated this claim by saying that women's greater efficiency is evident in their running households as well as in their scientific work, generalizing women's efficiency across different contexts including the domestic realm, which renders further support for her claim that women's efficiency must be biological. However, Rhonda's use of a tag question, "right?" (750) and several short pauses indicated hesitancy in making her claim of sex/gender differences.

Constructing a version of gender differences where women's holistic and intuitive qualities are essentialized and celebrated, Rhonda claimed that "western male science" (759) does not acknowledge the existence of intuition. Her reference to "magic side of things"

(757), "psychic abilities and stuff" (758), "spirit energy"(760), and "unseen forces and that kind of thing" (762) is contrasted with "male-dominated science" (758-759) and "if you can't see spirit energy, therefore it doesn't exist" (760). In lines 763-764, Rhonda answered what difference women might make: "I guess I would guess that there's probably a lot more research that would go on in … would be more holistic." Thus, Rhonda argued that women and men think differently and consequently would do different kinds of research. Subsequently, she developed her argument that these mysterious forces are amenable to scientific experimentation using India as an example. Rhonda further expanded her argument, including the West where we can find some research with an "intuitive feeling" (771) and pointing out that science has yet to quantify and label all the forces of nature. Contrasting the implicit rule in science where "those who practice science know for sure that there is (laughs), it's just not something you're allowed to say" (779-780) with women's differences by adding that "But women, quite freely, will say it, right?" (782), Rhonda constructed a version of science culture that does not explicitly acknowledge nor value women's holistic and intuitive qualities. In this excerpt, Maria and Rhonda constructed an argument that women are "better", "more efficient", or "more intuitive" than men. In constructing stories of gender differences, Rhonda claimed that women do different kinds of research due to their different thinking styles. However, Maria and Rhonda anticipated criticism for putting forward such a controversial claim that there are gender differences favoring women.

The second example involved Cathy, who argued that gender does not matter in the natural sciences. In response to the question whether having more women in science is beneficial, Cathy initially apologized for arguing for no difference by saying "In the natural sciences I do not think, sorry, that there is any difference" (503), which implies that the

interviewer expected her to take a different position. Making a distinction between psychology and mathematics, she constructed a version of science where the object of inquiry "exists independent of the researcher" (506-507). Constructing the absence of gender difference as ideal in doing science, Cathy reasserted "I do not think there is female mathematics and male mathematics" (517). However, talking about two probable ways in which women differ (i.e., "persistence and question the purpose") (507-508) with uncertainty, indicated by "I do not know" and "if it's important for biological laboratories" (508), Cathy claimed that whatever gender differences there might be, do not make a difference in mathematical knowledge per se. Although claiming that in classroom activities contributions can be made by having people with diverse backgrounds including culture, Cathy clearly denied gender differences in the mathematics and the knowledge produced within the discipline. Therefore, like Rhonda in the first example, Cathy made a distinction between the theoretical side of science where objectivity and neutrality are desired and the practical side of science where individuals' diversity can bring something new and beneficial.

The third example involved Lee, whose conversation in this example was marked by frequent long pauses and tentative language exemplified by the use of "I don't know" (438-439). In response to the interviewer's question, whether women bring something different into the practices of science, Lee interpreted the question about difference as a question about women being "stronger scientists" (438). She carefully talked about gender differences in terms of "reading things and people differently?" (442) with some uncertainty. After another five second pause and sigh (446-447), Lee challenged her previous comment about gender differences and moved to a gender neutral stance: "everybody looks, looks at things differently"(447) thereby avoiding the question of women and difference. In line 448, Lee

explicitly moved away from the notion that "women have a much better view of stuff" (448). My responses to her attempted answers remained ambiguous (i.e., "mhmm") throughout, supporting but neither endorsing nor rejecting her answers, and Lee continued to avoid answering questions by saying "that's hard" (450) and "I don't know" (452). Lee's interpretation of the initial question as asking about women being better led to awkward pauses and discursive moves that enabled her to avoid answering the questions. Clearly, for Lee, the matter of gender differences was sensitive. She did not commit herself one way or the other, although she clearly distanced herself from the notion that women are better.

In the three excerpts, the participants talked about gender differences and their implications for science in various ways. Interestingly, Rhonda and Cathy distinguished between two spheres of science where gender differences do or do not matter. Rhonda elaborated her argument that women may do science differently due to their holistic and intuitive qualities, emphasizing the gender differences favoring women. Cathy, on the other hand, claimed that gender did not matter in mathematics although she acknowledged that having people from different cultures could be beneficial in classroom activities. For Lee, addressing why women are stronger scientists placed her in a difficult position from which she attempted to move away. Although the participants worked up various versions of gender differences in making their claims, difficulty in making claims of gender differences was evident in their talk. In other words, arguing that women do science differently is not a straightforward matter. Rhonda and Maria worked hard to construct a version in which women's qualities were essentialized and celebrated, but a lot of tentative language was used throughout their talk, anticipating potential criticism against their claims. Cathy both rejected

and claimed gender differences, but maintained that such differences are not important in doing mathematics. Finally, Lee avoided taking one side or the other. The participants' talk, therefore, indicates that there is something controversial about gender differences and their implications for doing science. Before I discuss the controversy and dilemmas in talking about gender differences, in the next section women's denial of personal disadvantage will be examined as another discursive strategy for women making a place for themselves in science.

Talking about disadvantages: Avoiding the disadvantaged subject position

All the participants were asked what it was like being a woman in their areas of study or work. While they generally avoided positioning themselves as being disadvantaged, they used various discursive strategies to achieve such avoidance. These included (1) temporal distancing, describing discrimination against women in science as a thing of the past (e.g., Taku and Natalie), (2) avoiding personal engagement in the topic using personal distancing (e.g., Arlene), and (3) claiming gender-neutrality. The three excerpts used in this analysis can be found in Appendix H.

The first example is a conversation between Taku and Natalie, who knew each other before participating in the interview, and is an example of temporal distancing. At the beginning of the excerpt, Taku followed up Natalie's previous comment that her female supervisor at graduate school was unsupportive. Emphasizing 'my' experience in 'my' science (50-51), Taku avoided generalization, but simultaneously enhanced the credibility of her claim with experiential evidence. She subsequently presented an elaborate theory about why these women became "a nightmare to work for" (58); that is, these women become a "bitch" (57) in order to survive and be respected in the male-dominated atmosphere. Taku used qualifiers to make her statement credible, specifying the number of universities she's

familiar with (59), but at the same time being careful not to generalize, e.g., "my *general* experience for *most* women" (59-60; my emphasis). Using a close question, "do you think that's fair?" (62), Taku solicited agreement from Natalie. Taku, however, subsequently questioned her aforementioned theory and provided an alternative claim that these are simply women who are "driven to succeed", "like to compete" and are "motivated" but are labeled "bitch". She reinforced her point by making a direct comparison with men, who are labeled "hardworker" when they are "driven and focused". When I described this as the operation of gender stereotypes, Taku first agreed and then claimed that it's not true for the younger generation: "women are becoming more acceptable the way they are" (78-79). The rising intonation (e.g., "there's less of that?", 78; "to be accepted?", 80) left the matter of positive change as a question, but Natalie did not contradict her. Instead, Natalie supported Taku's comment by positioning the two of them as examples of the younger generation who contribute to such positive change by "training them up" (85). Drawing on the notion of women on top, Natalie distanced herself and Taku from the aforementioned women who struggled to be accepted in science by "having to get the hard exterior" (80). In this segment, then, Taku presented three conflicting versions of women scientists (i.e., women are 'bitches' vs. it's just a label unfairly applied vs. developing a hard exterior). Interestingly, Taku and Natalie made a temporal distinction between past and present, positioning themselves as not being subjected to the same difficulty as the older generation has been.

