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An Ethnography of Women Inventors in Chicago

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AN ETHNOGRAPHY OF WOMEN INVENTORS IN CHICAGO

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This project is dedicated to the many innovative, but too often invisible, men and women whose inventions have allowed us to break ground which might have otherwise been left unturned.

PREFACE

This project studies Chicago women inventors and their work. Specifically, this study looks at how women inventors experience double marginalization by virtue of being women and also by participating in the activities of inventing which continue to be neither clearly understood nor clearly defined by members of the general and professional public.

This study first explores previous and traditional explanations for women inventor's double marginalization. Then, through excerpts taken from the content of twenty face-to-face interviews with Chicago women inventors, this project goes on to look at the daily lives of Chicago women inventors, their failures and their triumphs.

Just who are the women inventors in this study? The question of "who is an inventor" is a theoretical point that is central to this study. For the purposes of selecting interview subjects, I have defined inventor as anyone who has been in contact with the Chicago Inventor's Council by attending workshops, being on their mailing list or responding to the newsletter

"calls for inventions". The greatest problem with this operational definition is that it excludes other populations of inventors who have not come in contact with the Chicago Inventor's Council. Although these inventors are equally important as those included in this study, avenues in addition to the council will have to bring them out of obscurity. Possibly this study is one such avenue.

It is through these interviews that we learn about the problems women inventors continue to face and it is through their successes that we learn how they are solving these problems; or at least, forging ahead despite them.

The more general value of this study is that a more public understanding of women inventors' constraints, and in some instances of success, their solutions, is at least one important step to redefining and better integrating inventors and their inventive activities into the mainstream of general and corporate life. The more specific value of this study is that through a common voice inventors, male and female, can

communicate their experiences in a way that is less individually threatening. As has been historically so, especially for women, collective activity is likely to be the greater step toward demarginalizing not only women's positions as inventors, but women's positions as innovative contributors to society overall and in general.

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CHAPTER I

INTRODUCTION: "ARE THERE ANY WOMEN INVENTORS?"

Modern independent inventors, whether male or female, are rarely taken seriously. Quite often they are considered figures out of history books, obscure and aloof little old men with wild hair and white laboratory coats. The modern and corporate notion of inventor conceptualizes him as a scientist or at least a member of a research and development team which capitalizes on product developments, at least some of which we can find in the worlds of medicine, technology or even personal care. So it is little wonder that when I first began telling friends and family about my studying women inventors their first question was "are there any?". You see, women inventors have always been hidden. Despite extensive research by both female and male scholars and writers, the prototype, inventor, user, thinker and reactor continues to be male (Keller, 1974; Daniels in Rothschild, 1983). In fact, the recent work of Amram and Morgan (1980, 1984) revealed that women inventors remain unfamiliar names, even to feminists.

Yet, despite the rumors, not all invention takes place in laboratories, not all inventors are scientists or engineers, and certainly not all inventors are men. Specifically, this project looks at the lives and inventions of Chicago women inventors and shows that women inventors are not only "out there" but that they are indeed "inventing". This project also looks at how and possibly why the independent inventor, as opposed to the corporate researcher or scientist, remains invisible, whether male or female. Especially this project looks at how being a female in the world of inventing works to doubly marginalize the independent female inventor.

This double absence as independent inventors and as women has many causes. In part it results from historian's blindness to women's innovative contributions. Historians, who have been men for most of history, have treated the products of women's creativity, especially in the domestic sphere, as trivial and obvious. As Precious argues:

> The invention of domestic products is likely to be seen as simply "finding a better way" to do house work, an improvisational "make-do", or an extension of the traditional home-maker's role (1984).

Such a statement is typical of the traditional belief that women are incapable of high level creativity beyond the scope of children and home and that such creativity really does not constitute innovation anyway. For instance, Guntrip (1969) is most fondly remembered for making the following comment:

> There are two ways of knowing; the male way of knowing in its highest development is objective, analytical, scientific investigation. The female way of knowing in the completest sense is the mother's intuitive knowledge of her baby.

Arguments against this line of thought challenge the perception that men are better suited in any area for innovative and creative activities simply because of their biological sex and ascribed gender roles (McDaniel, Cummins and Beauchamp, 1988; Cockburn, 1985; Rothschild, 1983) and show how instead, women's contributions to all areas, especially those of scientific and technological development, have been given little attention, and in many cases actively kept out of or omitted from history and literature (Rothschild, 1983). Thus, the alternative argument is that women's absence from the activity of innovation can be traced through their historically strong lack of access to resources, such as skills, tools, machines, legal and social enti-

tlements that are necessary for women to compete in arenas which have been traditionally taken seriously. The reality that women independent inventors are still invisible indicates that at least some, if not most, of these historical and social conditions continue to define and shape women's experiences as innovative contributors in ways that keep them on the sidelines of what is considered to be "real" in the world of inventing.

So now that we understand that independent inventors, whether male or female, are alive, and if not well, then at least kicking, the next obvious question, which I was commonly asked, is "where am I going to find these female independent inventors?". Because independent inventors continue to produce nearly twenty percent of American patents, from Xerox and Apple, to liquid paper and air-conditioning for space suits, organizations, such as the Chicago Inventors Council have been formed throughout the United States as well as in Canada. There are, for example, three thousand members of the Chicago Inventors Council, and over fifty such organizations nationwide. Observations suggest that at least twenty-five percent of the Chicago Inventors Council's attendees are women; and through

my own casual observations I argue that the proportion of attendees is rapidly approaching closer to fifty percent.

I was first introduced to the council, not to mention the notion to study women inventors, by Peter Whalley, who has been both professor and mentor throughout this study. Whalley's work has explored the social construction of the world of independent inventors and how they attempt to participate in the organized world of business and corporation when they themselves are disorganized and isolated from one another. Women, who have been historically isolated from one another as well as from the public worlds of paid work and social recognition may therefore have a much more difficult time participating as inventors, whether as corporate members or independents. The literature as well as this project argues that indeed this is the case.

CHAPTER II

REVIEW OF THE LITERATURE

According to the patent and trademark office in Arlington, Virginia, inventions by independent inventors have been on a slow decline since the turn of the century. Whereas fifty percent of all issued patents were formerly granted to independent inventors, today that number has dropped to about only twenty-three percent (Chicago Tribune Magazine, 1988).

At least since the 1940's independent inventors have been diminishing from public visibility and utility. Increasingly industrial and corporate research teams, with their new and fancy equipment, have replaced the independent inventor as the accepted source of innovation.

When described as an "endangered species" by Chuck Murray (1988) it appears that being an inventor is rare for anyone in our society. McDaniel, Cummins and Beauchamp (1988) argue that being an inventor is even rarer for women. The 1990 February issue of Goodhousekeeping Magazine supports this argument in their report that approximately only five and a half percent of the some 83,000 patents granted each year are awarded to

women.

The following exploration of the literature attempts to first shed light on reasons why the "social practice of independent inventing" (Whalley, 1988) is inhibited and therefore described as a rare event; and second, to explore the assumption that not only are female independent inventors even more rare, but that women inventors differ from men inventors in both qualitative and quantitative ways that can be best described and understood within a framework of cultural understandings and explanations that promote men more than women, and corporate (or at least collective) more than independent, when it comes to the world of innovation.

The Social Construction and Practices of Independent Inventing

Arguments against this line of thought challenge the perceptions that men are better suited for inventing. Marilyn Brown (a technology transfer official at the Oak Ridge Laboratory in Oak Ridge, Tennessee) made the comment "that the United States has recognized that the key to reversing its declining competitiveness is to encourage invention" (1989). Such encouragement might be said to be represented by the numerous government and university efforts involved in the sponsoring

of local inventors' groups, informational workshops, and other tools intended to assist inventors in such activities as building prototypes, conducting patent searches and contacting manufacturers (Business Week, 1989).

Indeed the Chicago Inventors Council is one such effort that was founded in 1983 by Don Moyer who holds monthly workshops for inventors. The workshops provide general information about the law and patent process, licensing and selling one's invention. In addition, the Chicago Council, as well as others, caution inventors about the risks of some invention development and marketing firms that have had a history of taking advantage of independent inventors by collecting fees (sometimes quite high) in exchange for agreeing to assess and "help" market the inventions. At minimum the risks involve spending a lot of money for little or no help; my guess is that the maximum risk is infinite, but at least somewhere along the lines of paying a lot of money to have the invention "borrowed, modified or stolen" for purposes and reward other than those of the original inventors.

Michael Blommer (1988), executive director of the American Intellectual Property Law Association in

Arlington, Virginia, believes that the inventors who give these marketing firms money and allow them to operate, often fail to understand that they are jeopardizing their rights to their ideas and inventions. Rarely do such invention assessment and marketing companies advise their inventor-clients to file for a patent, or at minimum to prepare and use a non-disclosure agreement. In fact, some of the inventors I spoke with informed me that some such companies, as well as potentially interested manufacturers had refused to sign the non-disclosure forms; thus terminating or greatly increasing the risk of doing business. And once an inventor has disclosed the invention, or even an idea for the invention, (s)he has only one year to apply for a patent. After the one-year grace period the idea/invention becomes part of the public domain and they then lose any rights they might have previously had to make a legal claim to their idea/invention through selling, licensing or profiting (economically or socially) from their idea/invention.

To guard against the outright theft, borrowing or modifying of their idea/invention many inventors present non-disclosure agreements to potential licensing and marketing firms. And many of the inventors with

whom I spoke informed me that they would present such non-disclosure agreements to anyone with which they even discussed their idea/invention (for many that included friends, relatives, adult children and even spouses).

Even with a full seventeen year patent, let alone a measly non-disclosure agreement, the risk to reveal one's idea/invention is very great.

To Patent Or Not To Patent...Consider The Risks Before the Question

The existing patent and legal systems provide relatively little protection for inventors and their inventions. Many inventors inaccurately believe that a patent is all the protection they need. In fact inventors run a substantial risk of losing their social and legal rights of control as well as their financial rights to secure profits if their invention is sold on the market without a patent.

On the other hand, even a full seventeen year patent is only as good as its seventeen years...once up, so is any protection that it provided. Further, obtaining a patent in the first place is a long, expensive, confusing and tedious process that leaves many independent inventors discouraged. One woman, who

finally did obtain a full seventeen year patent on her chocolate design molds told me that she had to go through twenty-five patents which were similar to hers and show "in detail" how hers was different. The average length of applying for and being granted a patent is about eighteen months, but it often takes much longer. The minimum cost is at least twelve hundred dollars for the attorney and patent examiner fees; and this is if the search and process of patent review goes without any hitches. Sure, you could conduct the patent search yourself, if you are willing to spend the time; but even so a legal search and examination has to be conducted by the official patent office down in Washington D.C. and that takes both time and money.

Further, even after a patent has been granted, it is limited in terms of its time and provisions. Proving that patent infringement has occurred is both costly and timely; and the experience of most inventors who have undergone such a process has been that they have lost. Who has not heard the infamous story about the inventor, his power tool and Sears? I would like to tell you, but there are so many stories and variations upon it that my guess is that there are a lot of

inventors without rights to inventions which they had originally invented. The defendant in a patent infringement lawsuit need only to show how his/her invention is "different", and this "difference" need only depend upon a single and unique feature.

For both defending and obtaining a patent the goal is to show how your idea/invention differs from others similar to yours by virtue of a single and unique feature. Considering that the processes of patent application and award are similar to that of defending one's invention, we can speculate that it is possible to not only find more people who have been awarded patents, but also to find patents granted to many ideas/inventions which are quite similar in many respects. Thus it may be easier to obtain a patent but it is also more difficult to defend a patent that becomes increasingly more limited in terms of its protective provisions as the number of patents awarded to ideas/inventions similar to yours increases.

As mentioned above, a preliminary step to obtaining a patent is to have anyone and everyone who sees or even discusses the idea/invention sign a non-disclosure agreement. The intended purpose of such an agreement is to prohibit the viewing individual or organization

from discussing, disclosing or using the invention with anyone else other than the original inventor without the original inventor's written consent. Even with a non-disclosure agreement, limited protection exists, even during this preliminary stage; especially since the inventor has only one year from the time of disclosure to obtain a patent.

It is not difficult to imagine how enlightened individuals and organizations manage to "get around" such a system. One inventor in particular informed me about how her invention had not only been stolen, but also how her age and gender had inhibited her from obtaining more effective legal recourse.

This inventor, whom I will refer to as Debbie, initiated the process of patenting and marketing her invention over ten years ago. When she first began work on her invention, during the late 1970's, women still did not have athletic equipment, namely shoes, that were designed specifically for their needs, whether as serious or recreational athletes. Debbie, who was athletic in highschool and college and then worked as a mail carrier was discouraged by what she found on the market...especially since she had a problem with supination and pronation (a common problem where people

walk more on the inside or outside of their feet). So, Debbie made her own model of the "ideal" shoe.

> "When I first came up with the idea (1977) I was still in school (college), but I kept working on it and tried it out myself and on friends. When I got out of school I put money aside and began to apply for a patent. At first I tried to get the patent on my own, but there aren't many books about how to patent and the others are really confusing or not up-to-date.
>
> When I had saved enough money for the attorney fees I contacted a lawyer, someone my dad knew, and he helped me rewrite my patent application so that it was legal.
>
> About that time I went to a trade show in Chicago. It wasn't open to the public, but I was able to get in through some friends. I showed my invention to two companies and one in particular said that they were really interested. In fact, one of the managers said he was embarrassed that they had not thought of it, considering that it was their line of work.
>
> I corresponded with them for nearly a year while my lawyer was trying to push through my patent application. Things really looked promising. Also during this time my patent examiner (whom she only knew through correspondence) was supposed to be checking through all similar patents. He sent me documents indicating that he had searched as far back as 1925 and compared my invention with patents on shoes in other countries, such as Germany. He said that there

really wasn't anything out there that was exactly like my idea.

Out of the blue I get a letter from the company that I had stayed in touch with since the trade show. They said that at the present time the would not be able to incorporate my invention into their current product line. So I thought no big deal. I'll get my patent and then I can approach other manufacturers. It seemed like it was taking forever for my patent to come through; and by this time it had been nearly two and a half years. I had already spent a lot of money to get this far, about fifteen hundred dollars, so I decided to stick it out and see what happened.

I became interested in other things, and just kind of let it sit on the back burner. One day I was flipping through this magazine-I remember it was a 1983 issue of Body Magazine-and I see my invention being advertised, even though it had a tiny disclaimer that said "patent pending".

I called my lawyer right away and he found out that my patent examiner was listed as the examiner for the company that was advertising my invention-or at least a product that was very, very similar to mine.

I had already spent so much money, but I borrowed some more so that I could fly to Washington D.C. to meet with this guy (the patent examiner). I wasn't planning on getting rich off my idea, I just wanted to see if we could agree on an arrangement...but he wasn't even

willing to compromise. I explained that I had a lot of ideas and features that were not included in their advertised model and that I would be willing to work with them as long as I got some of the credit.

