Do Other Femininity:

Chinese Women and Professionalization in Engineering[1]

Women's Studies and Sociology

Participant observation and in-depth interview were used to study the professionalization of Chinese women enrolled in American engineering doctoral programs. Previous studies based on American women's experiences regarded the engineering professionalization of women as processes to adapt themselves to the masculine engineering culture and internalize the masculine professional identity. My preliminary findings reveal that this is an oversimplification of the problem. Dominant forms of engineering masculinity are engaged in multiple ways. I intend to answer why and how particular femininity is produced in the presence of an engineering masculinity. I argue that local ethnical identities and moral contexts shape how women engage, respond to, and resist dominant engineering culture through the "re-doing" and "re-interpretation" of femininity in the relation of various reference groups other than their Chinese male colleagues. In the end, it appeals to more reflection on the western abstract and vague notions of femininity.

Scholars share a common argument that engineering is the most male dominated of all professions (McIlwee and Robinson 1992). Although it grew from 46 in 1973 to 696 in 1995 (Long 2001), the number of women with Ph.D. is smallest in engineering compared to law, medicine and most of the natural sciences. This has been explained in many ways surrounding one central argument: the equation between masculinity and the whole engineering knowledge and practical structure and process. The analyses of the "masculinist bases of engineering" by Hacker (1979) shifted the study focus to the interlocks between patriarchy and technology resulting in creating and maintaining inequality and oppression. This makes the graduate engineering profession a symbol of masculinity (Cockburn 1984). Many scholars argued that the masculine values currently synonymous with technology could be replaced in favor of

[1] The notations presented here are not complete because I had some troubles with my notes.

a new value system whose application would be controlled by women through women-centered leaning strategies (Rothschild 1983; Zimmerman 1983). The optimistic position focusing on the potential of women to take hold of engineering have not come true.

Whether and how the gendering of the engineering profession is being perpetuated? Much research emphasized that the biggest obstacles facing women are not about their knowledge and skills but of their adjustment to the masculinity of engineering culture (Hacker 1990; McIlwee and Robinson 1992, Dryburgh 1999; Seymour 1999). They concluded that women should exhibit characteristics of their chosen profession and be more masculine than their counterparts in sex-typical occupations as the ways of accommodation. However, the evidences of much study on other professions, such as law and medicine, directly counter this prediction: professional women are unreservedly feminine.

Secondly, there have been very few studies on women' lived experiences and their strategies to manage femininity and masculinity in engineering. Despite feminist criticism of engineering, many empirical studies indicated that most women were not bitter about their experiences in engineering (Trescott 1987). So what draws these women to and keeps them in engineering?

Meanwhile, the ethnical issues have not been noticed. The increases of the percent of engineering Ph.D. among non-white groups are almost entirely for Asian Americans (Long 2000). Xie (2003) argued that immigrant women increase women's representation in many areas. In a sense, Asian women are overrepresented among

minorities in engineering, which makes great effects on their professionalization experiences.

Therefore, I chose to center the analysis on the professionalization of women coming from Mainland China in engineering school and intend to provide insight into their early socialization into the engineering culture.

From the interviews and observations, it is revealed that Chinese women are struggling to be professional engineering as well as professional feminine. So the questions are: How do they define and construct professional engineering and femininity? What motivate them to make these efforts? How far our female engineering graduates share feminist analyses? Do they feel any need to transform their profession and its practices? In stead of regarding femininity as a homogeneous category and exploring how women diminish or prevent their femininity to fit in engineering, I examine what room there is for variations in the construction of femininity in engineering and for negotiating the meaning of femininity. I argue that particular ethnic context and engineering graduate culture shape how women "engage, respond to, and resist dominant cultural images" (Martin 2006: 4) of femininity and how women do another femininity.

Professionalization and Engineering Culture

The professionalization process entails learning the appropriate theory and code of ethics, associating with the professional regulating body, and adjusting to or internalizing the values, norms and symbols of the professional culture (Greenwood

1966). Graduate school is regarded as crucial for starting engineering career because the failure at this stage effectively closes the door to professional engineering careers and later career trajectory changes is more difficult the longer it is delayed (Evette 1996). By this way, the engineering students leant to take on the identity of the professional, thus gaining the authority and legitimacy granted symbolically by the engineering regulating body and granted generally by the public. In the process, they have to learn what engineers actually do.

Hacker (1981) described the culture of engineering as a professional ideology which is based on a mind/body dualism which identifies rationality with men and emotion with women. It stresses masculine over feminine traits. There is little feeling of overt personal discrimination at an individual level (Carter & Kirkup 1990). McIlwee and Robinson (1992) pointed out the existence of a particular culture of engineering in the university. Compared to other professions, the differences between the university and the workplace are more extreme in engineering. For engineering graduates, the standards applied to success are mainly academic (McIlwee and Robinson 1992) and less open to bias than the standards applied to the workplace where discriminations are reported much more. The culture is least dominated by the interests of organization and is quite compatible with the math and science capacities of women. However, both of them are characteristic of valorizes individualistic, competitive and specialized approaches (Selby 1999).