Personal distancing was another strategy utilized by some of the participants including Arlene. The interview with Arlene was the shortest one in the study and as evident in the excerpt, it was challenging for me as an interviewer to facilitate Arlene offering an account of her life as a woman in science. When asked about working in a male-dominated

environment, Arlene initially used tentative language, e.g., "mhmm" and "I think it's fine?" (70). In elaborating, she constructed this work situation as "normal", e.g., "always been working"; "don't know of it being different"; "haven't worked where there were a majority of people were women"; "quite, quite normal" (71-73). Nevertheless, she ended with laughter, marking the awkwardness of her answer--she had avoided telling me "what it's like". As I attempted to set up a context to talk about possible reasons for women's lack of participation and advancement in science, Arlene responded minimally simply saying "mhmm" (77, 81, 84). Subsequently, she provided two reasons for "why there are less women represented in higher levels" (93). Drawing on research "published in Nature", which showed that "women have to be three times more qualified as their male counterparts" in order to get a postdoctoral position (87-92), Arlene offered a de-personalized, factual account of discrimination in the post-doc selection process. Speculating that the demands of the higher level academic positions may be unappealing for some women as the second reason, Arlene carefully distanced herself from the topic using a textbook-like reference, e.g., "it's been theorized" (98). However, Arlene acknowledged the problem of women's attrition offering the speculation "whether there's this leaky pipeline or whether women aren't allowed *in* the pipeline?" (102-103). When I specifically asked whether she had experienced "any difficulties or obstacles", Arlene neither denied nor acknowledged having experienced gender-related problems in pursuing her career and explained that "it's always very difficult to be able to clearly identify if there was ever discrimination, you know, or, or not?" (110-111). Thus, Arlene maintained a detached position and avoided personal engagement using deflection and abstractions throughout the conversation. Simply avoiding discussing gender-

based disadvantage as a feature of one's own life might be an effective survival strategy for women in science.

Gender neutrality was another discursive strategy utilized by some of the participants including Christmas. When asked what it was like being in her discipline, Christmas immediately oriented to problems, emphasizing that she did not have "any issues, any problems" (37). Claiming that not getting "too aggressive" (40) is a secret to her problem-free experience in a male-dominated environment, Christmas individualized workplace problems and emphasized individual women's responsibility for keeping themselves out of trouble. In lines 59-60, she denied having experienced gender-based "discrimination", but recalled an incident where she and her woman colleague were told that "it takes two women engineers to do a man's job" (70). However, after hearing from the male colleague that the comment had not been directed at her, Christmas claimed that "it's not a (.) gender thing" (77). Subsequently, she blamed the woman engineer for being incompetent. When asked how Christmas was able to be successful in her job, she claimed that she "goes with the flow?" (87). Constructing a gender-stereotypical version of men talking about hockey and drinking, Christmas stated that "*when you get to know some* of these guys, they will listen to *some* of your women issues" (90-91). Describing the relationship between her and her male colleagues as "like a two-way communication" (91), she took a liberal humanist approach emphasizing gender-neutrality. Nevertheless, this is inconsistent with her previous gender-stereotypical construction of men and her effort to "go with the flow" (87). Thus, her account of gender relationships did not consistently reflect equality despite her proposed egalitarian moral stance that "your conversation with a woman should be no different than (.) with a man (laughs)" (93-94). The laughter at the end further marked the contradiction between the

proposed egalitarian ideal and her account of gender relations in her own workplace. Still, accounts of difference were followed by qualifications of similarity that supported her claim of having no gender-based problems.

These excerpts illustrate three ways in which women negotiate participating in science by denying any personal disadvantage. Temporal distancing was exemplified by the excerpt of Taku and Natalie, who made a distinction between the past and the present, positioning themselves as the younger generation who contributed to positive change in science where women can be accepted for who they are. By doing so, they distanced themselves from the women of the older generation who had to put on a hard exterior in order to be accepted in science. They also avoided positioning themselves as disadvantaged and constructed women's struggle to be accepted in science as in the past. Personal distancing was exemplified in the conversation with Arlene. Positioning herself as a detached observer and providing textbook-like accounts, Arlene used abstractions and deflection. In effect, her account was structured according to scientific principles such as objectivity and the need for empirical evidence to support one's claims. Thus, one way to make a place for women in science may be to take up subject positions modeled on scientific ideals. The third discursive device for positioning was identified in the talk with Christmas. Despite her attempt to construct a version of her workplace as characterized by gender equality, her account of gender relations in the workplace also included moments of gender inequality. Nevertheless, she explained away the gender inequality in various ways, thereby maintaining the principle of gender equality in access to science. Importantly, the three discursive devices enabled the participants to position themselves as not disadvantaged. Making a place for

women in science seems to entail the denial of disadvantage. The implications of this will be discussed in the next section.

Discussion

In the analysis, multiple ways in which the participants talked about gender differences and women's disadvantage in science were explored. In the context of the interviews, the participants presented various versions of gender differences and similarities as well as multiple subject positions that deny personal disadvantage. These discursive moves served to create places for themselves and other women in science. However, talking about gender differences and denying personal disadvantage were not a straightforward matter as the participants' claims were marked by hesitancy and tentativeness. The participants' talk anticipated potential refutation and counter-arguments and hence constructed gender and personal disadvantage as problematic. In this section, the controversies and dilemmas associated with arguing for gender differences/similarities and in denying personal disadvantage will be discussed. Finally, their implications for women in science will be discussed.

The hesitancy and tentativeness of participants' talk about gender differences is characteristic of the way people talk in the face of controversy and dilemmas. In this case, the dilemma pertains to claims about gender and gender differences. In other words, making a claim for gender differences implies an argument against gender similarity, and vice versa. Moreover, both emphasizing and de-emphasizing or denying gender differences could be used either to legitimize or deny women's place in science. The notion that different versions of, e.g., gender, may be used flexibly to support a variety of contradictory positions has been referred to as *ideological dilemmas* (Billig, Condor, Edwards, Gane, Middleton, & Radley,

1988). Not only does taking up one side of the argument entail arguing against another side, but taking one position over another potentially has negative consequences. Thus, the participants' hesitancy, tentativeness and avoidance in talking about gender marked the issue of gender differences/similarities as problematic.

Emphasizing gender differences through constructing a claim that women can bring positive qualities to science because they are "better," "efficient," and "intuitive" compared to men, Maria and Rhonda used their claim to support the argument that more women are needed in science. Maria and Rhonda's stance parallels the 'maximalist' position in gender scholarship, a historical tradition that emphasizes gender differences and essentializes women's psychological qualities (Bohan, 2002; Chodorow, 1978; Gilligan, 1982; Keller, 1987; Miller, 1976). The potential problem with such a claim is that it could be used to argue against concerns regarding the under-representation and participation of women in science. For example, the claim that "efficiency" and "intuitiveness" are not necessary for the practice of science and maybe even counter-productive (i.e., reason triumphs over intuition), undermines the argument for creating a place for women in science. Indeed, Rhonda provided an extensive defense of intuition as an important element of science practice, while allowing that this is not publicly accepted. Thus, Rhonda anticipated the counter-argument to her claim of women's special qualities. Furthermore, essentializing gender differences as Rhonda did in her construction of women's differences as biological supports the argument that women have something unique to offer science but also creates an opening for similar arguments favouring men to be made. Thus, Maria and Rhonda oriented to this controversy in the way in which they constructed their claims about gender differences.