Finally he said that I could revise my original patent application to reflect these features,but that I had better do it before their patent went through. I only had a couple of weeks, so as soon as I got back my lawyer and I worked on revising my application. It cost me another twelve hundred dollars. I sent it off to the patent examiner within two weeks. My revised application and letter came back unopened with a Letter of Abandonment. My lawyer agreed that there were no grounds for abandonment, but when I finally spoke with the examiner, and that was after he had avoided many of my calls, he just asked me how it would look if they gave a patent to some young girl instead of to the company whose livelihood depended on this product."

Debbie says that in total she spent at least twelve thousand dollars between legal fees, travel, and equipment. She believes that her only recourse is to try and do it on her own, but that would mean finding a manufacturer who would work out an arrangement with her to produce the shoe at a low cost. Like many inventions, Debbie's involves the use of a plastic, and rubber mold, and even though the plastics are inexpen-

sive, the molds are expensive to make and use.

Although Debbie's story is shocking to the general public, it is, in many cases, a familiar experience faced by the independent inventor. Not only must inventors protect themselves from each other, they also face members of the corporate, patent, and legal systems as contenders for social and economic control over their ideas and inventions.

Ironically, Debbie faced a problem that would otherwise have not occurred had her invention not been of interest to the examiner and athletic manufacturer. Many inventors face a different problem, and that is that they are unable to hook up with interested manufacturers. In fact, many inventors claim that most corporations are less than willing to spend their time and money on an independent and unknown inventor.

Despite the many legitimate efforts of encouragement and support for independent inventors, such as the inventors council, today's independent inventors argue that the majority of American industry is not willing to listen to new ideas (Chuck Murray of the Chicago Tribune Magazine, 1988):

> Inexperienced inventors have a familiar refrain. It goes something like this: "I've got an invention. There's nothing like it. Everybody needs one. What do I do now?" (Don Moyer, as quoted in the Reader, 1989).
>
> The very word "inventor" is taboo in business conversations. If I call up a company and say "Hi, I'm an inventor", then I've just ended the conversation (Burton Siegal, engineer, inventor and president of his own company, Budd Engineering in Skokie, 1988).
>
> When they hear you're an inventor they think you're rolling in money...and that's just not the way it is. Royalties are usually about two or three percent of sales and most of that money ends up getting reinvested in equipment. The chances of making it big as an independent inventor are not very good (Royce Husted, an independent inventor who has been issued over seventy patents).
>
> You can deceive yourself very easily into thinking that you have invented something-but you really haven't (Paul J. Whiteneir, Chicago Inventors Council member and electrical engineer, 1989).

Finding things to do with independent inventions is one of the reasons Moyer founded the Chicago Inventors Council: "It's primary purpose is to link inventors with manufacturers for their mutual profit and the public benefit" (as quoted in the Reader, 1989). But as Chuck Murray of the Chicago Tribune Magazine states

(1988), "proving, however, that the American economy is suffering as a result of this phenomenon (lack of involvement between independent inventors and industrial corporations) is difficult, if not impossible".

Peter Drucker, described as "a wizard among American management experts" by the 1988 September issue of INC. magazine believes that "having an idea is not nearly enough":

> Lots of people have ideas. Some of them can start something with those ideas. But the more tools you have, the more likely you are to succeed over the long run.

In support of the running argument between independents and corporations, such "tools" are most likely training and big business experience, not to mention the financial backing for "big equipment"...possibly a plastics mold for instance.

Such "training and experience" might be as mundane as the notion of corporate etiquette and business behavior. For instance, research and development managers, as well as industrial and corporate executives, point out that a lack of "sophistication" holds the independent inventor back:

> Conventional wisdom paints the inventing entrepreneur as a driven, undisciplined romantic, operating in a frenzy of energy. With a little luck he achieves his goal just before he goes under (James McManus, Marketing Corporation of America, INC., 1988).

> Manufacturers are troubled by the image of a person isolated from the typical socioeconomic system. They fear that inventors are going to be embarrassing, troublemaking and difficult to work with (Don Moyer, Chicago Tribune Magazine, 1988).

But for independent inventor Lazarus, the act of isolated inventing is just the first step:

> It's like coming to the Grand Canyon. There's this big hole and the commercial world is on the other side. How do you cross the gulf? (Chicago Tribune Magazine, 1988).

The typical answer is that to play in the game with the big commercial world you have to play by its rules. For instance, Michael Feygin, a successful mechanical engineer and inventor, who immigrated from the Soviet Union at the age of twenty-five, believes that if someone is smart enough to come up with a technology he should be smart enough to market it:

> Engineers are functionaries with logic skills, but they have to recognize that they have to be skilled in other areas (Chicago Sun Times, 1989).

Yes Michael, this might be so, but not all independent inventors are engineers and functionaries. And even when independent inventors possess technical expertise, industrial and corporate executives share the common belief that today's accelerated pace of technological development leaves little time to deal with "crude prototypes" and their inexperienced creators (Chuck Murray of the Chicago Tribune Magazine, 1988):

> The problem is that independent inventors are generally not a good source of marketable technology. Even with technical ability, it is not financially feasible for him to have the necessary equipment.

And Royce Husted of the Chicago Tribune Magazine (1988) sums it up by saying that "companies don't want to buy something as risky as innovation".

The effect of the prevailing acceptance of industrial and corporate research and development teams has been two fold: first, independent inventors have been inhibited, if not prevented, from participating and contributing to the world of the industrial and corporate economy; and second, by virtue of having been kept as outsiders for so many years, independent inventors .cp23have come to be socially defined as

"crackpots, wacky, strange...and in fact have been regarded as annoyances" rather than legitimate contributors to industrial and technological innovation.

As Whalley (Loyola, 1988) explains:

> The situation is understandable. The worlds of inventors and manufacturers have grown apart in the last forty years because they have not routinely been doing business with each other. Neither side knows the other's conventions of language. Even if they wanted to get together, they wouldn't know how (Chicago Tribune Magazine, 1988).

The separation between independent inventors and the public world of commercial and corporate economy parallels that between the traditionally male-dominated public spheres of work and social interaction and the private world of women, children and home. Possibly, female independent inventors face an even greater challenge than their male counterparts when one considers their experiences as members of both the private and female-dominated sphere and the disorganized and isolated world of the independent inventor.

Different Social Constructions Between Men and Women Inventors: How the "S" in She Is Still Missing When It Comes To The World of Inventing

Amram and Morgan (1980, 1984) focus on the important question of why so few women have been or are inventors; and they argue that our culture and language have firmly secured "inventor" as a masculine word and a masculine occupation. They describe the relevant literature as providing only sparse information, research and histories on women inventors during the Twentieth Century. Even Webster's Unabridged, into the late 1970's, continued to overlook women inventors by not listing examples of women inventors or their inventions; additionally and powerfully, the concept of inventor continues to be discussed or explained through the use of the masculine gender pronoun "he or him".

Examining the content of the discussions and quotations presented above, most of which are referenced during the 1980's, it is shockingly evident how very few references, in terms of biographies and language, are made to women as inventors, or even to women at all. Further, Amram and Morgan (1980) assert that when inventor and the activity of inventing are defined as masculine and male-occupations, respectively, the

consequence is that the minds of both women and men exclude invention as an expected and therefore encouraged activity for women.

On the other hand, I think I have made it clear by now that women have in the past and continue to participate as inventors despite the fact that they have not always been socially recognized for their efforts and contributions. Since the prehistoric taming of fire, through metallurgy and midwifery, to the groundbreaking discoveries in genetics made by Barbara McClintock and the development of white-out by a female secretary, women have been innovative contributors. Amram and Morgan (1980) note that even the Women's Bureau Report of 1923 proclaimed that "there is not an important sphere of industry, commerce or science in which women are not represented as patent holders".

Amram and Morgan (1980, 1984) also argue that the percentage of patents awarded to women compared with men has increased and shown strong profits over the last twenty years. Nevertheless, the trend has been that substantially fewer women than men have been issued patents.

Further, Amram and Morgan (1980, 1984) found that still today and even among feminist scholars, women's

names rarely if ever came up when posed with the task of naming (a very basic act of social recognition) inventors. Indeed it came as a surprise that most people, including Webster's and feminists, had failed to consider that the naming of women inventors might be a problem.

In addition to language and cultural expectations, Amram and Morgan (1980, 1984) argue that women inventors are less visible than their male counterparts because they have traditionally had greater difficulty in acquiring and controlling financial and legal resources for their own purposes. The following excerpt is taken from an issue in the 1890 publication of The Woman Inventor as an illustration of women inventors legal situation during that time:

> How does the law recognize woman? If she is married her husband can take out the patent in his own name and sell her invention for his sole benefit, give it away or refrain her from using it; and she has no remedy before the law...How many women's inventions are hidden under the names of fathers, husbands, brothers and sons, we cannot of course, know; but it is by no means unlikely that many thousands of such concealments exist in the lists of patents granted. Is it any wonder, then, that woman is not equal with man as an inventor?

Now that women can own property in their own names, control it and the profits obtained from it for their own purposes, as well as smoke cigars or cigarettes, for that matter, indicates that Virginia Slims is right "You've come a long way baby". But really not all that long ago were women considered property themselves, at least in the eyes of the law and husbands; and the reality that women are invisible, or at least obscure, still today, indicates that Baby, you've still got a long way to go.

The road traveled by women inventors is becoming more downtrodden as at least feminist inquiries are now considering women's absence and invisibility into yet another sphere which has been traditionally dominated and defined by its male participants. The Canadian researchers, McDaniel, Cummins and Beauchamp (1988) have explored some of the challenges, problems and barriers that Canadian women inventors face as members of an unusual, non-traditional and male-defined activity. These researchers specifically ask the question: "What might account for women's `lesser' participation in inventing, and constrain or inhibit them from contributing fully to the processes of innovation?".

The traditional and male argument (see Guntrip, 1969, among others) rests on the myth that women are incapable of high levels of creativity, and that this incapability is rooted in women's nature and biology which are seen to center only around the activities of reproduction and child-rearing. Kudos to both Amram and Morgan (who are both men) for their counter-argument that "cultural expectations, as reflected in child-raising practices, has not placed women in settings where creativity is expected or encouraged". In other words, the activities of child and home care have traditionally isolated women from the public world of work where the activities are not only qualitatively different than those within the world of home and children, but also where such social and public activities outside of home and children are more likely to be defined as creative and innovative rather than trivial and mundane. Anyone can birth and raise a child...but not everyone can accurately report the scoop on Reagan's prostrate check-up, or pull a major corporation up by its suspenders (until Woody Allen's Diane Hall-a typically masculine clothing accessory) and out of financial ruin...right? Uh, I don't think so...countless, yet recent, and most likely feminist, literature

examines how the work of mothering and wiving play crucial, if not recognized roles, in the shaping of our cultural expectations and understandings (Luxton, 1980; Finch, 1983; Hochschild, 1989). So are these unacknowledged or "other" activities important? Do they involve creativity? Or are they purely instinctual and mundane necessary activities of daily life?...Which is precisely the point I have been trying to make, that our cultural understandings, not on an individual level, but as a social collectivity, affect what gets defined and recognized as important.

For instance, there exist few social support systems that recognize and assist the independent inventor as it is, and the work of McDaniel, Cummins and Beauchamp (1988) reveal that the female inventor is even less likely to secure emotional and social, not to mention financial, support networks for her inventing.

Despite such barriers, Amram and Morgan (1980) comment on how impressive the range of women's inventive talent is anyway. Gee, thanks guys. The point is that only recently have we actually begun to realize the extent of women's innovative contributions; especially when so many were hidden under the legal and social claims of men.

It is not coincidence, as Papchistou (1976) remarks, that the period between 1848 and 1870 was a time when the number of patents took a sudden leap; also a time when the first phase of the American Feminist Movement was working to establish women's legal existence to the extent that they could own and control property and earnings in their own names and for their own purposes.

It is true that periods of social movement and change are most often preceded by activities that foster increased coming together and cohesion and that it is most often members of marginalized groups which are maturing in their understanding that they are not simply isolated individuals, but are members of a definitive and recognizable group that share in their experiences, goals and have the ability to make these issues known through their development of a common language and understanding.

Therefore, if we apply this understanding of Cynthia Cockburn's "critical mass theory" (1985) to the situation of women inventors, then we might presume that the overall situation would get "better" if women inventors, and women in general, formed a significant proportion of the traditionally male-dominated profes-

sions, such as science, medicine, engineering, technology and of course, innovation. Discouragingly, the only success Cockburn has seen thus far has been through the efforts taken by groups that are all-women:

> But that success is short-lived in occupations where professional ability and identity are so closely connected to masculinity.

Cockburn (1985) argues that it is the social construction of the male as strong, manually able and technologically endowed, rather than any inherent or biological differences that suit men, better than women, for scientific and technological ways of knowing and doing.

The problem is that this way of thinking does not remain merely a thought. Instead, gender bias becomes a powerful influence over people and their activities. Therefore the question of women's invisibility as inventors is strongly tied to the wider issue of how gender ideology manifests itself as a barrier that inhibits and constrains the lives of women.

Autumn Stanley (1983) argues that not only are women unacknowledged and given less credit in male-defined and male-dominated areas of work and innovation, but that males "come to take over" areas previ-

ously defined as female once these areas gain social and political importance. For instance, Stanley provides examples of how agriculture, chemistry, metallurgy and medicine can all be traced back to prehistoric and medieval women's roles as gatherers, cooks and health caretakers for other women and children.

Kristen Luker in Abortion and the Politics of Motherhood (1984) provides a social history of the emergence and legitimation of the medical profession on the basis of excluding, de-legitimating, and finally making outside the legal practice of the medical profession those activities such as midwifery and herbal healing. In fact, the control of contraception and abortion was removed from the hands of individual women; making it illegal for anyone other than a licensed member of the medical profession to issue or grant contraception and abortive procedures. Of course since the second wave of the American Feminist Movement, which reemerged during the mid sixties, abortion has been legalized and contraception is widely available...at least for now. These activities are still issues which continue to be defined as resolvable by professionals, politicians, religious figureheads.

Even when women are members of these "decision-making" groups, their actions and decisions often tend to be seen as inadequate and unequal when compared with men by those in positions to make judgments (more likely men) according to rules and standards that have been created by men (Cockburn, 1985; McDaniel, Cummins and Beauchamp, 1988).

So, when certain types of knowledge and experience are privileged over others, positions of access to the knowledge, as well as the knowledge itself, become tools that empower a select few to organize, structure and ultimately control our world. When only some have access, an inequitable situation is created. The extreme of this inequitable situation can be viewed through the experiences of those who are controlled, exploited and left wanting...their situations unacknowledged and their needs ignored. Therefore, I believe that it is necessary, if not crucial, to find out who some of these ignored and unacknowledged people are...at least for this project within the world of inventing. Why? Remember when you were unaware that a problem existed until it was you who was having the problem?

Rothschild (1983) argues this issue in terms of its social cost and loss for all members of society.