De-emphasizing gender differences through claiming that women and men do mathematics in the same way, Cathy used her claim to support the argument that women are as capable as men in doing science. Cathy's position parallels a 'minimalist position,' a historical tradition that de-emphasizes gender differences and has focused on the systematic measurement of psychological and behavioural traits of women and men in order to demonstrate that women are essentially not different from men (Bohan, 2002: Hyde, 2005; Maccoby & Jacklin, 1975; Spelke, 2005). Arguments that minimize gender differences, just like those that maximize differences, are problematic because they can be used rhetorically to not only advantage but also to disadvantage women in science. On the one hand, Cathy's claim that women contribute to the knowledge production in mathematics just like men do could serve to promote gender equality in science. On the other hand, the construction of a genderless researcher as an ideal in science might perpetuate the notion that women are no more needed in science than men, therefore rendering the issue of women's lack of participation in science unimportant.

Discourses of gender difference and similarity are difficult to avoid because they are readily available in popular accounts as well as in the research literature. For example, as previously noted, the feminist critique of science formulates science culture as 'masculinized' and emphasizes the possibility of women's distinctive contribution to knowledge production in science (e.g., Keller, 1983; Schiebinger, 1999). In my study, the topic of gender and science was a central element of the interview guide. Hence, it would have been difficult for my participants to avoid it completely, but despite their familiarity with the topic, their talk was characterized by uncertainty and elaborate justifications. In general, if arguments about gender difference and similarity can be used not only to

advantage but also to disadvantage women in science, the research tradition that focuses on gender difference becomes questionable as a means to promote women's participation and advancement in science. Similarly, for women scientists, this debate may not prove helpful in legitimizing their places in science.

The dilemma associated with talking about women's disadvantages was apparent in the participants' use of various discursive devices to avoid positioning themselves as having experienced difficulty or obstacles in their profession. Taku and Natalie used temporal distancing, describing discrimination against women in science as an event in the past and Arlene used personal distancing, avoiding personal engagement in the conversation and not talking about her own experience. Christmas, on the other hand, claimed gender-neutrality at a workplace, individualizing workplace discrimination. In traditional research contexts, Crosby and other researchers have noted a similar pattern of women's denial of personal disadvantage despite their acknowledgement that other women might be disadvantaged (Crosby, 1982; Denmark, Rabinowitz, & Sechzer, 2000). Crosby (1982) has termed this phenomenon the "ostrich effect" by which gender discrimination is thought to operate on a societal level, but not on a personal level. Based on their research findings, Crosby and her colleagues concluded that people who are disadvantaged or oppressed do not seem to have a clear understanding of their own disadvantage, suggesting that false consciousness is at work (Crosby, Clayton, Alkinis, & Hemker, 1986). In addition, other psychological and cognitive accounts of false consciousness have been suggested to explain the denial of personal disadvantage as system-justifying beliefs held by members of oppressed groups (Jost, 1995; Augoustinos, 1999). However, the proposed explanations for women's denial of personal disadvantage are problematic because they tend to imply, whether intentionally or not, that

individual women fail to perceive reality accurately or fail to recognize the need for social change (Augoustinos, 1999).

The participants in my study resisted the position of being personally disadvantaged in multiple ways, i.e., temporal distancing, personal distancing, and claiming a gender-neutral work environment. These were strategically worked up within the context of particular research conversations. False consciousness and cognitive failure are not satisfactory explanations for these varied discursive moves. Within a discursive framework, the women's denial of personal disadvantage has several implications. By denying personal disadvantage, the participants presented themselves not as victims but as normal, functioning scientists, which served to legitimize their current participation and positions in their professions. Women who acknowledge their disadvantage may be seen as victims and held accountable or blamed for their experiences of disadvantage, and the problem of blaming individual women is that the social, interactional contexts in which the problems are produced go unexamined. In other words, individualizing women's disadvantage means the status quo, which is maintained by unequal power relations, remains unchallenged because the issue of women in science becomes a problem of individuals requiring individual solutions.

Another implication of women's denial of personal disadvantage is political. If there is no one who reports and discusses personal disadvantage in a profession, there can be no movement or activism to improve the status of women in science. One reason why women continue to be under-represented and have difficulty advancing their careers in science despite researchers' and policy makers' efforts to ameliorate the status of women in science may be that women themselves do not complain and demand change even though

information about salary and resource inequities are known. Thus, when problems like the under-representation and participation of women in science become individualized and women deny personal disadvantage, injustices that cannot be addressed by collecting equity data may continue unchallenged.

Not only the participants' talk about gender difference/similarity and denial of personal disadvantage but also the ways my participants approached the project, exemplified the culture of science. In the recruitment process, the potential participants were very concerned about confidentiality and anonymity. Although I introduced my project as focusing on women's success and struggle, when asked what it is like being women in their area of science, my participants often oriented towards talk about (lack of) difficulties or obstacles facing women in science. During the interviews, they were often very careful about sharing their personal stories in relation to disadvantage. Thus, it became clear that talking about their lives in science is a sensitive topic and talk of personal disadvantage is not safe.

In sum, I argue that the participants constructed versions of gender differences and denied personal disadvantage to legitimize, and therefore create a place for themselves in their profession. The problem with making arguments about gender differences is that such arguments can be used not only to legitimize women's places in science but also to deny them, which makes arguing for gender differences and similarities as a basis for gender equality problematic. In addition, although denying personal disadvantage could be a useful strategy to create a place for women in science, it may also serve to maintain inequalities that disadvantage at least some women.

My research findings have implications for how to approach the issue of women in science. Although researchers and policy-makers have investigated the issue at the level of

individuals and institutions, their proposed solutions will not be able to effectively address the socio-political context in which individual women scientists are motivated to deny personal disadvantages. On the one hand, research at the level of individuals tends to mask social problems by individualizing women's disadvantages and delegating the task of creating solutions to individual women. On the other hand, research at the level of institutions tends to ignore subtle forms of discrimination or difficulty arising within the culture of science, such as the denial of disadvantage. Therefore, an alternative way to create solutions would be collective action so that individual women do not have to risk their careers in demanding changes in their profession. Organizations such as the Alberta Women's Science Network (AWSN), which was formed to provide women in science and engineering with venues to communicate and share resources to improve the status of women in their profession, are one example. Educating researchers, policy-makers and members of the scientific community about the current status of women in science and arguing for the change in the current culture of science (e.g., the assumption that women are somehow less legitimate members than their male counterparts) is beyond individual efforts.

Arguably, my project makes contributions to both psychological theory and social practice. On the theoretical side, the ways in which my participants denied personal disadvantage challenged the explanations provided by the previous research literature attributing the denial of personal disadvantage to false consciousness or women's cognitive failure to understand the problem. Another theoretical contribution of my research would be the focus on the dilemmas associated with women's talk about gender difference/similarity in science; such findings further question the utility of research traditions overemphasizing gender difference/similarity. Instead, I would argue that preoccupation with gender

difference/similarity is not beneficial in terms of promoting women in science and that the focus should be directed towards exploring alternative ways to think about gender and its implications for women in science so that women can pursue their studies and careers without being constrained or limited. On the practical side, the current project points to collective action as a way to create solutions for women in science. Advocacy groups and special organizations are better able to bring the broader changes much needed in science, without jeopardizing individual women and their status.

Future research taking a discursive approach could build on the contributions of this thesis by exploring the culture of science in different contexts. For example, it would be interesting to analyze the accounts of women in science who also are positioned as ethnic or racial minorities. In addition, a sample heterogeneous in terms of generation and with multiple participants from each generation might provide some insights on changes in the cultural discourse of science over time. As I have argued above, change in women's representation and participation in science is not well served by formulating the problem in individual terms and proposing individual strategies. Instead, future research and practice must focus on the social relations within science that work against the ideal of gender equality.

References

Atkinson, J. M. & Heritage, J. C. (Eds). (1984). *Structure of social action: Studies in conversation analysis*. Cambridge: Cambridge University Press.

Augoustinos, M. (1999). Ideology, false consciousness and psychology. *Theory & Psychology, 9*, 295-312.

Bebbington, D., Athena Project, & Equality Challenge Unit. (2002). Women in science, engineering and technology: A review of the issues. *Higher Education Quarterly, 56*(4), 360-375.

Billig, M., Condor, S., Edwards, D., Gane., M., Middleton, D. J., & Radley, A. R. (1988). *Ideological dilemmas: A social psychology of everyday thinking*. London: Sage.

Bohan, J. S. (2002). Sex differences and/in the self: Classic themes, feminist variations, postmodern challenges. *Psychology of Women Quarterly, 26*, 74-88.

Chodorow, N. (1978). *The reproduction of mothering*. Berkeley: University of California Press.

Clewell, B. C., & Burger, C .J. (2002). At the crossroads: Women, science and engineering. *Journal of Women and Minorities in Science and Engineering, 8*, 249-253.

Conefrey, T. C. (1998). Discourse in science communities: Issues of language, authority, and gender in a life sciences laboratory. *Dissertation Abstracts International, 58*, 10A.

Cronin, C., & Roger, A. (1999). Theorizing Progress: Women in science, engineering and technology in higher education. *Journal of Research in Science Teaching, 36*(6), 637-661.

Crosby, F. J. (1982). *Relative deprivation and working women*. New York: Oxford University Press.

Crosby, F. J., Clayton, S., Alkinis, O., & Hemker, K. (1986). Cognitive biases in the perception of discrimination: The importance of format. *Sex Roles, 14*, 637-646.

Dale, B., & Rosemary, L. (2003). Letting girls speak about science. *Journal of Research in Science Teaching, 40*, 176-200.

Davies, B., & Harré, R. (1990). Positioning: The discursive production of selves. *Journal for the Theory of Social Behavior, 20*, 43-65.

Denmark, F., Rabinowitz, V., & Sechzer, J. (2000). *Engendering psychology: Binging women into focus*. MA: Allyn & Bacon.

Edley, N. (2001). Analyzing Masculinity: Interpretative repertories, ideological dilemmas and subject positions. In M. Wetherell, S. Taylor., & S. J. Yates (Eds.). *Discourse as data: A guide for analysis* (pp.189-228). Milton Keynes: Open University Press.

Ferreira, M.M. (2003). Gender differences in graduate students' perspectives on the culture of science. *Journal of Women and Minorities in Science and Engineering, 9*, 119-135.

Gilligan, C. (1982). *In a different voice: Psychological theory and women's development.* Cambridge: Harvard University Press.

Hare-Mustin, R. T., & Marecek, J. (Eds.). (1990). *Making a difference: Psychology and the construction of gender*. New Haven: Yale University Press.

Hyde, J. S. (2005). The gender similarities hypothesis. *American Psychologist, 60*(6), 581-592.

Jost, J. T., & Burgess, D. (2000). Attitudinal ambivalence and the conflict between group and system justification motives in low status groups. *Personality and Social Psychology Bulletin, 26*, 293-305.

Katila S., & Merilainen, S. (1999). A serious research or just another nice girl?: Doing gender in a male-dominated scientific community. *Gender, Work and Organization, 6*(3), 163-173.

Keller, E. F. (1983). *A feeling for the organism: The life and work of Barbara McClintock.* NW: W. H. Freeman and Company.

Keller, E. F. (1987). *Reflections of Gender and Science.* New Haven: Yale University Press.

Kelly, A. (1985). The construction of masculine science. *British Journal of Sociology and Education, 6*(2), 133-154.

Maccoby, E. E., & Jacklin, C. N. (1975). *The psychology of sex differences.* Standford, CA: Standford University Press.

Madill, H. M., Ciccocioppo A. L., Stewin, L. L., Armour, M. A., & Montogomerie, T. C. (2004). The potential to develop a career in science: Young women's issues and their implications for careers guidance initiatives. *International Journal for the Advancement of Counseling, 26*(1), 1-19.

Massachusetts Institute of Technology. (1999, March). A study on the status of women faculty in science at MIT: How a Committee on Women Faculty came to be established by the Dean of the School of Science, what the Committee and the Dean learned and accomplished, and recommendations for the future. *MIT Faculty Newsletter,* 11(4). Retrieved from http://web.mit.edu/fnl/women/women.html#The%20Study

Miller, J. B. (1976). *Toward a new psychology of women* (2nd ed.). Boston: Beacon Press.

Morawski, J. (1997). The science behind feminist research methods. *Journal of Social Issues, 53*(4), 667-681.

Morgan, C. S. (1992). College students' perceptions of barriers to women in science and engineering. *Youth & Society, 24*(2), 228-236.

Potter, J. (1996). Representing reality: Discourse, rhetoric and social construction. London: Sage.

Potter, J., & Wetherell, M. (1987). *Discourse and social psychology: Beyond attitudes and behavior.* London: Sage.

Rosser, S. V. (2004). *The science glass ceiling: Academic women scientists and the struggle to succeed.* NY: Routledge.

Rossi, A. (1965). Women in science: Why so few? *Science, 148*, 1196-1202.

Schiebinger, L. (1987). The history and philosophy of women in science: A review essay. *Journal of women in Culture and Society, 12*(2), 305-332.

Schiebinger, L. (1999). *Has Feminism Changed Science?* MA: Harvard University Press.

Spelke, E. S. (2005). Sex differences in intrinsic aptitude for mathematics and science?: A critical review. *American Psychologist, 60*(9), 950-958.

Steele, J., James, J. B., & Barnett, R.C. (2002). Learning in a man's world: Examining the perceptions of undergraduate women in male-dominated academic areas. *Psychology of Women Quarterly, 26*(1), 46-50.

University of Calgary, Canada, Office of Institutional Analysis. (2004, March). *Fact Book.* Retrieved on November 18, 2004, from the University of Calgary Web site: http://www.oia.ucalgary.ca/Facts/03-04FB.pdf

VanLeuvan, P. (2004). Young women's science/mathematics career goals from seventh grade to high school graduation. *Journal of Educational Research, 97*(5), 248-267.

Wallace, J. E. (2005). *Faculty Salary Equity Report.* Prepared for the Academic Women's Association through the Office of Dr. Hermina Joldersma President's Advisor on Women's Issues. University of Calgary.

Wetherell, M., Taylor, S., & Yates, S. J. (Eds.). (2001). *Discourse as data: A guide for analysis.* Milton Keynes: Open University Press.

Wyer, M. (2003). Intending to stay: Images of scientists, attitudes toward women, and gender as influences on persistence among science and engineering majors. *Journal of Women and Minorities in Science and Engineering, 9,* 1-16.