> The products and uses of science and technology become our tools, friends and/or oppressors for political, economic and personal reasons. As a consequence, women and men experience and interact with science and technology in different ways.

Because these "different ways" are neither mutually exclusive nor can they be ranked as right and wrong, we all lose by ignoring or discrediting any one way simply by virtue of its being different from our own experience, or that which is promoted by the dominant group. In sum women's absence and invisibility in the worlds of science, technology and innovation have resulted in what Sandra Harding refers to as a "lesser science" when ironically the quest of science and related fields is to find "the truth" in an objective, neutral and inclusive manner.

CHAPTER III

REVIEW OF RELATED LITERATURE

How The Absence of A Lesser Sex Results In A Lesser Science

Stanley (1983) argues that the absence of women was most likely the result of "impersonal and intentional forces" exerted by various economic groups, from doctors and lawyers, to engineers and even members of merchant guilds, who strived not only to make claims about the incapacities of women, but often to accomplish the physical liquidation of women from these practices.

The following review of the literature related to women in innovation will present short illustrations of how women have been excluded and made invisible within fields which are inter-related with innovation. Specifically I will explore medicine and engineering.

Prior to the mid-1800's and early 1900's health care was traditionally practiced and regulated by women for women and children. Kristen Luker (1984) explains how women's capacities as midwives and health agents were de-legitimated by the efforts of the medical profession (a group that was predominantly composed of men) to establish themselves as the only legal and

socially legitimate group able to perform, not to mention charge fees, for medical and health-care services. Part of this process of de-legitimating women and their traditional practices involved redefining the meaning of health-care and who was qualified to perform such a service.

The grounds for privileging physician's knowledge and practices increasingly came to rest upon the assumption that their knowledge and practices were better than the traditional or "old fashioned" practices that existed before the development of scientific processes of study, investigation and procedure.

A recent study of abortion and contraceptive clinics, by Carol Joffee (1986), reveals that the current situation for clients and workers is shaped by this notion that the medical profession and the scientific procedures that it employs are the most thorough, qualified and therefore are the authority with regard to the care of the female biology and psyche.

I do not intend to argue whether or not science and the medical profession are legitimate and/or better than alternative forms of health care. Instead I contend that exclusion of alternative approaches to health care is destructive to our operating body of knowledge

as well as to the physical and psychological operation of our bodies. Where slicing and dicing procedures might work better for you I might opt for massage and meditation...of course the treatment should be considerate of the ailment; but my point is that not being given the opportunity to choose, let alone participate in the decision-making process of how our bodies are handled and treated, is a violation of our in-alienable rights. And I must remind you that in the medical world, as well as in the legal world, women have historically been considered property to be used at the discretion of other members of society for purposes other than their own. Thus, to be able to participate as a legitimate member in the decision-making process, one's position and situation must be considered meaningful and valid. Where women do not have legal rights to own and control their physical and psychological selves, not to mention children and other marginalized groups in our society, they will continue to be consulted last, if at all, when health care decisions and approaches are being legitimated and legalized. When those in positions to make legitimating and legalizing decisions are largely men, it is unlikely that women's positions and situations will be fully understood.

Traweek (1988), Cain (1987), Harding (1986) and Rothschild (1983) all argue that men's and women's ways of knowing and doing are inherently different. But they also argue that women's and men's different ways of knowing and doing are socially constructed and shaped by the larger society's goals and expectations which continue to be defined on the basis of gender. Therefore, we can attempt to understand the "way" that is different from our own, but we will never fully know it.

My argument, based on the above theorists, is that when one way is excluded or discounted, and this is likely to occur when a group is predominated by singular ways of knowing and doing (which are often defined in terms of age, race, social status, education or economic level, in addition to gender) then our decisions and understandings have been formulated on the basis of incomplete information that cannot be retrieved or repaired because it remains hidden as those in positions of dominance continue to promote their understanding as the complete and correct understanding and position.

Engineering has been described as one of the most masculine occupations today (Carter and Kirkup, 1987). Despite the increasing number of female engineer college majors, only two percent of the 608,000 women in engineering firms can be counted as actual scientists and technologists (Cockburn, 1985). It appears that little has changed since Harris and Grede's 1977 study of engineering firms where women were actively recruited into the lowest paid and lowest skilled ranks as technical aides and assistants. As Cockburn (1985) noted, managements recruited employees into existing sex-segregated patterns. Therefore, she argues, it is wrong to make the assumption that in all or most of these cases women were simply less qualified for acceptance into the higher ranked positions. In fact, the criteria and standards for acceptance into or dismissal out of engineering and related fields often had little to do with the actual scientific and technical demands of the work.

By looking at the social organization of the engineering world of work we can find a more likely explanation for women's fewer numbers that does not rest on the notion that they lack confidence or are incapable of high levels of knowing and doing. An

alternative to these traditional explanations questions whether or not scientific and technological activities, knowledge and applications are as neutral and objective as they claim to be. If not, then it is likely that they are not necessarily available to everyone, nor are they available within the same conditions (Cockburn, 1985).

For instance, the engineering work atmosphere is depicted as competitive and uninviting. Networks, such as skilled trade unions and workshops promote masculine patterns of relations and interactions. Where workers are connected through their shared understandings, as are the members of any group, workers who do not share the same experiences are excluded. And yet, it is likely that the knowledge generated within these networks is what might better enable those excluded to participate meaningfully. Cockburn (1985) as well as Carter and Kirkup (1987) found that when women did attempt to interact in male-dominated groups on male terms, for instance in the sense that they adopted masculine styles of dress, mannerisms, talk and activity, they continued to find themselves excluded from many of the activities and not taken seriously.

Common complaints by such female-would-be members were that their male counterparts insisted upon viewing them as females, first and foremost and only secondly, and sometimes begrudgingly as co-worker or colleague. Quite often they were mistaken to be secretaries or members of work groups traditionally defined as female. On many occasions the female engineers' levels of expertise and status were minimized and negated by the male engineers who used non-technical jargon or assumed a non-professional stance when discussing work-related issues (Carter and Kirkup, 1987).

Related to this experience of being treated and made to feel like "they don't belong" in this technical and sophisticated world of science and technology is the experience of women scientists who have traditionally suffered from the view, their own as well as that promoted by others, that family and child-rearing should not be second to activities and work outside the home and family. On the other hand, the recent research of Donovan (1990) suggests that women hold less traditional views of women's work than do men.

Donovan (1990) found that men are significantly more likely than women to have negative images of women in science, to predict failure for women in science and

to deny the success of women in science altogether. Donovan ultimately argues that failure in science or related careers is wrongly viewed as a "deserved price" paid by women who chose both family and career. Donovan concludes that a career in science and related fields may be equally as important as family and child-rearing; and in some cases even a greater source of emotional and temporal reward.

These findings are encouraging for women who have access to female support networks. On the other hand, Rothschild (1983) argues that the token participation of a few women renders them apparent simply as appendages and passive recipients, rather than as active contributors. In other words they are not viewed nor do they often view themselves as the ones who shape the social conditions, but rather as the ones who conform, compromise and struggle with the existing social conditions.

Considering this information it is plausible to argue that women's invisibility and lesser participation in the worlds of science, technology and innovation may be because women choose to absent themselves rather than make the costly compromises and changes which are necessary to their integration and acceptance

into areas of male-dominated and defined ways of knowing and doing (Cockburn, 1985).

The "Difference" is Inadequate Justification For Divided and Inequitable Action

Feldberg and Glenn (1983) argue that social characteristics, such as cultural background, gender, age and race, influence the way(s) in which innovations are used, understood, promoted and created. For instance, Cockburn (1985) argues that the design and intended applications of American technology reflect, as well as reinforce, deeply held biases about single family households and traditional gender roles.

In our culture we find that there exist few tools and technologies designed for communal or shared use. In contrast, we can look at cooking activity in third world countries. Prior to our introduction, or interruption, with our solar powered cookers, all family members, regardless of gender or age, had participated in the growing and cooking of food. Solar powered cookers allow food to be prepared and cooked only during daylight hours; a time of day when most men are away from the home site. Thus, the effect of this particular technology was that it did in fact reduce the amount of men's cooking work and thus their contributions to the activity of cooking; simultaneously it

increased the amount of work for women who had to pick up the men's former share of the work. Hence, this example of the solar cooker suggests that applications and meanings associated with particular types of technology vary in response to different needs and practices of men and women in different cultures.

A similar perspective is presented by MacKenzie and Wajcman (1985) who point out that technology, as a factor independent of social, cultural, political and economic conditions, does not produce nor cause social change. Rather, it is existing social practices and structures that determine which technologies will be accepted and how they will be used.

Daniels (1970) and Rurup (1974) stress the importance of social factors in shaping technological and social change; such social factors include women, their lives and professional as well as personal activities.

Interestingly enough, Rothschild (1983) points out that gender and public versus private ideologies are not universal. Growing up Jewish in central Europe she understood the division of labor on the basis of class; and therefore distinguished between intellectual and manual/mechanical work rather than the traditional American view of masculine and feminine work. Her

point is that an understanding about the divisions of thought and activity, simply on the basis of gender, which is irrespective of class or culture is as incomplete and inadequate as are masculine ways of knowing which exclude or ignore the feminine.

My interpretation of Rothschild (1983) elaborates upon her argument. I argue that our culture, which is male-dominated and male-defined, continues to value and pursue the activities and interests of men. The consequence is that society continues to depend upon men's experiences and values as the only legitimate frame of reference (Spender, 1982). Both Smith (1987) and Spender (1980, 1982) write that such a sexist ideology says that "what men do matters more so than what women do". Hence, the lives of women, their thoughts and activities are actively and purposefully made invisible when they are viewed and understood as secondary or less than. It is this daily reality which further constrains women in their efforts to establish themselves and participate within the valued ranks of innovation and other related fields.

Conclusion

The absence and exclusion of the female in any activity affects what is known and how it is known. The problem is that the dominant society continues to focus on men, their ideas and understandings of the world. As a consequence we are given a single-sided viewpoint which comes to be seen as natural, obvious and general (Smith, 1978). Such an incompleteness diminishes the value of existing modes of knowledge and activity. Therefore, I agree with Stanley (1983) that we must change our attitudes and definitions from what men do to what people do. Otherwise we risk stagnation; which is counter to the prevailing principle that innovation promote new forms of knowledge and progress.

The above literature has been presented because of its ability to question the operating premises that masculine ways of knowing and doing are universal and superior to other knowledge forms. We needed to understand that we are not justified in valuing or devaluing the different ways of knowing and doing simply by virtue of their being different from the dominant social features which establish and maintain the status quo on the basis of any one gender, age, race or cul-

tural understanding.

If we have been successful in exploring and questioning existing boundaries of knowledge and knowledge production, what counts, is excluded or used, and how these processes are often hidden from common knowledge, unless the problem is one's own, then it will be easier for us to understand how the Chicago women inventors experience their social world as women and independent inventors.

Only then will we be sympathetic to their experience and then we will agree that we are not justified in locating or understanding them or ourselves on the basis of traditionally held divisions between men and women, public and private, independent and corporate. Because society continues to do so we all miss out on what "could have, would have and should have been" (Chicago Woman Inventor, wife and mother of two boys, 1990).

CHAPTER IV

PURPOSE OF THE STUDY

Feminist inquiries, such as that of McDaniel, Cummins and Beauchamp (1988) have explored some of the challenges and barriers faced by women inventors today. Specifically they ask the question: "what might account for women's lesser participation...what constrains or inhibits women from contributing fully as innovators to all areas of the social world?".

These researchers have, in particular, studied Canadian women inventors extensively and they argue that the overall and greatest challenge faced by women inventors today is a "social structure which continues to undermine the legitimacy of women, their experiences and contributions" especially in activities that remain male-defined and male-dominated.

The situation of independent inventors still today, whether male or female, is that limited time, lack of technical skills, very little social support (sometimes even resistance and confrontation) and never enough money are challenges faced by many. On the other hand, current research and feminist studies argue that these constraints and barriers, inhibit and in many cases completely prevent women, more so than men,

from being able to fully participate as inventors. My task is to see if this is the experience faced by some of the women inventors in the Chicago area.

Therefore, the primary goal of this paper is to explore the lives of women inventors who are alive and kicking in the Chicago area and to investigate some of the ways in which social biases, such as gender, age, race and corporatism, shape but also obstruct independent inventors.

Background and Personal Interest

I began this study of women inventors during February of last year (1990); but the project really did not pick up momentum until the following May, a time when I had completed my semester course work. Nevertheless, in looking back I realize how very important those initial months were, despite the fact that I was not actively engaged in the process of interviewing. It was during these months that I first became acquainted with not only the literature about women inventors and related activities, both present and past, but also the Chicago Inventors Council itself.

Because the origin of this study is with the Chicago Inventors Council I believe that it is important to provide a brief, but informative history of its

founding and purposes--both spoken and unspoken. As mentioned earlier I was initially introduced to the council and its founder, Don Moyer, during February 1990. Peter Whalley took me down to see where the meetings were held and to meet Don Moyer. The following has been excerpted from fieldnotes that were taken during and after this meeting.

My first meeting with the Inventors Council had been arranged by Peter Whalley. Peter knew and had worked with Don Moyer, head of the council, because of his own research about independent inventors. Peter's interest with inventors began after he had completed his doctoral dissertation about British engineers. Through casual conversation with friends he learned about the existence of independent inventors in the Chicago area.

Peter explained all of this to me as we boarded the Chicago El on a cold and windy day during February 1990. He explained that Don Moyer had founded the Chicago Inventors Council in 1983, but that Don's background had been a Ph.D. in physics.

Upon meeting Don I was unsure as to what I should do and say. I felt fortunate that Peter was with me because then I could sit back and learn more about the

project through Peter and Don's conversation. You see, prior to this meeting I had embarked on only a limited review of the inventor literature; primarily McDaniel, Cummins and Beauchamp's article about Canadian women inventors (1988).

The office of the Chicago Inventors Council is located on Jackson and Dearborn in a very large office building that has many stores, and two coffee and donut shops. Don's office space consists of two small rooms, which appear to be very old. I noticed that there was a small white porcelain sink openly exposed and mounted on the wall next to an old fashioned wooden wardrobe.

At the time this meeting took place a man by the name of Dave was working with Don. In return for learning about the ins-and-outs of the Inventors Council Dave helped Don with some of the office work.

After about an hour of sitting on wooden chairs in Don's second office, the one that had a large picture window which over looked Dearborn street, Peter and Don suggested that we go for lunch. I was unprepared for this and had not brought that kind of "lunch money" with me...but I felt uncomfortable and said nothing. We went to a pasta restaurant within walking distance

of Don's office and we were joined by an editor with whom Don had scheduled a lunch meeting. So there we all were, Peter, Don, Dave, the editor and me!

The editor was looking for a "new and exciting" story, and I doubt that he had anticipated sharing Don's attention with the rest of us. The pre-meal conversation focused on how Don was making arrangements between interested manufacturers and one woman who had invented self-destructing plastic bottle and can binders...the kind that people are supposed to cut-up so that birds and other small animals don't strangle themselves. Don said that he thought that this would be a big break for the council; something environmental and conservation groups would be interested in. Since the council survives on grants Don tries to pursue linking some of the inventions that come across his desk with companies or manufacturers. To do this he not only needs to be able to "assess" the invention, he also needs to keep abreast as to which companies are interested in and willing to fund innovative ideas. Not all companies are willing to even have contact with independents, no matter how "good" the invention is. Thus, Don has a very tough job...selecting which inventions he should pursue in this way depends upon his own

judgment about the needs and interests of the corporate and general public. The fact that inventors are "selected" in this discretionary manner serves as one more way in which they are marginalized and kept out of mainstream America. Another way they remain marginalized and conceptualized as "strange and different" is due to the fact that someone else, in this case Don, rather than the inventors themselves, must represent their idea/invention as well as their interests.

During lunch my attention moved in and out of the conversation. I was concerned with the seating arrangements and by whom I should sit. I had come with Peter and did not really know anyone else; but I did not want Peter to feel like he had to babysit me. He appeared to want to engage in the conversation between Don and the editor; but Dave seemed to care less and "rescued" me by asking me about my work. Unfortunately I really did not have much to say about "my work" since it had only just begun. I found myself repeating things that I had read and things that I had heard Peter say, hoping that I sounded at least half way intelligent. When the food came the conversation really died down...which made me feel even more uncomfortable; but when the bill came I felt the worst. I was rescued

again because Peter said to me, "I've got it"--I am not certain if he knew the predicament I was in or if he was simply being polite.

After lunch we all walked back to Don's office and I made arrangements to attend the annual inventors showcase that was being held the following week. "Finally", I thought, "I can begin my research". Only now do I realize that even these first meetings with Don and the others are very real components of my field work that precluded my getting to know and learn about the women inventors who came in contact with this particular social organization, each other and Don.

I cannot say that I enjoyed this first meeting with Don and the council. I spent a lot of time worrying about who should walk or sit next to who and if I should walk through doors first, or wait to see whether someone else went. Being the only woman in the group I worried about the way I had dressed. Had I worn too much make-up, or not enough? Should I have fixed my hair in a more professional style? Were my black dress slacks and green paisley blouse appropriate? Maybe I should have worn a skirt. To say the least, the entire experience was stressful and I was glad when it was over.

Reflections About My Roles As Researcher and Student

The above experience made me think an rethink my roles as a student, as a young woman and as a researcher. These roles and how I see myself in them invariably affect how I act and what I say when I am with other people. Rethinking the above experience makes me realize how much I depend upon my understandings of my various life roles...such as young woman, student and researcher. These understandings guide my behavior and interactions with other people in ways that are specific to my various roles. When my understandings are challenged or in conflict with others, my whole self-identity feels shaken and threatened. When this happens I find myself defending a particular role, or building up another.

It is difficult to recall the countless number of times that I have defended my job as a waitress by informing "everyone" that I am in graduate school...in other words, that what I was doing was purely momentary and that I was indeed onto bigger and better things. I also learned that I could downgrade myself as well as build myself up when the situation called for it. For instance, if someone called me stuck-up or said that I was a showoff, I would go into my routine about how I

had waitressed and knew all about that kind of work. My understanding, and much of the literature on class and status show that trade jobs, like waitressing, painting and being a mechanic are often misunderstood as being low skill and therefore are considered low status and low class (Sennett and Cobb, 1972). Making clear my association with these roles and their related meanings allows me to demonstrate that I am "real" and down to earth (despite the reputation of graduate students: idealistic and strange). Even after I have thought about it I still believe that I can often shape a situation and the interaction depending upon how I act, what I say and how I present myself...thus, I can play many roles depending upon what I believe the situation calls for.

For instance, using my different identities made setting-up and conducting my interviews much easier. When I thought that the person on the other line was hesitant about why I wanted to interview them I would switch on the serious researcher role and tell them about being a graduate student at Loyola University. On the other hand, researchers or journalists are often viewed with curiosity and sometimes suspicion. People are cautious about how much they want to share, espe-

cially with someone they do not know...even if it is for a so-called worthy and respectable cause.

If I sensed that the inventor was uneasy about the project or my interviewing her I would assure her that I was not another inventor or someone who was in a position to use or profit from her ideas. Instead, I would explain, I am a graduate student who wanted to interview her about her experiences as an inventor for my masters thesis. It is not that I ever lied about my "identities", rather, I would promote a particular identity over another for the purposes of obtaining and maintaining the interview.

Having spent so much time reading about the constraints and difficulties experienced by marginal groups on the basis of their gender, age and race I had forgotten to look at my own situation. To me being in graduate school was considered higher in status than being a full-time waitress, but to members of the corporate public, graduate school is often looked at as putting off working in the "real world".

Thus, I can now think of being a student and a researcher in terms of being a member of marginal groups; marginal in the sense that members of other groups do not have clear understandings or shared

definitions about what it is we do or why we do it.

Sometimes our habits seem strange to the general or non-academic public. Our language or jargon helps to maintain our isolation and distance from the more visible and easily understood groups of our society. In many ways I am a lot like the female independent inventors that I am studying; but a crucial way in which I am different is that I can easily recognize other students and researchers, even if we are not easily recognized by the general public. We are taught to speak the same language, yet we are often in competition with each other for funding, jobs and ranking. Still we are not bound by the same fear and suspicion that keeps independent inventors isolated from each other and unable to share an understanding or even resources for their common, but separate, experiences.

For instance, many times graduate students must (or even want to) work in collaboration with each other on projects. Because we all benefit or suffer from the success or failure of the project we have to construct ways of working together so that the project gets completed. I am not saying that there are never conflicts, there are many...but in contrast to the independent inventor, collaborative work is expected and

taught in the academic world; in the world of inventors, most work alone. When work is completed in the inventor world there is greater question about which individual has full rights of ownership. As in the corporate world, the academic world assesses its members not only by their work, but also in terms of their professional affiliations. Isolated and viewed with skepticism, the independent inventor has fewer resources by not being able to rely on similar affiliations. The fact that inventors are wary of each other increases their isolation and makes it difficult for affiliations to be formed and maintained.

Critical theory informs us that it is often in the interest of dominant groups to maintain distance between marginal groups. The reality is that individual lives are only flexible and changeable within the terms of existing social conditions. Therefore, as we discussed before in the literature review, social changes in understanding and action are most likely to occur when groups are formed and construct shared meanings about their experiences and goals. For instance, the first and second waves of the American Feminist Movements show that when women came together and began to construct a common language about their experiences

they learned that their often difficult and constraining experiences were not only individual pains, but socially constructed situations which were capable of being changed through their collective efforts. On the other hand, to question and ultimately change an existing social condition requires the recognition of problem(s). Members of the dominant and privileged groups are unlikely, or unwilling, to recognize the existence of problems with regard to less dominant groups; this makes sense when you consider that being in a dominant position often means that one is comfortable with the situation precisely because it has been constructed to promote and maintain that position of comfort.

I can think about this issue in the context of my lunch with the boys. It is likely that Peter, Don, Dave and the editor were not "having a problem"...I was. Case in point: I was floundering at each door while any one of the men would automatically reach for it and hold it open without breaking their own stride. But I was out of step. My positions as student and younger female placed me in a more sensitive and uncertain position than Don, Dave, Peter and the editor. Not necessarily because any one of them actively reminded me that I happened to be young, female and student, but

rather because the existing social conditions have clearly defined professor, male and professional as higher in status and more dominant. More sensitive to and certainly more affected by my position in relation to their positions, I was the one who questioned my thoughts and actions whereas their actions seemed natural and spontaneous. This is precisely Smith (1987) and Spender's (1982) point: that we come to accept the dominant as though it were natural and right, and if we feel anxiety or conflict we question ourselves and our positions rather than the existing ideology and actions that support the current condition. Therefore, whether or not one would criticize me for being hypersensitive or simply reflective about my position in the all male, all professional and all older luncheon situation, my gender, age and status allowed me to question rather than simply accept the situation. In this way I am privileged because I am able to think about, as well as experience, the situation from more than a single viewpoint: I am in my position while at the same time I am struggling with the viewpoint(s) being promoted. Nonetheless, this helps me as an ethnographic researcher where being strange and being able to see the obvious as strange is

likely to yield more valuable, and assuredly more interesting findings.

In any event an important consequence of feeling different and "out of step" is that one is more likely to keep quiet because of questioning and being unsure about their own ways of knowing and doing. Granted, some people react "loudly" when they experience marginalization; but as Simmel points out, this is more likely to occur at a later stage when the individual has been integrated into a group that shares a common understanding about their situation. Keeping quiet, or more theoretically, not questioning the existing social conditions propagated by those in positions of dominance and control, is yet another way to maintain the marginalization, isolation and powerlessness of non-dominant groups. More often than not, when members of marginal groups "act or speak out" they are punished and their message is referred to as "unwelcome noise, social deviancy or even criminal behavior". Why? The questioning of existing social conditions threatens the positions and situations of those who are comfort able...anyone of us who is unable to recognize that there is a problem.

We can see how this is the case for independent inventors and why the independent inventor, in contrast with the corporate supported research and development team member does not fit in nor benefit from the existing conditions of corporate ideology. Indeed equal opportunity exists as long as you are willing to play by the rules of corporatism. Still don't believe me? Consider how many of the women inventors, not to mention the men in the above literature review, define successful inventing:

> If I can see my invention on the shelves of a store or on the pages of a book, then I'll think of myself as an inventor...not until I am able to sell my invention will I really believe that I have done something.

According to this common notion inventing is synonymous with selling rather than creating or making. In other words, at least ninety-nine percent of the women inventors I spoke with believed that they could not see themselves as an inventor simply by virtue of engaging in inventing activity...the creating of new ideas, meanings, uses and things.

The Chicago Inventors Council provides a needed and useful service because it offers general information about the legal patent system as well as helpful

and practical "tips" for independent inventors who want to enter their invention(s) into the open market. On the other hand, these tips often tend to support and perpetuate the existing ideology of coporatism and conditions of successful sales and marketing.

CHAPTER V

METHODS

Methods In Action

My first methodological step of this project was to attend the Chicago Inventors Council's monthly workshops, which I did during the winter months of 1990 (February, March and April). I also had the opportunity to attend the annual showcase display of inventions which is held once a year. The purpose is to give the inventors an opportunity to present their ideas/inventions in an informal way. The inventors are cautioned that public presentation of their ideas/inventions is a risk, especially when one does not have a patent or patent pending. Nonetheless, the annual showcase remains a popular and attractive feature of the council...because despite the weather the room was practically filled (See Appendix C for a full list of Chicago Women's inventions).

During these workshops I was able to take fieldnotes and felt comfortable doing so since most of the attendees had also brought notebooks and folders and were scribbling away. The following illustration is an excerpt from my observations.

It is Thursday night and the workshop is scheduled to start at six o'clock. Because parking downtown is difficult and also because Peter and I had taken the el the one time he had shown me where the workshop is I decided to ride down on the el rather than drive. On the other hand, I feel uneasy because riding the el at this time of night is not something that I would normally do. Going down to the workshop I am riding the el with the other suits; it's rush hour, so my position as a young, white woman does not stand out or draw much attention. Still, I am nervous about riding back after the workshop. I decide that I'll think about leaving the workshop earlier than eight-thirty.

When I arrived I had to enter the building through a jewelry, art and antique store that was located on the Dearborn Street entrance. Although Peter and Don had not shown me where I was to go they had said that there was a meeting room upstairs from this shop and that was where all of the workshops were held. I walked up the stairs and was somewhat surprised that the clerks in the store did not ask me where I was going or doing...even though workshops were held upstairs I thought that they might question the people who entered the building just to make sure that they

were actually attending the workshops.

When I got upstairs I found rows of folding chairs that were all facing the opposite end of the room. There were paintings and architectural drawings on the light-lit paneled walls. The side of the room that overlooked Dearborn street had giant picture windows; there were no other windows in this room other than these. At the far end of the room was a long brown table; next to it was a white marker board that was set-up on a tripod.

I saw Dave and Don talking up at the front of the room. Although they smiled and waved when they saw me they kept on talking. There were between fifteen and twenty people, most were standing or sitting alone; others were talking with each other. Five minutes later, Don began the workshop. I thought about moving up to the front, but decided that at least for this workshop I would sit near the back so that I could observe the people in the rows in front of me.

Don began the workshop by welcoming everybody and then asking if anyone had any questions. He explained that the workshop would be putting together its next newsletter and that if anyone wanted to be on the mailing list they should write their name on notepaper

and give it to him after the workshop.

During the lunch Don had given me a copy of the newsletters. The section, "calls for inventions" asked people to fill out a short questionnaire about their invention. The purpose was to link the inventor and their inventions with companies that were looking for new ideas to manufacture. Some people had questions about the type and amount of information they should reveal. Don explained that they should protect their invention and disclose only general information. But the catch twenty-two is that if the invention and its purpose are described vaguely or in a way that is too abstract, it is unlikely that they would have much "success" in being sought out by an interested manufacturer. Don went on to explain that the best way to "sell" the idea is to demonstrate how it works or have pictures that show it working; he explained that in some cases this would not be possible because doing so might reveal the working mechanism or unique feature of the invention. Like I said, it really is a catch twenty-two because there is no exact or sure-fire way to present your invention and fully protect it from being stolen, borrowed or modified.

Don also had suggestions for inventors who are trying to find economical ways of making a working model or prototype of their invention. He suggested that they contact students of design and engineering schools with whom they might be able to work with. On the other hand, this approach involved the risk that the student would alter or outright use the idea/invention for his/her own purposes. Don agreed that it is best if you could produce your invention in your own home...for instance, if it involved basic woodworking, cooking or sewing. But if you needed large machinery or something like a plastics mold you probably would have to come up with the money yourself, forget about the idea altogether or risk talking to other people who might be interested in your invention (the risk of course being that they might be interested in your invention without regard to your interests as the original inventor).

One thing I noticed right away is how the inventors talk about their inventions. No one ever comes right out and says exactly what their idea/invention is...they talk about it in generalities and I could see that Don was very frustrated with trying to answer their non-specific questions. For instance, people

would say, "my invention is mechanical and made out of steel...how should I market it?"--and Don would say, "well, what is it used for?", and the inventor would say, "if I tell you that will give it a way". It is really hard to understand what someone is talking about when what they are really doing is talking around the issue. The fear and need to protect the ideas/inventions is probably intensified, rather than lessened, in this group of all inventors. Rather than being a network of support for each other, they find themselves in one more arena of competition which is probably heightened by the fact that they are all independent inventors. Possibly, instead of feeling comfort in their common identity they may feel they have to increase their guard because they are in competition with each other to get their idea/invention out on the market and in their name first.