Appendix A

The Percentage of Student Enrollment in Science Programs

at the University of Calgary in the year 2003-2004

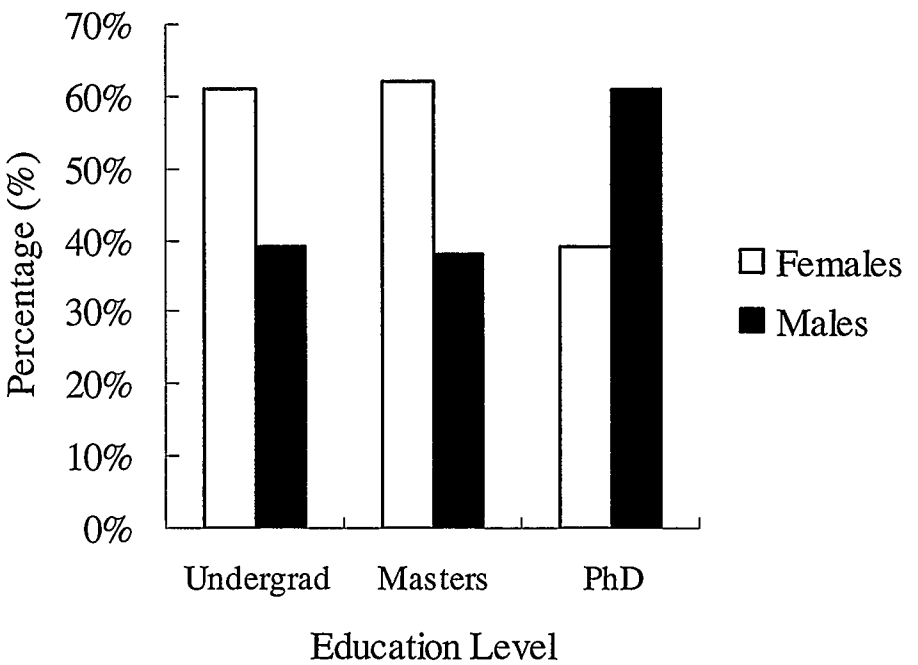

Figure 1. The percentage of female student enrollment in undergraduate, graduate and doctoral programs in Biological sciences at the University of Calgary (2003-2004).

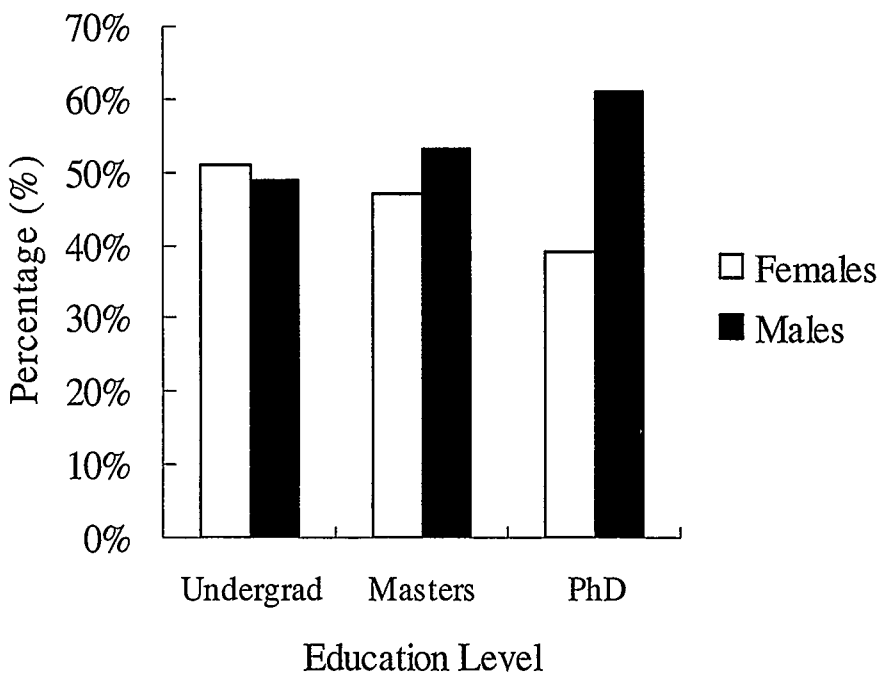

Figure 2. The percentage of female student enrollment in undergraduate, graduate and doctoral programs in Chemistry at the University of Calgary (2003-2004).

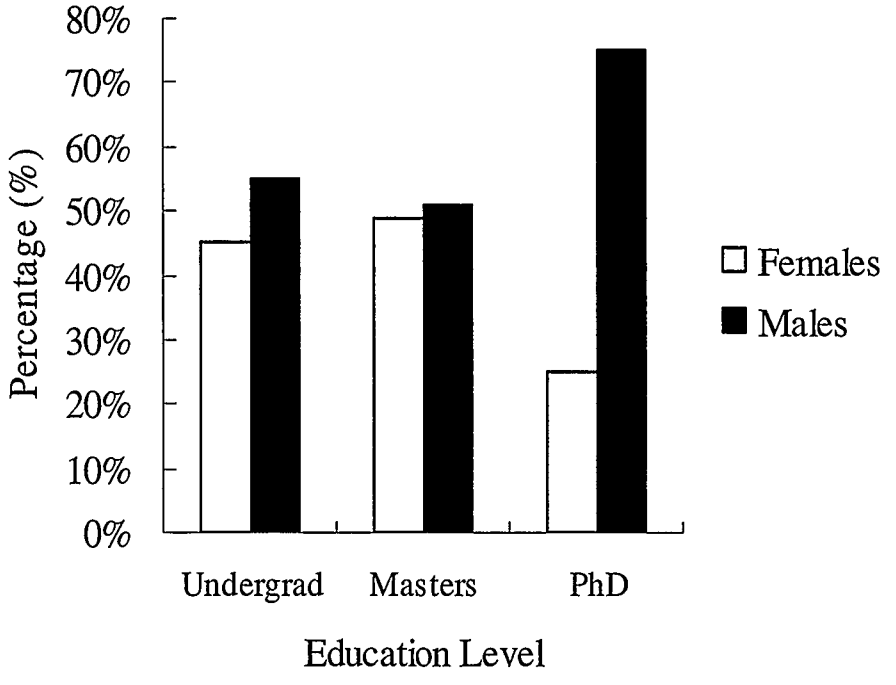

Figure 3. The percentage of female student enrollment in undergraduate, graduate and doctoral programs in Geology and Geophysics at the University of Calgary (2003-2004).

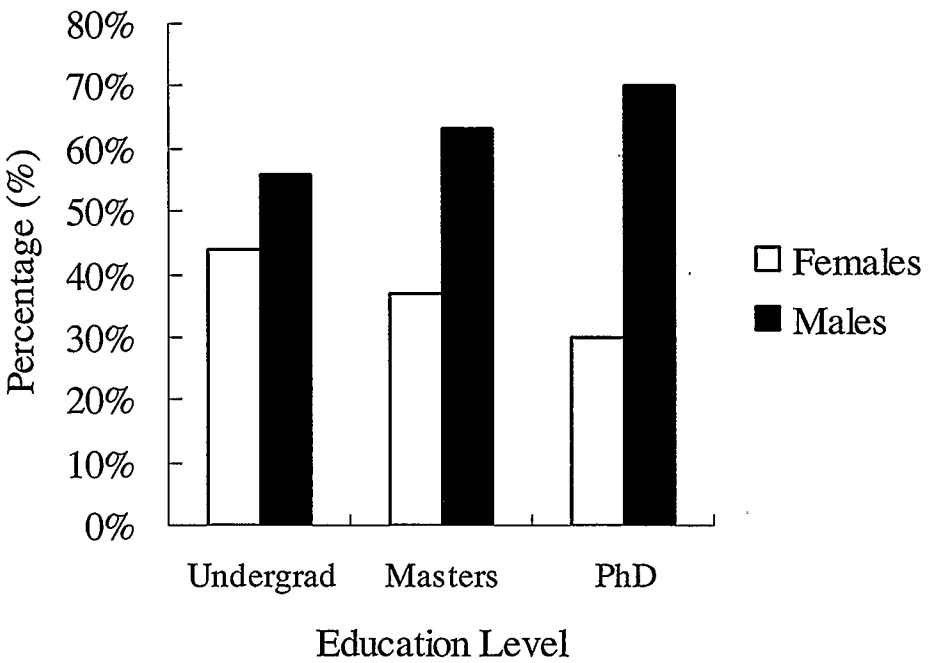

Figure 4. The percentage of female student enrollment in undergraduate, graduate and doctoral programs in Mathematics and Statistics at the University of Calgary (2003-2004).