In one sense the council validates the inventors' identities as inventors; for instance, the council is called "the Inventors Council" and it does provide information to the inventor about other inventors and their inventions. On the other hand, the council is concerned with teaching inventors about "fitting into" the existing marketplace as "market producers". Thus,

Don's primary message to the inventors is that they need to identify themselves not as inventors, but instead as market producers.

Don has an exercise that he walks each inventor through when they ask him marketing questions. Don says that if an inventor cannot answer these basic but important questions then they are unlikely to get very far in the market as it is currently structured and understood: 1)who is going to buy your product? 2)why would they buy your product? 3)from where will they buy your product? and 4)for how much will they buy your product?

Don cautions these inventors to always remember that "unfamiliar" does not sell. Simply because something is new and different does not always mean it is better. Further, if something is actually "better", most people need to be shown that this is so...not simply told...and the problem with this approach is that most people are too busy to pay attention. For instance, when you go shopping it is unlikely that you will have time to do little more than grab off the shelves what you usually purchase...and therefore what you are accustomed to "needing".

Creating new needs or at least fulfilling existing and familiar needs is what the world of product manufacturing and advertising are all about. It appears that this dominant perspective is the standpoint from which Don teaches.

When I first began attending the inventor workshops I did not readily notice this aspect, despite the fact that it was happening right in front of me. Don, who sets up the workshops, runs them with a particular style. He instructs the inventors, as if he were teaching them information that you might find in an introductory inventor course (if such existed; maybe this is it, or is at least its precursor). His information is presented like a well-rehearsed script and at least for the workshops which I attended, his message was not only the same but almost always stated the same exact way and using the exact same words. Probably from his years spent as a physics teacher, his style is clear and consistent.

Don stands up in front of the inventors who are seated in chairs which have been carefully set up into two rows with a single aisle between the rows. During his presentation he paces back and forth and looks at the floor. He holds a wooden pointer-stick which I

estimate to be at least two feet in length; frequently he raises it over his head, waves it or pounds it against the floor or on the empty front row chairs--especially when making or emphasizing a particular point: "Inventors have to realize that it is their responsibility to present their idea in a way that the general public as well as potential investors and manufacturers can understand...if you cannot answer the who, why, from where and for how much questions about your `product', then you are not going to be very successful at getting your product out on the market".

Thus, the "successful" inventor should strive to fit into the existing business world in a way that makes corporations, manufacturers and other members of the general public comfortable. Thus, the inventor cannot think about his/her invention as such because then people in the corporate and general public will be unable to recognize what it is since a common understanding of who inventors are and what they do does not exist. Inventors cannot refer to themselves as inventors unless they want to risk being ridiculed as strange and wacky...a common perception that all inventors resemble the crazy doctor in Back To The Future, Parts I, II and III.

Although the information is practical, considering the social structure of the business world, its goals and expectations,the content of the information reinforces the current situation that "inventors" per se, are still an obscure and unfamiliar group that can recognize and refer to themselves as inventors in few arenas, such as the inventors workshop...but even there they are being "taught" to redefine themselves in terms of product creators...an identity that is more comfortably recognized by dominant corporate America.

In other words, even though Don's intention is to help inventors and the business public make contact...doing so requires that Don and the inventors approach this task from the perspective of corporate America. Thus, the inventors are reeducated about their identity as producers of products rather than approaching their isolated and misunderstood situations from the perspective of reeducating America, and each other, for that matter, about inventors, their unique interests, goals, needs and contributions.

Don has made it clear that his capacity is to make the workshop available to anyone who wants to participate, but that he cannot dispense legal advice, other than that which is considered general information.

Further, as a general rule, he cannot work on an individual basis with inventors other than to help them connect with manufacturers or investors who seek the council out because they are looking for inventions. To do this Don must review and keep files on the various types of inventions that people send in to him. It is because of these files, the council and Don that I was able to meet and interview twenty women inventors in the Chicago area. My hope is that the content of these interviews will not only help reeducate the general public about who these inventors are and what it is they do, but I also hope to provide information that will help Don and others like him who have taken their time to form groups and workshops, such as the Chicago Inventors Council. Indeed these efforts are valuable steps for helping inventors and their inventions become more visible contributions from which we can all benefit.

Interview Settings

I used an interview schedule which consisted of twelve open-ended questions (see Appendix A). Seventeen of the interviews were face-to-face and three were conducted over the phone. Notes were taken during all interviews; in addition, I was able to tape record the

face-to-face interviews. The shortest interview lasted twenty-nine minutes and was conducted at a McDonalds in a west suburb of Chicago. The longest interview lasted six hours and included my going on a brief job interview with the woman and then out for a bite of supper as well. The average interview lasted eighty-five minutes. I signed ten non-disclosure agreements, and in all but one case was allowed to see the invention, or at least pictures of the invention. Two of the women in particular invited me on a tour of their work spaces and allowed me to look at some of their "inventions in process" (see Appendix C).

I always felt a great deal of anxiety prior to the interview and even during the phone conversations when I was scheduling the interviews; but I always felt glad that I had gone on the interviews and in some cases I walked away with a treat in addition to valuable information. One woman gave me an abundant amount of her delicious chocolate which I refused to share with anyone else...and another woman told me how just thinking about being interviewed had created a great deal of anxiety for her the night before, but that she was glad that we had gone through with it and felt that she had learned to look at herself and her inventing different-

ly. For the past fifteen years she had felt guilty about not taking her invention "all the way" (into publication and onto the market for learning impeded students). But now she was able to look more at what she had accomplished and was beginning to think about new strategies for pursuing some of her "old dreams".

I have to say that I learned so much more from participating in these interviews than I ever could have by only searching documents about women and their inventions. One thing I learned is that it is more than "okay" to be "different-or out of step"...Without them and their approach to life this project would not be possible. My hope is that by sharing their experiences and stories through me they will realize their common bond and believe in themselves that the prices they have paid are worth it...and keep on "moving on" in their "different and unique ways".

Interviews On The Run

Ten of the women invited me to interview them in their homes. On the other hand, some of the women expressed concern about my coming to their homes when they would not have time to clean beforehand. Others said they could only "spare the time" to be interviewed if I would agree to meet with them between carpooling

their kids to school, running errands and working their jobs outside of their home. As a result, five of the interviews were held at restaurants and three of the women were interviewed over the phone. One of the women requested that I interview her on the stairs of the Chicago Art Institute, and another woman was interviewed in her church parking lot because she had to watch the vacation bible school children.

Sample Characteristics

Nine black women and eleven white women participated in this study. They ranged in age from twenty-seven to sixty-six with an average age of forty-one. It is interesting to note that four of the women refused to reveal their actual age or the year that they were born. In fact, one of the women informed me that former civil law protected women from perjury in court and that they could not be prosecuted for lying about their age or sexual practices.

Four of the women are single, nine are married, six are divorced and one is widowed. Seven of the women have between one and three children which are twelve years old and younger living at home. Eight of the women have between one and four adult children (eighteen years or older); and five of the women do not

have any children.

Three of the women have high school degrees, six have had some college, three have completed four year college degrees, five have earned masters degrees and three have specialty degrees (one of the women has an L.P.N. and two of the women have degrees and certification in fashion and design).

Fourteen of the women currently hold jobs outside of the home, two are self-employed and work out of their homes, and one of the women does extensive volunteer work for her church and neighborhood organizations. Three of the women currently do not work outside of the home, but each of these three women has previously worked in the paid labor force: two were teachers and one had been an elevator operator until she lost her vision a couple of years ago.

The women's inventions range from domestic items, such as a dual washing and dryer machine, furniture and athletic equipment to child, home and personal care items, literature, lyrics, music and business plans and equipment (please refer to Appendix C for a more complete list of the women's inventions).

The Theory That Is Embedded In My Methodological Approach: Whose Story Is It?

A problematic, yet important methodological approach for interviewing these women inventors is rooted in feminist and ethnographic research and literature. Primarily I point to Dorothy Smith who has informed me through the teachings and assignments of Judith Wittner as to the importance of treating the people being interviewed as subjects rather than objects, thus making your goal the telling of their story in their words.

I employed a number of ways to make sure that I was doing more than simply striving toward this goal. For instance, I sent the women copies of the interview-summaries (interview transcripts in a story/report form) and subsequent written analysis and papers, as well as the transcript of the paper I presented at the 4-S conference this past October (1990) in Minneapolis. I sought their comments, clarifications, criticisms and suggestions as well as corrections.

My plans to conduct the project in this manner were with me since its inception, despite the cautions given by one of my supervisory professors who informed me that whether or not I "left a particular quote in"

or took it out was really my decision and that part of my study/project would be based on my selection of which statements and experiences I believed should be told.

According to my instincts and understanding of feminist research methods I had no choice but to proceed in a manner where I allowed the women inventors to participate to their fullest and most willing extent in the construction of the telling of their stories. I have to respect that not only could this study have not been possible without their willingness to participate fully in this study, but it is also because of their experiences and approaches to life that this story can even be told. All but one of the women not only complied with, but actively maintained this project environment of ongoing researcher-subject interaction. Some women wrote me, others telephoned me, some even sent me additional articles about themselves or other women inventors.

In addition to submitting written material for their review, I also sent three newsletters to keep them informed as to the status of the project, what I was doing, my preliminary findings and my anticipated future plans for action. One woman was so enthusiastic

that she rewrote her interview-summary for me and I think that she was somewhat disappointed when she did not find it fully reproduced into my twenty minute presentation given at the above mentioned 4-S conference (The Society for the Study of The Social Sciences).

I think that my approach allowed me to establish a rapport with the women inventors that would not have been possible if I had not been able to fully disclose the purposes and intentions of this study. In other words, I did not have a hidden agenda and therefore I had no reason to keep my data from the inventors; except in cases where it would have violated the confidentiality of another inventor.

One woman told me that it was the nicest thing I could do...rather than simply dropping in and taking up their time with an interview for my sole benefit I shared my work about them with them and gave great consideration to not only the content of their interviews, but their thoughts, feelings and comments about what they had told me.

It is true that I ran the risk of having important information disclosed and then denied upon their reading the written analysis. Nevertheless, it was a risk I

believe I had to take. I wanted to reassure myself as well as the women that I have integrity as a researcher and would strive to set up a positive and pleasant interview experience. Too many people are suspicious or afraid to be interviewed...especially when they are given little chance to participate in the telling and writing of their stories. By working to construct a "safe" interview environment I believe that I was able to obtain more complete information that might have otherwise been invisible or eluded me. When I say a "safe interview environment" I mean "safe" in the sense that the women I interview will have access to this project at every step; for instance, I sent them the interview summaries before I drafted the conference presentation. Thus, the women had opportunities to review, critique and even contest what I wrote about them, their lives and their inventions. Which is, after all, their story to tell.

There was an instance where a woman made a comment about her husband being unsupportive toward her inventing. She told me that she was angry with him for not emotionally and financially supporting her and her goals...in fact, she was so frustrated that she was willing to give her invention away to a friend to

pursue and felt bad about having given herself and her goals up when she got married. When she read her interview-summary she called me and wanted me to take that part of her comments out. "If he reads this he'll hit the ceiling". At first she told me that she had never said such a thing about her husband; but I told her that her identity would be anonymous and that if I had correctly understood what she said, then it was important for her to share this feeling and experience because my guess was that a lot of other women, and women inventors in particular, were experiencing the same thing. She agreed that it should be a part of the research findings.

An important part of forming a community of shared interests and identity is knowing that you are not alone and that there are others out there who are enduring or enjoying similar experiences. Some of things I was told during the interview sessions were difficult to get through...some of the women were very emotional about their inventing. One woman explained that inventing is something that she does just for her own enjoyment and that not everyone in her life understands its importance in her life but that she believes inventing has helped her to understand who she is...it

gives meaning to her life and she would be unhappy without it, even though some of her friends and family members do not take her seriously. One theme that runs through all of the interviews is that inventing is a serious part of their lives, it is their approach to life for dealing with the little and big daily encounters, it is a way for them to explain to themselves and the rest of the world who they are and how they fit into this social world. The reality that being an independent inventor does not always fit neatly into the existing scheme of things, or the fact that it is difficult for them, me and the general public to clearly define what it means to be an inventor indicates that this study is not only interesting, but necessary in explaining a way of social life that is real and does count yet is sorely misunderstood and underestimated in terms of its actual and potential social benefits for all...some of which we can already feel but not yet see.

Ethical Considerations

In this written analysis, as in all previous work, the names of the inventors or any identifying characteristics about them or their inventions are anonymous, except in those rare cases where their identities are

public knowledge (i.e. Don Moyer, who is head of the Chicago Inventors Council) or where they specifically requested disclosure of their identity.

This methodological and ethical approach has been strictly adhered to for the purposes of protecting the participants in this study and their interests. Further, the participants were informed prior to the interview and during the preliminary phone call that they could terminate their participation at any time, and in any way. A written thank you note was personally addressed to each participant upon the conclusion of their interview; and I want to formally thank all of you again for your time and your willingness to be part of this project and your kindness for sharing your experiences and lives with me.

CHAPTER VI

INTERVIEWS

Introduction: The Social Situation of Chicago Women Inventors Still Today

My work of independent inventors in general has revealed a number of widely-shared characteristics: a great deal of creativity and persistence, but on the other hand, difficult access to material, social and financial resources. Additionally limited access to the marketplace is further hindered by widespread mistrust on the parts of both manufacturers and inventors, and also a lack of collective organization with each other...hence, a "disorganized social world" (Whalley, 1988).

My expectations were that women inventors would certainly share such difficulties with their male counterparts; in addition, I expected that their gender would place them in a doubly marginal position...especially in regard to the dominant institutions of corporate innovation.

The literature and current research about independent inventors argues that all independents, whether male or female,experience the challenges of limited time, lack of technical skills, very little social

support (sometimes even resistance and confrontation) and never enough money. On the other hand, current research and feminist inquiries argue that these constraints and barriers inhibit, and in many cases completely prevent women, more so than men, from being able to participate fully as inventors.

Therefore I want to specifically focus on four aspects which I think are especially relevant for understanding the position of women independent inventors today. Three of these deal with resources, such as time, social and financial support. The fourth concerns aspects of the women's self identity as inventors.

It's Only A Matter Of Time

Cummins and Beauchamp (1988) suggest that given the division of labor on the basis of gender, where women are still primarily responsible for the care of home and children, most women have less time to themselves for leisure, recreation and personal activity, such as inventing, than do men. For women who are inventors, as well as labor force participants, mothers and wives, the biggest challenge is attempting to balance their time in such a way that it might include

inventing. When they did rearrange their schedules to make time for inventing, many of the women inventors in the Canadian study experienced ambivalence, uncertainty and even guilt that they might be neglecting their children and household responsibilities. To counteract or placate these feelings they consistently gave up inventing in order to fulfill these other demands.