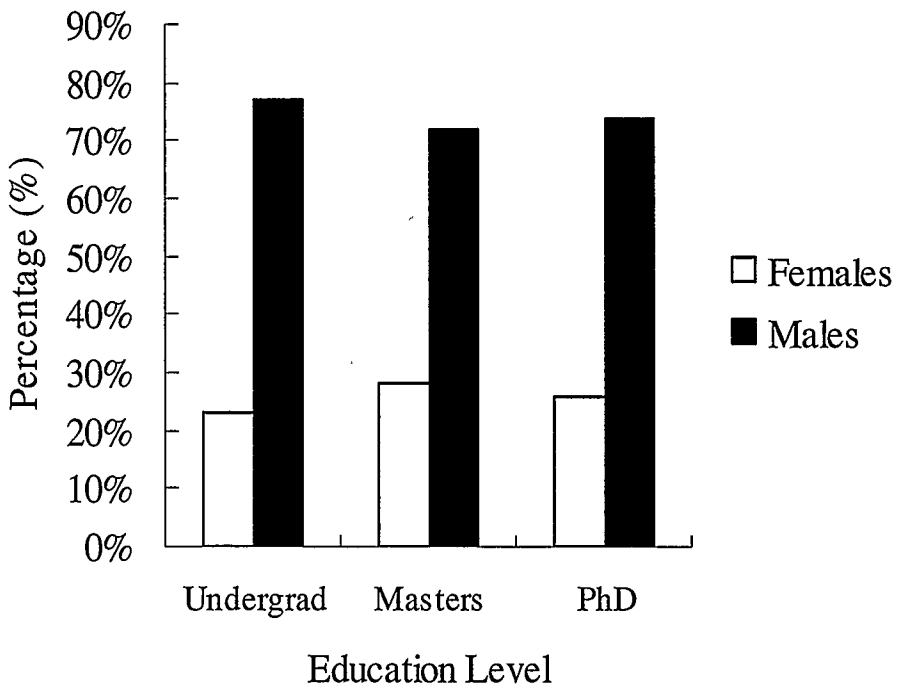

Figure 5. The percentage of female student enrollment in undergraduate, graduate and doctoral programs in Physics and Astronomy at the University of Calgary (2003-2004).

Appendix B

Recruitment Script

Hi. My name is Minji Kang and I'm a graduate student in clinical psychology at the University of Calgary. I am conducting my Master's thesis research under the supervision of Dr. Radtke and Dr. Stam. I'm calling/emailing you because I'm looking for women who are pursuing careers or graduate education in science to participate in a project on women and science. I'm calling to ask whether you would be interested in participating. This is an interview study that will take approximately one hour of your time. The questions focus on how women negotiate a place for themselves in the scientific community. I am interested in women's stories of success and struggle; what enables them to thrive in science as well as what discourages their participation and advancement. I hope to make an original contribution to the research literature in this area by emphasizing what women have been able to accomplish. The interview will be tape recorded and can be conducted either in a lab in the Department of Psychology or your office or lab. If you have a colleague or friend, who is eligible for the study and interested in participating, I could interview both of you at the same time. I very much appreciate your considering my request. Do you have any questions about the study? Would you be interested n participating? Can we set up a time?

Appendix C

Consent Form

Name of Researcher, Faculty, Department, Telephone & Email:
Minji Kang, Department of Psychology, (403)239-9201, kangm@ucalgary.ca
***Supervisor**: Dr. Lorraine Radtke, Department of Psychology*
Title of Project:
Women professionals' accounts of their lives in male-dominated areas of science

This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

Purpose of the study:
The current research aims to examine women professionals' personal accounts of their lives in the natural sciences, looking at how women negotiate a place for themselves in a scientific community. You were chosen as a possible participant because you are either a student in science or a working scientist in the areas of math, physics, chemistry and biology.

What Will I Be Asked To Do?
You are expected to participate in an interview study, which will last for approximately an hour. A series of questions will be provided in order to facilitate conversation. The session will be audiotaped and transcribed with all the identifying information deleted. Your participation is voluntary, meaning that you may refuse to participate altogether or may withdraw from the study at any time without penalty. You are free to not answer any questions you do not want to answer.

What Type of Personal Information Will Be Collected?
All participants shall be referred to by their pseudonyms of choice. Should you agree to participate, you will be asked to provide your gender, age, ethnicity, marital status, academic area of study/work and a pseudonym you wish to be referred to by. You are free to disclose as much or as little personal information as you like.

The pseudonym I choose for myself is:_____

Are there Risks or Benefits if I Participate?
Respecting privacy of the other participant(s) as well as your own is of crucial importance. Should you participate in a group discussion, you are expected to respect others' privacy and agree that you will not reveal the identity and any identifying information of the other participant(s) outside of the study. Although each participant will be asked to respect other participants' privacy and not disclose their identities/contributions outside the focus group settings, the researcher cannot control what is said outside the group. Consequently, absolute anonymity and confidentiality cannot be guaranteed.

What happens to the information I Provide?
Only the research and her supervisor will be allowed to hear the interview tape or read the transcripts. Only pseudonyms of your choice will appear on the transcripts. Once the transcription is complete, the tape and transcript will be stored in a locked filing cabinet in Dr. Radtke's research lab for five years. After five years of storage, they will be destroyed. In research reports of this study,

quotes from the interviews will be used but anything that might allow others to identify you will be omitted.

Signatures (written consent)

Your signature on this form indicates that you 1) understand to your satisfaction the information provided to you about your participation in this research project, and 2) agree to participate as a research subject.

In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. You should feel free to ask for clarification or new information throughout your participation.

Participant's Name: (please print) _____

Participants' Signature_____ Date:_____

Researcher's Name: (please print)_____

Researcher's Signature_____ Date:_____

If you have any further questions or want clarification regarding this research and/or your participation, please contact:

Minji Kang
Department of Psychology
(403)239-9201, kangm@ucalgary.ca
Supervisor: Dr. Lorraine Radtke, radtke@ucalgary.ca

If you have any concerns about the way you've been treated as a participant, please contact Patricia Evans, Associate Director, Research Services Office, University of Calgary at (403) 220-3782; email plevans@ucalgar.ca

A copy of this consent form has been given to you to keep for your records and reference. The investigator has kept a copy of the consent form.

Appendix D

Demographics Information Record

For demographic purposes (in order to make general comments about the range of participants in this study), you are invited to fill out the following information.

NOTE: All questions/answers are optional.

Age: _____

Ethnic background: _____

Marital status: _____

Area of your study/work: _____

Period of study/work in your area: _____

Appendix E

Conversation Guide

- In your opinion, what makes a good scientist?
- What is it like being a woman in your discipline?
- What is it like studying or working in the area where the majority of peers are male?
- Have you experienced any difficulties or obstacles in pursuing your career due to being a woman?
- Has being a woman been advantageous in pursuing your studies and careers in science?
- In your opinion, why do fewer women reach a higher level of science education/careers compared to men?
- Some have argued that science reflects a male bias and that women bring something different to the practice of science. What do you think about this in the context of your work in science?

Appendix F

Transcript Conventions

A simplified version of the transcription notation developed by Gail Jefferson (for a more comprehensive description, see Atkinson & Heritage, 1984):

= An equal sign at the end and beginning of speakers' utterances indicates the absence of a discernable gap between utterances;

[...] Material deliberately omitted;

? Rising inflection at the end of a phrase;

(.) A full stop in brackets indicates a pause which is noticeable but too short to measure;

[text] Interruptions that did not lead to a shift in speaker;

(test) Brackets are used to indicate clarifying information or descriptions, such as "laughs."

text Italicized words indicate that they are uttered with added emphasis;

TEXT Capitalized words indicate that they are uttered louder than the surrounding talk by the speaker.

Appendix G

Excerpts Used in the Analysis

M: I don't think, in *my* experience (.) I almost think that having (.) women in your group, or sometimes women are better workers than men [I: Mhmm] because we're focused, we really want to get something done, and we'll do it until it's finished. [I: Mhmm] Whereas men, you know, the men that I've encountered will (.) kind of do a haphazard job and then take a break (.) and then go back at it and, you know, whereas women can, I don't know, it just seems that women can be more focused [I: Mhmm] and finish a task whole heartedly, rather than a man. [I: Mhmm] I don't know, in my experience.
I: Mhmm. So more kind of organized [M: Yeah, I guess so] and better workers.
M: Yeah.
R: Mhmm.
M: Just (.) more efficient, that's the word I'm looking for.
I: Mhmm.
M: More efficient, yeah.
R: I don't know, I've worked with a lot of people, right? [I: Mhmm] So it's hard for me to say in that respect, but I would certainly (.) tend to believe that? [I: Mhmm] Because, just women run households [I: Mhmm], it's not men who run households [I: Mhmm], right? Multi-tasking, being organized, being efficient, um (.) those are all qualities that women seem to naturally possess, you know, they biologically possess. So I'm just wondering if this question even asks us about how women think differently and that women [I: Mhmm] tend to be more holistic and maybe even take the, uh, magic side of things [I: Mhmm] and (.) and (.) intuitively, like [I: Mhmm] rely on intuition, rely on psychic abilities and stuff [I: Mhmm]. Whereas in male-dominated science, western male science world, you know, [I: Mhmm] you can't, uh, you can't see spirit energy, therefore it doesn't exist. [I: Right] You can't manage it, therefore it's not real kind of thing, whereas I think women tend to be much more believers in magic, intuition [I: Mhmm], unseen forces and that kind of thing [I: Mhmm] so (.) I guess I would guess that there's probably a lot more research that would go on in (.) the Western world that would be more holistic. [I: Mhmm] Like in Indian stuff, they had no problem with that, accepting spiritual energy and psychic [I: Right] energy and, and being able to do experiments [I: Mhmm] taking that into account as one of the forces of nature, type of thing. [I: Right, mhmm]. Here in Western medicine, you know, Europe and North America [I: Mhmm] it's not happening that way. There are some labs that are doing a bit more of that, but I've noticed on the internet if you look up different subject levels, now of course most of these things are still run by men, but they have that sort of intuitive feeling. [I: Mhmm] 'Okay, there's definitely more than meets the eye here in terms of, you know, energy, the forces that are occurring in our system [I: Right] and there's more variables than we're actually accounting for [I: Mhmm] because there are these other things that we haven't actually quantified and labelled (.) scientifically yet [I: Mhmm], um. So maybe more and more of that goes on? I, I know in the teaching profession and in your profession, psychology, you'd be more aware of it too, right? [I: Mhmm] I mean, I know in psychology, intuition is considered something *real*, right? I mean, in science there's no such thing as intuition [I: Mhmm] but those who practice science know for sure that there is (laughs), it's just not something you're allowed to say.

782 I: Okay (laughs).
783 R: But women, quite freely, will say it, right?
784 I: Right.

I: So do you think women bring something different into the practices of science? So having more women in science is beneficial for the science discipline itself?
C: In the natural sciences [I: Mhmm] I do not think, sorry, that there is any difference.
I: Oh don't be sorry, right.
C: There is probably, I do not know, in psychology there is different approach and separation. In natural science, there is something which exists [I: Mhmm] independent of the researcher. So probably women have more persistence [I: Mhmm] and question the purpose, if it's important for biological laboratories, I do not know. [I: Mhmm] In mathematics, I do not think there is much difference [I: Mhmm]. Does not matter.
I: I see. Whether the researcher is a = male or female.
C:= Male or female, I do not think.
I: Okay.
C: At least there shouldn't be much difference [I: Mhmm]. Other things are much more important. Imagination [I: Mhmm], um (.) exactness [I: Right, right] and those kind of things.
I: Right. So those are qualities to have for scientists?
C: Yes. I, I do not think there is female mathematics and male mathematics [I: Mhmm]. I think they probably can bring something new to classes from a cultural point of view, but certainly not (.).
I: In terms of research.
C: Mhmm.

L: What makes us stronger scientists. Um (five second pause) I don't know (coughs). (Nine second pause). (Even though I'm a woman), I don't know (laughs).

I: (laughs).

(Five second pause)

L: Mmmaybee [I: Mhmm] we read things and people differently? Well, we certainly read more into body language of people [I: Mhmm] more than men do.

I: Mhmm.

L: Um.

(Five second pause).

L: (sigh). But I mean, everybody looks, looks at things differently [I: Mhmm] and so (.) I mean you can't say that (.) women for sure [I: Mhmm] have a much better view of stuff [I: Mhmm]. There are some men, obviously, who are gonna have some very unique (.) view on. That's hard.

I: Mhmm.

L: I don't know.

Appendix H

Excerpts Used in the Analysis

T: I just want to follow up a bit on what Natalie said about women. [I: Mhmm] It's been my experience in my science that women supervisors are not great people to work for.
I: Mhmm, why is that?
T: Uh (.) well (.) part of it is having to deal with the male-dominated atmosphere. [I: Mhmm] You have to be (.) to complete a PhD, I think less so for master's, but to complete a PhD you have to have a strong personality [I: Mhmm] just to get you through the adversity that you face. In women, it tends to be, uh, you tend to grow in this environment where, the bigger bitch you are, the more respect you get [I: Mhmm] and in order to compete with men there's a lot of women that just end up being a nightmare to work for [I: Mhmm] and that's been my, I've been in [...] Universities and that's (.) my general experience [I: Mhmm] for most women [I: Mhmm] that run their own lab.
I: Okay.
T: Do you think that's fair?
N: Mhmm. I think it is fair.
I: Mhmm.
T: And part of it is the label that you're, you're given. [I: Mhmm] If you're a woman and you're driven to succeed and you're, um (.) you like to compete and you're motivated [I: Mhmm], you're considered a bitch. But if you're a man who's driven and focused [I: Mhmm] and that sort of thing, you're considered to be a hardworker and, you know.
I: Right, right.
T: He's narrow-focused and understands where he wants to go [I: Mhmm] and what he needs and, you know, like it's just a different way of how you're viewed [I: Right] depending on what sex you are.
I: Mhmm. It's almost like gender stereotypes are operating.
T: Yes.
I: Like not in favour of women in this case.
T: Now that's not (.) I would say that that has not continued with the younger generation in sciences that are coming through [I: Mhmm]. I think men have realized through grad school that women are their equals [I: Mhmm] and there's less of that? Uh, women are becoming more acceptable [I: Mhmm] the way they are, instead of having to get the hard exterior to be accepted?
I: Right, mhmm.
T: So, uh (.) I think.
N: Mhmm.
I: Right.
N: We've trained them up.
All: (laughs).