The Canadian women inventors are not unusual. In fact, if we look at when, where and how many of the interviews with Chicago women inventors took place we can see that they also placed the responsibilities of family and home ahead of their inventing. Consider the fact that nearly half of the women in the Chicago study had to squeeze their interviews in between the demands of children, husbands, home, friends and their own jobs. Others worried about entertaining me in their homes without having thoroughly cleaned it first. This alone says a lot about the structure and demands of their daily lives as well as the expectations that they hold for themselves as mothers, wives, workers and homemakers. It is likely that adult women, more so than other members of the household or family, put their needs and goals on hold in order to care for the needs and interests of the other people in their lives.

Although this grandmother-inventor has already raised two children, worked for most of her life as a teacher and earned her masters degree in counseling education, she recently had to rearrange her life and change her plans in order to raise her four year old granddaughter:

> Having a small child in the house all day keeps me from doing many things. Before she came to live with us I was thinking about going back to school. I love having her here with us, but I really miss teaching.

This single mother-inventor has put her successful, but time-consuming free-lance design business on hold so that she can take a full-time job that will provide a steady day-to-day routine for her seven year old daughter:

> There have been times when I've had to bundle her up in her sleeping bag in the middle of the night so I could get some slides to an early morning presentation on time. If it was just me, then I'd probably put up with that schedule, but I can't keep doing that to her.

Very little support exists to encourage these women to do otherwise; especially when existing social expectations and norms demand that women, more often

than men, rearrange their schedules and compromise their goals in order to accommodate the needs of the other people in their lives.

For instance, Whalley (1988) reported that his interviews with men were often conducted in a business-like atmosphere; if not in an office, at least in an area that was removed from the activities and schedules of other family members.

The following illustration is excerpted from my fieldnotes and an interview...it shows us how even the interview experience for women inventors is different from interviews conducted with men inventors.

Standing before me is a sleepy woman in her early thirties. She apologizes for her appearance and explains that she has been dozing on and off after working all night at the post office (her full-time job). As she clears a place for me to sit at the dining room table she apologizes for the mess...after a second thought she comments that things are actually pretty neat, even if not up to her mother's standards...especially considering her schedule. A little boy of four or five is driving his Tonka trucks around the room and making whirring noises; a little girl, about two, is softly whimpering in her play pen in a room off of the

dining room. This woman tells me that she considered having her mother watch her children during our interview, but decided that she needed to spend some time with them before her meeting early that evening (she has her own finance consultant business with two other partners that she is running on a part-time basis). She hopes that her husband will be home soon...then maybe he will watch the children so we can finish our interview. In the meantime, a large dog barks loudly and bounds around the dining room table while a small white poodle occasionally jumps up onto and down again off my lap.

This interview setting is not unusual. The demands of children and other family members often define and give shape to the daily lives of women. Even when the children were not present during the interview the mothers would check their watches, make phone calls to sitters or cut the interview short because they had to pick a child up from school, or get dinner on the table for the family. These day-to-day interruptions in the daily lives of women, are what Dorothy Smith (1987) means by "episodic events"; thus nothing can ever be fully completed. This is in contrast to the flow of men's daily lives, which in general involve

fewer episodic interruptions related to children and home care. Although this situation is in a process of change and redefinition as men increasingly take on greater home and child care responsibility, Hochschild (1989) shows that the second shift of home and family care is still primarily women's responsibility more so than men's.

Because all inventors need to manage without the resources of time and money which are more readily available to the corporate engineer, many work at home in their spare time. On the other hand "spare or leisure time" has always been problematic; especially for women who work outside the home as well as within--what Arlie Hochschild refers to as the "second shift" (1989). Often the women had to make time to do inventing in between car-pooling, cooking and cleaning; or work late at night and early in the morning. The fact that other family members did not always understand or support their inventing activity made it more difficult for them to find the time as well as the space to invent.

In addition to the problem of time the women inventors had a hard time claiming their own space within which to do their inventing. Where the men in

Whalley's study of independent inventors often had the basement, garage or even their own study set up for their inventing (1989) only two of the women I interviewed had their own work spaces; and one of the women was single and lived alone. For the other women the kitchen or dining room tables served as their workspace...an area that is considered a "common area" for all family members and their activities.

With limited time and space as well as episodic interruptions it is obvious why the women would be hesitant to even begin an idea for an invention; especially when they knew it would be very difficult to get it going, let alone finish it. Simply asking for more help from others might seem like the obvious solution. The reality, as the women explained, is often that the costs of accepting help quite often outweigh the benefits.

> When I first began work on my invention, my father-in-law took a real interest. In fact, he offered to put up the money for all of the initial legal fees. Since my divorce the invention has been pretty much on hold. Our relationship is strained and I wouldn't feel right asking for help.
>
> If you have one of your friends or neighbors watch the kids, even if you pay them, then you are

> obligated to return the favor the next time around.
>
> I would like to find a job so that I would have my own money to put into my invention. That way, if it doesn't work out I won't have wasted my husband's money.
>
> My mom helps me the most by coming over and watching the kids when I have to work. I feel bad because she's getting older and shouldn't have to baby-sit during her retirement years.
>
> My ex-husband will pitch in and relieve me of her (their daughter) when I have a lot of work to do...but it's according to his schedule. Because it's this way I don't feel good about having him watch her just so I can do something personal...she's really my responsibility.

In some instances the women were afraid to ask for help because they felt guilty that they were shirking their "primary responsibilities". Their overall sentiment was that inventing was a personal goal that had to take a back seat to the needs and goals of their other family members. The result was that many of the women were unable to fulfill or fully pursue their inventions because of these conditions. They did not like the situation, but believed that the choice of family and home over their work and interests was the way it had to be because work and outside interests were viewed as

an "extra or personal" choice. Marjorie Donovan (1990) in her research on men's and women's perceptions about women scientists and their work argues that failure or setbacks in their work should not be a deserved price women have to pay for choosing both careers and family. Certainly men have succeeded with both family and careers for generations; and if he does not realize his full potential in his career it is unlikely that you would ever hear, "well, that's what he gets for trying to have it all". In any event, the women felt that they really had very few people to turn to who would really support their inventing...something that they struggled to define as both important to them and their lives, yet it was too often in conflict with the other aspects and responsibilities of their lives.

Sources of Emotional Support

Many of these women told me that despite the additional burdens of rearranging their schedules and giving up other activities, inventing had become an important part of their lives. For many it has become a way for them to express themselves, and for some it is another way to earn money. Yet, for every woman inventor that gave credit to her spouse, family and friends

for emotional, and sometimes even financial support, there were at least three others who felt that their families and friends reacted with indifference, at best, toward their inventing. Others experienced open criticism or ridicule.

> At first most people think it's great when I tell them that I'm an inventor; but then they start asking negative questions like, "how are you going to pay for it?", or, "do you really think it's going to sell?". This works on my confidence because then I start thinking "hey, maybe this won't work".
>
> My husband is always bragging to his friends, "my wife has an appointment to see the vice-president of THAT company!". He says that I have the gift of gab and can get my foot in the door anywhere.
>
> It's not that anyone in particular says, "don't do it", often it's in how they say "sure, go ahead and try". You can tell just by the way they say it that they don't think it will work.
>
> My greatest support comes from family; especially my husband...he takes my work seriously. Until I started contracting my designs to boutiques, most of the money has had to come out of our personal savings. It means a lot to me that my husband really believes in me and what I'm doing.
>
> My husband's dream is to have his own church and to expand the

ministry. My goals are to keep growing. I think he sometimes is a little jealous of my creativity...he has never really shown an interest in my invention, and that hurts.

My mother has never really been interested in my invention...until you called. Then she was worried all of a sudden that I'd say too much and give it all away.

I first tried working for myself when my kids were in school. I was tired of feeling like my only purpose in life was to be a stay-at-home mom and make my husband look good. I also felt like I had to prove to my family, especially my mom and dad, that I could be just as successful as my older sister. At least I got the patent before my dad died.

I couldn't keep up with my schedule if my husband didn't help out. He's always willing to watch the kids, when he's not working.

I have been angry that my husband would not support my invention by putting money toward it. Sometimes I feel like when I got married I lost myself. I pushed my identity aside in order to blend in with him and his dreams.

My husband's friend laughed at my idea for a glow-in-the-dark jump rope and said, "oh, that will never sell". I nearly had a heart attack that same Christmas when I was shopping and there it was in a Toys R Us. I bought one and cut off a piece that I kept wrapped around my purse for the longest time...it was a reminder to myself to never let

> me think that my ideas won't work; also...it kept me from strangling my husband's friend.

In many instances having a single friend, relative or family member, especially a spouse, who gives support and encouragement, is the difference between fully pursuing the invention or putting it "on the back burner", or in some cases, forgetting about it all together. Inventors have always been viewed with curiosity and skepticism, but had they all given up we might be without many of the comforts of modern day living; for instance heating and electrical lighting, not to mention white out and sanitary napkins. Silly or mundane, many inventions solve real problems which are not always evident to those in comfortable or dominant positions. So a little discomfort can be good because it can lead to the creation of novel solutions for problems that are sometimes hidden. On the other hand, lack of emotional support, not to mention limited money, time and space can make innovation an elusive and difficult activity to incorporate into an already crowded daily schedule.

A possible explanation as to why women are less likely than their male counterparts to receive emotional support from their family and friends may be related

to the argument made by Amram and Morgan (1980, 1984): that inventing is not an expected activity of women and therefore is less likely to be an encouraged one. The prevalent attitude toward many of these women and their inventing is that if they have the time, great; but if it interferes with their other responsibilities, such as their jobs, or family, then it is their problem to solve. In a social environment that promotes this attitude we can easily see how many women would give up on their inventing rather than struggle to keep all their responsibilities going or place themselves in an additionally difficult or uncomfortable situation because they had asked for help.

Social Need and Political Importance of Support Networks

Quite often inventors, especially those who work at home, experience feelings of isolation. In part this is due to their lack of peer groups, colleagues and business or professional contacts who might possibly provide a frame of reference against which to measure their accomplishments and a network within which to assess their failures and gather additional information for further improvements. Feeling isolated serves to heighten their sense of strangeness, deviancy and unacceptability that they may already experience by virtue of being an independent inventor (McDaniel, Cummins and Beauchamp, 1988). Women, especially those who have not worked outside of the home, have had a history of living their day to day lives in a way where they have been isolated not only from each other but also from the world of public, paid and visible work. Hence, being both female and an independent inventor, especially if she does not work outside the home, gives rise to an even greater feeling of isolation and deviancy than that experienced by her working female counterparts; and certainly more so than that experienced by her male counterparts.

One woman told me that she took a part-time job sending and receiving faxes, even though it was only for a couple of hours three days a week, and for only four dollars an hour at that:

> I need a reason to get myself up and dressed each morning. I have to have some place to go; otherwise I'll just stay in my robe all day. Now I can feel like the rest of the world who's out there and doing something.
>
> Part of the reason why I have gone back to work full-time (rather than keep at her free-lance design business) is because I have missed the professional contacts that you get through working in the business world.

Organizations such as the Chicago Inventors Council do provide a means of social support that helps to reinforce their identities as inventors. On the other hand, the real need to protect their inventions from each other, as well as outside groups, inhibits them from fully sharing their experiences and resources with each other. Such an environment further promotes feeling isolated and does little to help establish professional as well as social networks of support. Many of the women inventors that I spoke with recognized that indeed this was the case; but many were not sure what they could really do about the situation.

> I think we could accomplish so much more by working as a group. If nothing else we could share information on things, like drafting business letters or practice presenting our inventions to companies. Most of the time I feel like I'm winging it and making it up as I go along. It would help if I had someone else to talk to...not just a friend, but another inventor who understood what it is like.
>
> I would be interested in attending a meeting where inventors just come together to share their work...kind of like a support group; but I don't see how people can share their idea without giving it away. Like at the annual showcase. How can people just get up there and display their inventions when they say that you have to not give it away...especially if they don't have a patent!

Even though one of the women inventors proclaimed that she "didn't care if someone steals my inventions because I'm always thinking of more", most inventors feel a strong need to protect their few, and sometimes only one invention.

> By the time you've presented your idea publicly, something that you need to do to test and research whether it's going to work, someone like Proctor and Gamble, who has a whole research team trained to develop anything after seeing it only once, can take your idea and claim that they were working on it all along. And there's really

nothing that you can do about it.

Some would argue that the only way to succeed as an inventor and experience an environment of social support rather than isolation is to get a job as part of a research and development team. You could get paid for your "inventions-or-products", have support and be among people who were doing the same thing as you. In addition you might be able to establish professional or social contacts and thus invent in a way that is socially recognized and supported by the business world as well as by the general public.

In many cases this alternative is not practical. Such positions require degrees and training that are not options for the already working mother and/or wife. Even in instances where such an option would be feasible, many former research and development team members, such as Burton Siegal, feel that the corporate environment limits your inventing to their budget and market interests. In other words, you invent what they tell you they can afford and want you to invent. If the corporations are concerned about their budgets for money one can just imagine how concerned the independent inventor is.

Cold Hard Cash

Between the costs of applying for and maintaining a patent, not to mention costly legal fees, which, I have been told can run up to $3,500.00 just to get the process started, many inventors find that they are unable to afford the costs of making a working model or prototype of their invention. All of these other costly steps aside (legal and patent fees), a prototype is actually the one expense that could really help these inventors secure interested investors and manufacturers.

> My goal is to pick just one or two of my inventions and then get them ready to show. The problem of entering a professional housewares show is not just the cost of renting the booth and show space, but trying to get a working model ready. No one is going to be interested in looking at pictures and technical drawings of my invention when other people have models to look at and try.

Many of the inventors who do manage to at least start the process of inventing are not only discouraged at the expense, but are even more aggravated when they realize how little they are getting in return for the time and money they are spending.

> We have this big patent office in D.C. but that's all it is...a big old office. I know this woman who had to have her prototype made in India and then have it shipped back here...it was that much less expensive to ship it all around the world than to have it made in our own country.

Their feelings of discouragement and frustration are compounded when they are "taken advantage of" by so-called "market or assessment firms" that promise big results in exchange for big money. Although inventors, as well as the general public, are more aware of these groups...the unseasoned or beginner inventor can still fall prey to such groups who promise them the world and deliver little more than a "polished looking report".

> I didn't know how to get started, so I just looked in the yellow pages and called the first place that looked close. I spent eight hundred dollars, which I now realize was a small price to pay for the lesson that I learned, to basically have a "report" done about my invention. Basically, they didn't even tell me anything I already didn't know; and they certainly did not pursue me or my invention after the initial assessment...that they had originally said they would do at no cost if the invention looked promising. If someone seems a "bit too interested" in my invention, or if they want a large sum of money up front, I get off that phone and don't do business with them at all.

Many of the inventors with whom I spoke have looked for public services or organizations to provide funding, or even information for independent inventors. Organizations for inventors that currently exist, other than non-profit groups, such as the Chicago Inventors Council, often provide these costly services, such as market analysis and product assessment or fancy packaging. Whether they are legitimate or fraudulent, they rarely result in the inventor actually getting his/her invention out on the market. The bottom line is that there are not any organizations set-up to fund the work of independent inventors in a way that is economical and minimal in risk.

Inventing Is Not Gender Neutral

Pinch and Bijker (1987) argue that technological developments and innovations are often the result of resolving controversies and finding solutions to problems that are faced during everyday life. Consider the following illustrations which show how "inventions" are solutions to problems in the everyday world of family and home.

Two of the women inventors I interviewed, a mother and daughter team, had tried to find financial assistance because they wanted to develop a prototype of their invention...a specially equipped potty chair.

> We went to this government funding agency in Chicago, but they said that they weren't interested in giving money for "that" area of development.

"THAT" area of development most often refers to innovations which are produced for the home or produced from within the home; what we might generically refer to as "domestic products". Thus, inventing is not gender neutral; instead, inventions are gendered by where they are developed, by whom they are developed and for whose purposes they are developed. Because home and child care have historically been associated with the female, inventions made within these contexts are also associated with the female. Because the female and her activities have historically been considered less important or secondary to the male and his activities, female inventors and their inventions are likely to be considered less important and secondary to male inventors and their inventions.

> I was washing clothes one day and I guess that I was tired of going back and forth between the washer

and dryer. I thought, "there has to be a better way"...and there is! I did an informal patent search on my own and found a dual-washer and dryer that is on the market now, but there are problems with it; so, I'm in the process of inventing a new one.

Writing songs is something I have doing on my own for at least fifteen years. Recently I helped my friend's boyfriend write a song. I stayed there all night because he didn't have a clue how to use his electronic equipment. We even made a demo tape with me singing. Now we have found a publisher willing to publish our lyrics, but we have to get them copyrighted first.

We needed a simple way for the kids to have access to emergency phone numbers. We thought of having a cube-like design with pictures of a doctor, neighbor or policeman and then the phone number of that person under the picture. It would also be helpful for elderly people who forget things easily.

I have always loved to bake, especially chocolate. During one of my ceramics classes I thought, "hey, why not pour chocolate instead of plaster?". Since then I have created over ninety-five hundred molds and I have hundreds of pounds of chocolate designs in storage. Mostly I make gifts and decorations for holidays, birthdays and wedding receptions.

When I began working as a substitute teacher for inner city school kids, nearly thirty years ago, I quickly realized that what people thought were poor speech patterns

and writing skills could be retaught if I could find a way to teach the kids that was interesting enough for them to keep at it and learn the concept. I invented a puzzle; and through repetition and practice the kids relearned how to speak and write (her example: they like the girl instead of they likes the girl). It worked so well that the kids not only learned the concept, they loved the puzzles and were sneaking them out of class to take home. Even when I tried to give them dime-store presents for jobs well-done...they preferred the puzzles. Not only did I end up taking a big bag of prizes back to the dime store, I had to make a lot more puzzles. Almost as an accident I discovered that this puzzle concept could work really well as a teaching aide for the deaf. The deaf have problems seeing or feeling the "s" sound...so they don't really have an understanding of adding an "s" to make something plural. My friend's little girl, who is deaf, had what I would call a "eureka experience" while playing with the puzzles. It was very exciting.

One day I was feeding my granddaughter and watching her try to feed herself. I came up with an idea that I tried out on her. I made a model out of some things I had around the house; some clay and a marking pen. Little kids have an easier time handling thick and big feeding utensils. I found nothing like my invention at the grocery store and decided that I should try to get it out on the market...as an after thought I realized, "hey! I bet I could make a lot of money with this".

> All through high school and college I have been very athletic; also, I worked as a mail carrier. I first came up with the idea because there were not many athletic shoes on the market that were designed especially for women. I took a plain shoe and began experimenting with it and just adding things here and there to see how they worked. Then I tried it out on my friends.
>
> As soon as my son could crawl he figured out how to get into, and destroy, our videos. Lot's of fun, right? I began to think of ways that would protect, but also decoratively store, our tapes. What I came up with can hold a lot of tapes safely, but can also be used as a piece of furniture that you wouldn't mind having in your living room or den.

When women, as a group, find themselves dealing mostly with the controversies and problems within the world of children, husbands and home, then it should be little wonder that their inventions involve so-called "domestic products".

On the other hand, the same argument can be made for men...

At a recent inventor's workshop a father talked about his invention for a child-safe alarm that would sound-off if the child opened the front door or drawers and cabinets that contained dangerous appliances and products.

Thus, both men and women are likely to invent solutions to problems that arise during their daily life experiences. While these occasionally involve child-care or domestic situations, men are still more likely, as a group, to focus their attention on public (rather than private or home) based problems; for instance, transportation, energy and the like. It is these latter kinds of inventions or solutions which are given the most serious attention, and funding for that matter, in the world of public and business.

Despite the fact that the home is where most independent inventors invent, a number of feminist writers on technology have argued that the home as a place for inventing is less than ideal (McDaniel, Cummins and Beauchamp, 1988). They argue that inventions which are produced within the home, or as solutions to problems within the private world of family and household are likely to be discounted as unimportant:

> The home-based inventor, whether male or female, is less likely to be taken as seriously as is the person who works outside of the home.

These researchers also argue that any activity carried out within the home, whether the worker is male or female, is less esteemed because of its historical synonimity with the feminine. Therefore, in a world where funding is in very short supply, women are even further excluded when they invent in these fields and areas which are traditionally defined as female.

> Domestic creativity--even in the more public worlds of science and art--is discounted as is women's creativity (Cockburn, 1985).

In other words, these researchers believe that inventing at home, even if the invention is not "considered" domestic, may have a very different meaning for women inventors than it does for their male counterparts. In particular, women inventors and their inventions are likely to face the problem of not being fully accepted as serious and worthy in the world of innovation.

> The invention of products for or within the home is most likely to be seen as finding a "better way" to do housework, simply an "improvisational make-do", or an extension of the home-maker's traditional role (Precious, 1984).

"Improvisational make-do's" make the connotation that the activity or creation itself resulted from little more than a whimsical notion...certainly nothing that would require great expertise or training...unless, of course, one might consider the work of homemakers and mothers, not to mention wives, as requiring a life-time of learning, experience and even upgrades or updates (to use a computer tech term that connotes increasing one's capability and knowledge).

Indeed, most of the inventions created by women in this study could be loosely classified as "domestic improvisations". But I argue that inventing at home, or inventing in response to the needs of the household and children is an inadequate explanation of why women's contributions continue to be undervalued. Instead, I argue that their problems of invisibility and lesser value (when compared with their male counterparts) are rooted in the divided images of private and public which are strongly held, still today. The consequence of the public versus private ideology continues to mean that what women do, whether in private or in public, is still defined as feminine, and activities that are defined as feminine continue to mean private. Associations of private and feminine

carry the meaning of not being within the range of, or deserving of, public attention.

So yes. Society continues to believe in and promote gendered categories of actions. Conceptually this might make talking about our world and experiences easier, but the price for ease is that the conceptualizations are far more reaching than mere thoughts. Translated into action these conceptualizations and categories serve as criteria that allow those in positions to judge, limit and often block certain groups from full participation in many areas of social life.

For instance, activities which have been traditionally defined as feminine are stamped with the underlying message that they are supportive and secondary to those activities considered masculine. This understanding translated into action continues to hinder male participation in activities and experiences traditionally defined as female as well. In households or families where this is the expected and promoted, both fathers and children, as well as mothers, miss out. Mothers are likely to carry a greater workload in these areas and fathers and children participate in the promotion of a one-sided viewpoint: that mothers and children are encouraged to interact and participate

more simply by virtue of one of their parents being female and the work of mother being gendered as female.

Fathers who attempt greater participation in the sometimes mundane, but often meaningful nuances of daily life are socially ostracized. This inhibits their full participation; and this situation is something all household members miss out on...regardless of gender. Although the situation has changed somewhat since more and more women have entered the paid labor force and women and men are slowly renegotiating their roles in terms of gender and previously held gender associations, dominant society continues to hold onto these traditional and tired beliefs (Rubin, 1983).

Inventing An Identity

Earlier in this paper I presented arguments which claim that the meaning of "inventor" and the activity of "inventing" have traditionally been male defined and male dominated (Amram and Morgan, 1980, 1984). Other feminist researchers argue that women who enter male defined and male dominated situations, or occupations, are most likely to be seen as inadequate simply by virtue of their gender rather than any consistent or real measure of their ability (Cockburn, 1985; Carter and Kirkup, 1987). Even when women's participation and

performance are justly measured, and found "up to par" with that of their male counterparts, society continues to accept and support the myth that women are less capable and creative than men, especially in areas that are traditionally found to be male dominated and male defined. This myth is so real in its power over women that the women inventors actually deny their own experiences. McDaniel, Cummins and Beauchamp (1988) make this point in their discussion about the identity problems of Canadian women inventors:

> They have so internalized the myth that women are not inventors that they deny their own experiences in order to accept the prevalent belief propagated by the dominant group. As a result, women tend to hide their inventing from others...rather than being a source of pride, their inventiveness is discounted as easy to do, or already a part of their expected household duties...thus, their inventing became as invisible as the housework that they do.

The argument that these researchers make is that women's contributions become invisible...even to themselves, simply because of the underlying gender biases associated with their work.

The research of Whalley (1988) suggests that men are equally unlikely to identify themselves as inven-

tors; instead they commonly refer to their work as "just something I do". In part this might be due to the unclear definition and marginal status of inventing in general. Whalley argues that most male independent inventors are likely to reserve the term "inventor" for their more successful or visible colleagues. Even so, I argue that women are even more alienated from the term "inventor".

Nearly all of the women inventors I interviewed claimed at some point during our contact that they "really weren't an inventor", but would then go on and show me their inventions and explain about the various groups they had attended in search of information. When I asked them why they did not consider themselves inventors, or what it was they thought an inventor might be, the responses had two major themes.

The first theme is clearly gendered. Many claimed that they "weren't really inventors because what they do isn't technical or mechanical". In part this reflects the stereotyping and gendering of activities on the basis of traditional gender roles; but it also reflects a more complex sense of their own capabilities in relation to those of the male inventor stereotype.

Many of these women believe that they and their inventions have suffered because they were not encouraged to participate in and learn traditional male activities while they were growing up.

> I feel that I really missed out on learning some basic mechanical and technical things that would really be of help to me now. We (girls) always had to take classes like sewing and cooking; I would have also liked to have taken things like shop. Now I have to find someone and pay them for information that I know I could have learned.
>
> I think I was born too late. I missed out on learning "mental toughness" and developing a "competitive edge" that boys are naturally taught in school and in sports. If I had learned this I think I would be more successful at selling myself and my invention.

It might be thought that this situation has changed for women; especially since schools now require both boys and girls to take classes like shop, sewing, cooking and gym. Even the comments made by the above two inventors, who are forty-something agree that the past educational system especially discouraged young women from participating in activities traditionally defined as masculine...and young men from participating in activities traditionally defined as feminine. On the

other hand, most of the inventors in this particular study are in their twenties and thirties; and even though they have enjoyed many of the social changes brought about by the second feminist movement, the reality is that activities, whether in the school or other arenas of social life, continue to define and limit who should and should not participate on the basis of gender and gender associations.

> When I went back to get my masters degree in product design (1983) very few women were encouraged to go on in this area. Women were typically expected to get degrees in photography or graphic design instead. I think product design has a lot of men in it because of all the shop classes that are required. I was lucky. My mentor always encouraged me and told me that I was just as good as the men. But when I graduated, less than seventeen percent of the graduates were women (woman inventor in her thirties).

> I had this idea and wanted to make it but I didn't know how...I didn't even know what kind of machine I would need. I didn't want to share my idea with anyone because it's so simple I thought that they might steal it...but I had no choice because I couldn't make it without knowing what equipment I would need. My friend told me that all I would need is a jigsaw cutter...the kind they teach kids how to use in school. So I learned how to use it and made my own model...but I'm

> still worried about showing the finished product to anyone (woman inventor in her late twenties).

Whose Idea Is It Anyway?

Control over the production and application of technical and mechanical knowledge traditionally has been and continues to be in the hands of men and their interests. Although there have been some changes since the American Feminist Movement of the late 1960's and early 1970's, only in recent years have women gained increased and more meaningful access to areas traditionally defined and dominated by men; for instance, sports, technical drawing and design, science, engineering and medicine...to name only a few. One visible consequence is that we continue to see fewer women than men who have earned degrees or hold high ranked positions in these fields. Even when women are "technically" admitted, have an M.D., Ph.D. or J.D., they continue to be viewed as "lesser participants" and often are recruited into the low pay and low status areas of assistant, aide and support personnel despite their credentials or degrees (Cockburn, 1985; Carter and Kirkup, 1987). These researchers argue that overall, women as a group continue to be excluded from full participation in areas traditionally defined as mascu-

line more often on the basis of their gender rather than on the basis of their technical expertise and skill.

As long as the terms "inventor" and "inventing" continue to have overtones of masculine "tinkering" with mechanical objects, rather than referring to broader aspects of our social world, my expectation is that women will continue to have difficulty participating in these areas traditionally defined and dominated by men; further, even when they do participate, their contributions will likely be discounted or considered secondary to those of their male counterparts.

Inventing Within Corporate Ideology

The other source of women inventor's resistance to seeing themselves as inventors is less rooted in gender and more closely tied to the conditions under which inventing is practiced in this country. There may be something very American about the strong connection between inventing and the desire for market success. This association is much less present in the Canadian study of women inventors. For the Canadian researchers, women inventor's hesitation to see themselves as inventors is specifically tied to masculine stereotypes and the notion that inventing activity has traditionally

held. For Chicago Women Inventors, at least, their understanding of successful inventing is more closely tied to that of economic success.

Nearly all of the women I interviewed believe that to be a "real" inventor their inventions should yield economic rewards. "Success" as these women describe it means that the invention has to be visible as a product on the shelves of a store or on the pages of a magazine. At least in this respect Chicago women inventors have fully internalized the ideology of the marketplace in the same way as their male counterparts (Whalley, 1988).

> I don't consider myself an inventor; not until I get my invention licensed or sold on the market. Sometimes I tell people that I'm an inventor; but I'm not sure if it's to convince them or myself.
>
> Even though I have helped many of my students by using my invention in the classroom, I feel that if I could have only gotten it into publication I could have helped so many more. In this respect I feel I haven't fully succeeded.

A compromise of this understanding of what it takes to be a "real or successful" inventor only occurs when some of the women inventors accept changing or redefining their goals. For some this means making and selling their invention on a smaller scale, giving it

as gifts to friends, or just having it for their own personal use.

Sometimes the women inventors are surprised to learn that what they thought would be "successful" is different from the general or corporate public's ideas of a "marketable product".

> I obtained a patent on a particular dress pattern that I thought was really unique, but none of the boutiques were interested. Instead they wanted some of my designs that I thought were so ordinary I hadn't even bothered to try and patent them.