I: Mhmm, I see. So I'm, um, I'm wondering, like, um, in terms of the professoriate kind of level, like what are the, how many professors are women versus men in the department?
A: Ohhh, I haven't counted recently but I, I think it's approximately (.) 10% or something like that.
I: Mhmm. Mhmm, I see. So what is it like kind of working in the area where the majority of peers are male?
A: Mhmm? Ummm (.) I think it's, I think it's fine? [I: Mhmm] It's, it's certainly an environment that I've always been working in, so I don't know of it being different in work. So, I haven't worked where there were a majority of people were women, so it also seems quite, quite normal (laughs).
I: (laughs). Um, and, uh, I'm wondering, like, um, in the research literature, as well as kind of stat-statistics in student enrolment in, at the U of C, kind of show that as one goes up to a higher level of education, fewer women exist?
A: Mhmmm.
I: So, you know, at an undergrad level, for example, in biological science last year, actually the majority, like, more than, the women basically *outnumber* men at the undergrad level in biological sciences particularly?
A: Mhmm.
I: But as one goes up to (.) master's, PhD and the faculty level, really kind of the level, the pattern of at-attrition is quite noticeable.
A: Mhmm.
I: So I'm wondering, in the context of your own experience, what might account for this phenomenon?
A: I, I would say that there's possibly *two* reasons for this. [I: Mhmm] One is there was a study that was done a few years ago that showed that women who were applying for a postdoctoral position had to be three times as qualified as their male counterparts in order to get the job.
I: Wow.
A: Sooo, and, and that was published in *Nature*, I think. [I: Mhmm] So that could be one significant reason why there are less women represented in higher levels. [I: Mhmm] Ummm (.) second? The job is (.) highly demanding as, as you progress through. So as a graduate study it's harder, or as a graduate student it's harder than undergraduate levels. At the postdoctoral fellow it's harder than graduate studies [I: Mhmm], it's more demands on your time, and especially when you get to faculty level position, it is even more demanding. [I: Mhmm] And (.) it's been theorized that perhaps that women are not (.) *keen* to take up a position that is imbalanced in many different ways. [I: Mhmm] So it could be that it doesn't *appeal* to, to women to continue through that career path but, I think, given that other study there's, I think it's warranted to look at exactly [I: Mhmm]

whether there's this leaky pipeline [I: Mhmm] or whether women aren't allowed *in* the pipeline?

I: Right, right. So, um, you think that there are, there must be some individual reasons why women don't go up to a higher level of education? As well as some maybe systematic discriminations or difficulties that women face as one goes up?

A: Mhmm.

I: So I'm wondering if you have personally experienced any difficulties or obstacles in pursuing your careers because you're a woman?

A: Right. Ummm (.) nothing that I could specifically identify? [I: Mhmm] I think it's always very difficult to be able to clearly identify if there was ever discrimination, you know, or, or not?

I: Right.

I: I see. So, um, this, I guess, I mean you can answer this question in different ways because you have work experience as well as you've been a student in [...], so what is it like being a woman in your discipline?
C: Ah, I, I, you know what, I've never had any issues, any problems. [I: Mhmm] Umm (.) in (.) *any* place I worked? And I do work in fairly male-dominated type environments and I get along great with the people that I meet. Umm (.) I think the secret to that is probably (.) umm don't get too aggressive [I: Mhmm] because they'll treat you the same way as anybody, whether regardless you're a woman or a man [I: Mhmm] and you get too aggressive? [I: Mhmm] They will fight back. And they will be nasty and [I: Mhmm], umm, so it's no different, um, than telling a MALE, men telling a male colleague to go F-off and, or, um, telling a *woman* or making remarks about a woman or being really hostile towards a woman? [I: Mhmm] So as long as you're nottt (.) aggressive? [I: Mhmm] In terms of trying to climb the corporate ladder or, if you do climb the corporate ladder (laughs) do it in the nice way (laughs), I guess.
I: Okay, okay.
C: So.
I: Okay, so not being aggressive could be one kind of strategy to get along with your (.) whether it's male or female, but your colleagues.
C: Yeah, I mean it's more I'm kind of, I find go with the flow? Because I have had comments from men, because I do work closely with other um (.) women in the workplace [I: Mhmm] and I, you know, these guys will be complaining to me about her? So it's (.) so it's not really being a *woman* [I: Mhmm], it's that person.
I: Right.
C: And it's no different than them complaining to me about another guy. [I: Mhmm] So (.) um (.) so I have never experienced that gender-type ah, discrimination [I: Mhmm] at all.
I: Mhmm.
C: Umm, the only comment I have ever had was in my first year of work. [I: Mhmm] Anddd (.) what the guy had said, I was working with another woman engineer on this project that she was working on and I had developed some, um (.) shortcuts [I: Mhmm] so that, um (.) so basically they don't have to spend as much time [I: Mhmm] with the engineering and, like, spend as long in the mechanical engineering so it would be really parametric? [I: Mhmm] And you'd only have to enter values and it would create whatever it is, well, it was for the keypad so basically what keypad they want and, uh, one of the older guys [I: Mhmm] made a comment and said, 'It takes two women engineers to do a man's job.' Yeah, I (.) initially I thought, where the heck is that coming from?
I: (laughs) Kind of (.) old school (.)mentality (laughs).
C: But the thing is (.) again, the other woman engineer must have rubbed him the wrong way because he came back about, after she left, he came up to me and he apologized and said, 'That comment was not directed to you.'
I: Okay. Mhmm, mhmm.
C: So (.) no, it's not a (.) gender thing (laughs).
I: Okay. So he implied, he implied that that comment was directed to another= colleague
C: =To her.

I: Mhmm.
C: Because he felt that she was (.) not pulling her weight, I guess. And for me, that's a fair comment regardless of whether, um, you're male or female [I: Right]. If you're not pulling your weight [I: Mhmm] you're not (.) you know, you're not being productive.
I: Mhmm. I see. So what do you think that, what kind of sets you apart from these women colleagues that, such that you can get along well and be successful at work?
C: Umm? As I said, go with the flow? [I: Mhmm] Because sometimes (.) umm (.) you know they'll talk about hockey [I: Mhmm] and, or (.) whatever type of sports or they'll talk about, 'We went drinking the night before,' and that kind of thing. Um, but at the same time, when you get to know some of these guys, they will listen to some of your women issues as well so, so it's, like a two-way communication, so it's, it's not treating them as a guy? [I: Mhmm] It's treating them as a person [I: Mhmm], soo (.) um, your conversation with a woman should be no different than (.) with a man (laughs).

Appendix I

Certification of Institutional Ethics Review

UNIVERSITY OF CALGARY

CERTIFICATION OF INSTITUTIONAL ETHICS REVIEW

This is to certify that the Conjoint Faculties Research Ethics Board at the University of Calgary has examined the following research proposal and found the proposed research involving human subjects to be in accordance with University of Calgary Guidelines and the Tri-Council Policy Statement on *"Ethical Conduct in Research Using Human Subjects"*. This form and accompanying letter constitute the Certification of Institutional Ethics Review.

File no:	**4514**
Applicant(s):	**Minji Kang**
Department:	**Psychology**
Project Title:	**Women Professionals' Accounts of Their Lives in Natural Science**
Sponsor (if applicable):	

Restrictions:

This Certification is subject to the following conditions:

1. Approval is granted only for the project and purposes described in the application.
2. Any modifications to the authorized protocol must be submitted to the Chair, Conjoint Faculties Research Ethics Board for approval.
3. A progress report must be submitted 12 months from the date of this Certification, and should provide the expected completion date for the project.
4. Written notification must be sent to the Board when the project is complete or terminated.

J. Kent Donlevy, Ph.D.
Acting Chair
Conjoint Faculties Research Ethics Board

Date: Aug 23/05

Distribution: (1) Applicant, (2) Supervisor (if applicable), (3) Chair, Department/Faculty Research Ethics Committee, (4) Sponsor, (5) Conjoint Faculties Research Ethics Board (6) Research Services.