Although the ability to realize financial and social success through inventing largely depends upon the type of invention and the resources that are needed to make it, one thing is for sure, there are no guidelines for inventors that indicate which inventions are going to "work" in terms of the marketplace. This reality alone works against the independent inventor, whether male or female, who rarely has the time, money or space to support the creation of multiple inventions in the hope that "one will take off".

The mutual lack of understanding between the corporate/public marketplace and the independent inventor serves as an additional barrier that keeps inde-

pendents in a marginal position when compared to their professional and corporate counterparts (i.e. research and development team members). In this sense women and men share a similarly frustrating experience as independent inventors. In the sense that masculine and feminine stereotypes about work and areas of work continue to exist, women experience an even greater frustration than their male counterparts in the world of inventing.

Conclusion

The absence and active exclusion of the female, in any activity, affects what is known and how it is known (Smith, 1987; Spender, 1982). The problem is that those in dominant positions not only continue to focus on masculine issues, ideas and understandings of the world, but they are unable to recognize that this way of approaching social life is problematic. Because this and other single sided viewpoints have been accepted with few questions for so long, the dominant and common belief is that these "ways of life" are natural, obvious and general.

Despite the invisibility and misunderstandings about women and their contributions within the world of innovation, they are "out there" and have been all

along. Correcting our understandings about women and their roles as innovators will increase as not only independent inventors themselves, but also the general and corporate publics, become more comfortable with broader definitions of innovation that are not limited by traditional stereotypes rooted in the historical divisions between male and female, and public and private. A starting point is to begin changing our attitudes and definitions to what people do rather than continuing to focus on any one social groups in terms of gender, age, race, professional or economic status, or otherwise. Only then will we be able to approach a multiple, rather than single sided approach to the world of innovation and its participants.

CHAPTER VII

CONSIDERATIONS FOR FUTURE RESEARCH

Independent inventors continue to work in suspicious isolation from each other. They are viewed with skepticism and curiosity by the more general and corporate public. Thus, biographical accounts about inventors' lives have always been interesting...on the other hand, most accounts were written within a particular historical context; thus we have likely read mostly about men inventors and their "masculinized" contributions since most of history has been written by men, about men and for men. Therefore, I propose that biographical accounts about the women inventors living today, as well as those that diligent and persistent feminists researchers have been able to dig up about past women inventors, are not only interesting, but important in the sense that they allow us to locate women and their social positions within a particular historical, as well as current context. Understanding these social positions is one step to bringing women closer together so that they can share in their interests, goals and needs. Hence, biographies especially of women inventors today would help to change future

history from being written from a single sided and only masculine viewpoint.

I have not ignored the fact that nearly fifty percent of my sample is made up of black women. I realize that black women have experienced histories that are both similar and different to their white female sisters. It is important to not only acknowledge these differences, but consider the consequences for women of all races. The fact that black women inventors are female, black and independent indicates to me that it is likely they experience a triple marginalization. Possibly a comparative analysis between women on the basis of race would result in important findings that could facilitate understanding the black woman's experience as an independent inventor.

During this project I had the opportunity to meet many incredible women; but this woman in particular has motivated me and inspired me to keep on "keeping on"...

This particular black woman is in her late twenties. She is married and has two small children. During her childhood she suffered from discrimination, not only because she is black, but also because she has worn a leg brace for most of her life. You see, one of her legs is shorter than the other. Growing up, this

young black woman experienced great shame about her appearance because of her leg and its ugly steel brace. Not until she went to Paris on a scholarship to study fashion design under famous designers, such as Dior, did she meet people who went on with life regardless of physical disabilities: "this was the first time in my life that I ever wore a skirt or dress".

When she came back to the states to finish her degree she realized that nowhere on the market were there fashion accessories for the physically confined and disabled. One of her first inventions was a fashionable leg brace. She additionally financed a design school for the handicap where she taught her students how to make clothes for people with physical attributes that are different from the average person. She also taught dance to people in braces, wheel chairs and with other physically unique characteristics.

Every step along the way she has been met with resistance. When she first tried to find financial support for her leg brace she was told that there was no need or market for such a thing. The dance and design school only lasted a couple of years because of financing difficulties. Nonetheless, she is still pursuing her leg brace invention and an adaptation that

allows it to be marketed as a rehabilitative device for injured college and professional level athletes. Now that she has located a visible and profitable market she plans to pursue her original goals of working with and teaching the "physically unique" ways in which they can make their lives easier and more enjoyable. The fact that this market consists of semi-pro and professional athletes indicates that society is still ready to support the people who are the most economically and socially visible in terms of their needs and interests.

Also, this black woman inventor told me that she has experienced open racism in her efforts to publicize and find financial backing for her invention. Many times she could not even get her foot in the door because of being black. She admitted that she decided she would have to give in to this game of discrimination and play by its rules in order for her to get what she wants. Her best friend, who happens to be white, now works with her and helps her to promote her invention by getting her "in the door". Although she is discouraged that she has had to make such a compromise, she believes that it is socially more important to promote her invention(s) than to protect her personal feelings. Hence, like herself, she chooses to call

people with physical differences, those characteristics which are visibly different from the dominant norm, as "physically unique".

Like women, and black women, the "physically unique" have always been actively hidden and discouraged from public and social life. Only within this century have we seen a greater effort to include, rather than shut out or lock out, their participation in the more visible spheres of public work and activity. This black woman inventor is one person who is actively seeking to bring all "physically unique" people out of obscurity and into shining visibility.

Thus, a study that looked at the physically unique as a marginalized group, in addition to studies that consider how gender and race serve to marginalize individuals, would help bring together women and other members of marginal groups from all corners of the many invisible disorganized worlds out into a community of, about and for themselves.

Most of this study has focused on the standpoint of marginalized groups. Because focusing on any one standpoint results in a lesser understanding it would be valuable to study those groups that are considered dominant in the world of inventing. For instance,

patent attorneys and examiners, as well as members of the corporate and business worlds.

Repeatedly I have referred to corporate and business America as the dominant group that works in their own interests, and that this generally means that as a consequence they work to exclude the independent inventor from participating; unless the inventor is willing to participate on their terms...and this quite often involves re-identifying as a corporate producer rather than as an inventor. Another argument is that corporate America has been unwilling to learn about inventors and their contributions from the perspective of the inventors. Often, what appears to be different and strange is based on a lack of a common language. As Whalley (1988) argues, "they have been separated for so long that even if they did get together they would not know how to keep it together". Therefore, a study that explored the role and identity as well as the activity of the corporate research and development engineer would not only allow us to help the inventor learn how to behave in the world of business, but it could possibly help the corporate engineer learn about behaving in the world of inventing.

Ultimately, any work that is sincerely pursued in the interest of how groups become and are maintained in marginal positions can help us understand and then undo our mistakes of shutting the seemingly unique peoples out of mainstream social life.

APPENDIX A

INTERVIEW SCHEDULE

The following is the interview schedule that was used as a prompt during my interviews with the twenty women inventors. Each inventor received a copy of this interview schedule along with her interview summary.

1. Could you please tell me about the invention(s) you are currently working on? Where do you invent? How much of your time do you spend inventing?

2. How did you become interested in the project you are currently working on?
Probe: What experiences have influenced or inspired you to work on this project?

3. Do you have friends or family members that you see as creative and innovative? In what ways have they influenced your work?

4. How do you explain your inventing activity to others?
Probe: Do you see yourself as an inventor? How do you describe yourself and your work to other people?

5a. What people in your life are the least supportive? How does this lack of support affect your work?

5b. What people in your life are the most supportive of your work? In what ways do they show their support?

6. Are you currently employed outside of the home? What do you do?

7a. Have you ever been self-employed?

7b. When you compare working for others with working for yourself, what aspects do you like and dislike?
Probe: Which do you prefer? Why?

8. Why do you invent?
Probe: financial need or goal, recreational, other?

9. What goals do you have for your invention(s)?

10. What costs have you experienced in order to continue work on your invention(s)?
Probe: emotional, financial, etc.

11. What would help you as an inventor?
Probe: What information or what other resources would better enable you to continue or start another project...or finish the one that you are currently working on?

12. Background:

race
age/year born
location grew up
education
work/job history
marital status
children

APPENDIX B

INTERVIEW SETTING

The following excerpt is taken from my field notes with a woman inventor whom I shall call Kathy. Kathy is single and lives alone and she has devoted her entire living space to her inventing. This is a unique situation since many of the inventors I interviewed were married and/or had children living at home. This particular excerpt is an illustration of Kathy's work-space...

Before Kathy opened the door to her one room condo she explained that it was crowded and a mess...but nothing could have prepared me for the overflow of creatively compiled piles and piles of "ideas and inventions in process" that were in essence Kathy's life. There were yellow post-it notes entirely covering her walls and cabinets. There were inventions "in process" that she was trying out for herself: a special panty-hose garment washing device that protected your pantyhose so you could put it in the washing machine (I told her I wanted one as soon as it hit the market), a special garbage receptacle, and a decorative phone book holder. In the center of the room was a bed that was piled high with boxes. She said that she was

in the process of refiling and sorting many of her things and that she had begun nearly three weeks ago and still hadn't cleared her bed off. I told her how my professor, Peter Whalley, said that filing and refiling your ideas and articles was work in itself because the way you filed indicated your conceptual scheme for thinking about these things and their inter-relations.

Kathy went on to show me how she had been sleeping on a giant fur rug that was on the floor. She claimed that it was surprisingly comfortable and seemed to better support her back than did her bed. She had a couple of plants that were trying to find sunshine, but she had closed her shades to her only exposure and that was north.

The south wall of her one room condo was made up of her kitchen. Between the kitchen and the rest of the room was a wall of filing cabinets, a large desk and a personal computer and printer. All had mounds of papers and cardboard boxes piled ceiling high. The floor was covered with books, files and boxes. Over the bed was a scenic, but dark picture...but I can't really remember what it was about. She had a mantle and some personal pictures...but what I really remember about

her work space was how it was entirely devoted to her inventions and ideas in process.

She told me that the boxes were filled with files of stories, poems and songs she had written. She also had business plans filed away, except for one that she was currently pursuing with a finance company. On her kitchen counter was a large plastic tub that was filled with all different colored pens; some were felt-tipped, some were ball point and she even had pencils for sketching. She told me that although she hated carrying a purse she had no choice because where ever she went she took an abundance of notebooks and pens with her.

Kathy agreed that her approach to life, her inventing, had taken over the living space of her life and that she hoped to "straighten it up" so that she could put some order back into her life. Her cluttered condo was her way of expressing her feeling cluttered with so many ideas. Kathy had told me that she viewed her creativity as a gift, but also as an obligation:

> Even if I can't get to the idea I have to at least write it down and file it. I feel like it's my duty. I can't let them (the ideas) go even if I try to work on just one at a time...they all keep flooding into my head and then I have to stop what I'm doing or I'll forget

> them. I have often worked non-stop for days at a time.

Kathy's approach to her inventing is more extreme than many of the other women inventors I interviewed. She appears to be almost driven and controlled by her inventing; she expresses her need to invent almost as a moral obligation to society:

> Of course I would like to make money from my inventions. But I really believe that I have this gift that I'm supposed to give back to society. I believe that at least one of my inventions will make it really big...the one thing I want to do is to invest in research for arthritis. Then I want to buy my mom a house and support her financially so that she doesn't have to work anymore.

After interviewing Kathy and looking at her inventing experience in relation to the experiences of some of the other inventors I interviewed I realize that Kathy is unique for some of the following reasons:

First of all Kathy has not only "a" designated space for inventing, something that really only two other women inventors had (one had an upstairs bedroom and hallway converted into her sewing studio, another worked in the kitchen and in the basement on her chocolate and plastic molds), but Kathy devoted (accidentally or on purpose) her entire living space for inventing. Second, Kathy had worked full-time, but since an

extreme bout with arthritis she was only working sporadically a couple days a week. Thus, Kathy had more time to work on her inventing, yet she felt like she was accomplishing less because there was little or no structure to her days. One other full-time woman inventor (children's apparel designer) had devised a strategy for structuring her day so that her time would not get away from her:

> First of all, it helps to have deadlines. I'll have appointments to show my designs...so I have to meet these deadlines. I get up at the same time as my husband (who works outside of the home), get dressed and work and full nine to five day, just like him. I even schedule lunch and coffee breaks for myself. It really seems to help me feel like I'm "really" working.

This strategy for feeling like she is "really" working is related to the traditional belief about activities that take place in the private sphere of the home not being seriously considered as work in the same sense as activities that take place in the outside spheres of public and business interests.

Thus, conceptions about where someone works, as well as what they do have a strong effect on how they are understood and treated. Traditional and gendered stereotypes about the kinds and places of work hold us

back from fully participating in and sharing these activities with each other for the benefit of all members of our society.

APPENDIX C

LIST OF INVENTIONS

The following is a list of inventions submitted by the women who participated in this study as well as women who were not included in this study. This list was compiled from the files at the Chicago Inventors Council. Don Moyer, who keeps these files, graciously allowed me access to them. These files also allowed me to contact the twenty women who did participate in this study. The inventions were originally submitted to the council in response for "calls for inventions" by the council.

The following inventions are reprinted from the descriptions submitted to the council by the women themselves:

Plastic phone number and picture display device
Decorative cooking ware in the shape and design of food
Jewelry cases
Improved arch support for shoes
Specially designed tote bag for women
Improved disposable baby diapers (also for adults)
Rock-a-bye baby mattress or puppy pad
"Kinderkinetics" (trademarked) children's apparel and design
Sanitary disposable item made out of paper
Educational learning product
Toilet training chair
Skill development program
Fashion watches
Adaptable shampoo tray for people who can only sit in

the shower
Security device for high chairs
Video storage cabinet
Reminder bra for breast feeding mothers
Chocolate and plastic molds
Feminine hygiene products
Marking and measuring instrument for laying out things like tile
Athletic/support shoe
Modified and improved ironing board
Portable organizer for books, paper and writing utensils
Disposable kitty litter box
Educational games
Household and personal care items: single toilet paper dispenser
decorative phone book stand
pantyhose protector for wash
Wet swimsuit storage device: no mold or odor
Rope game
Sliver medication and removal kit
Decorative home care items
Molded vinyl receptacle "panhandler"-protects wall and floor from kitty litter
Wood and leather games, household items and personal accessories
Programmable clock radio
Modified lounge/sunbathing chair
Multi-purpose lawn sprinkler system
Motorized master sifter of pollen and seeds from plants
Safety blanket for restraining a bed-ridden adult
All-purpose convertible rack or holder
Something for handling out-of-order parking meters
Vehicle head and neck support
Auto-cycle-carries three to four passengers and has storage space
Exercise equipment
Teaching device for mentally impaired kids
Fishing pants
Flytying/fly fishing gear
Vehicle storage device
Alternative to hand-held and clothes tearing cassette players
Stow-away, hold-away: holds boat away from dock/pier
Teaching aid for children learning to use silverware
"Ponchos": wheelchair outwear garment
Disposable bibs, blanket, or drop cloth

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12/9/91
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