Empirical studies identified engineering culture as hardworking profession and tightly knit community. So the challenges to women are to learn to project confidence

in their abilities to adapt to high working pressure and show solidarity with others in their profession.

PREVIOUS LITERATURE [2]

DIFFERENCES AND ACCOMODATION

Presuming the engineering as possessing an unique masculine group culture (Greed 1991), the professionalziation is argued to be a process of women's accommodation to masculinity (Meadow 1989) and the difficulties and pains women have sustained became the focus in this area (McIlwee & Robinson 1992; Dryburgh 1999). A review of even the most recent literature suggests that knowing how to conform to the masculine professional culture and learn to perform and enact masculine norms of attitude and interaction is critical issue to women (…). This literature explored the masculine characteristics of engineering (…). It also examined the effects of gendered socialization on women's general orientations and attitudes toward professional success (…). The important factors involving in this process include family, especially mother's occupational status, school, career mentoring and particular events. Next, it noted the production of cultural messages which define engineering as a male field and contribute to the sense of discomfort engineering women feel (…). The literature emphasizing on basic and stable gender traits cannot explain sufficiently the situations of women in engineering nor why the numbers of engineering women had increased dramatically before 1990 and then remained on a stable level (…).

[2] The notations are to be complemented.

The different-sameness dilemma is also at the center of studies on law and medicine profession and organization (…). The former placed strong emphasis on how women are forced to be masculine in order to survive uncivil masculine culture of legal systems (…). The latter focused on the stratification and isolation of professional practices between men and women (…).

The discussions on whether professional women are or should be masculine or feminine understood gender as an attribute and have "led to the construction of unilateral categories which suppress differences between men and between women" (Kvande 1999:306). Secondly, they returned to gender socialization and psychoanalytical development as the primary determinant of women's professional status even though there is no links between childhood experiences and engineering students' current values, such as gender-assigned tasks and behaviors in childhood and attitudes toward characteristics considered womanly. Thirdly, they conflated "femininity" with "women" and take the conception of femininity for granted which only confirms the stereotypes of femininity. Those analyses did not address the size or prevalence of gender differences; this information was essential but well covered in the literature. In a word, the criteria of masculinity and femininity themselves have not be clarified.

DO GENDER AND PERFORMATIVITY

Instead, I follow West and Zimmerman's (1987) conception of "doing gender" or Fenstermaker's (1985) application of gender as situated accomplishments. Here,

gender is done in interactions which "is not always to live up to normative conceptions of femininity or masculinity; it is to engage in behavior at the risk of assessment" (Moloney & Fenstermaker 2002). For example, Kvande's (1999) research applied a relational understand of gender to illustrated the diversity in female engineers' construction of femininities.

Kvande's (1999) approach is promising but limited. Firstly, she ascribed the variation among femininities to the range of women's personality and individual choices. Her analyses is fixated on the reifications of femininities as discrete variables rather than concerning them as active social processes in the reciprocal relations between social structure and individuals. Secondly, she weighed different femininities equally and did not notice the power relations between them. In other words, she did not explain why majority of professional women did the same choice despite other possibilities. Thirdly, she emphasized gender as adaptable and mutable at the cost of affirming the natural class differences.

On the other hand, the analyses of femininity are grounded in Butler's notion of perfomativity. Butler (1993) distinguished perfomativity from performance in theatrical or dramaturgical terms. She argued that performativity "consists of a reiteration of norms which precede, constrain and exceed the performer an in that sense cannot be taken as the fabrication of the performer's 'will' or 'choice' " (234). She further argued, gender, "as a strategy of survival within compulsory systems", "is a performance with clearly punitive consequences" (139). As a summary, the construction of femininity itself is both interactional and institutional in character;

performativie act as a kind of "constitutive act" enables "the possibility for agency, resistance and change" because the "success of a performative—of the performativity of gender—is always provisional and deferred" (Moloney & Fenstermaker 2002: 199).

DO FEMININITY

This article is a study of variations in the construction of femininity. The focus is on the heterogeneity of "femininity" category instead of on differences between women and men or on the relations between the assumed different qualities and values of women and men. Then I turn to the area of masculinity and femininity studies.

This area is based on the work of masculinity scholars such as Connell (1987, 1995), especially the concept of hegemonic power which emphasizes the historical situations in which gender relations are established. Further, Chen (1999) claims that "In discussions of gender, hegemony is associated with the taken-for-granted conceptions about the nature of men and women, of masculinity and femininity" (586) and it is about one type of masculinity establishing and preserving ascendancy over others. Meanwhile Connell argues there is no hegemonic femininity, only an emphasized one.

Yet, just such an application is useful for understanding the production of a variety of feminine appearance routines. Scholars on profession shared the common argument that "femininity has more to do with a particular state of being than with actually doing anything" (Williams 1978: 78). Women do not face the pressure to

prove their feminine identity. As a result, the "difference-sameness" debate is about whether and how women struggle to protect their femininity from masculinity.

Martin (2006) provided a useful framework of "hegemonic femininity" as a resolution. She criticized that Connell ignored the power relationships between women where race and class are unequal. She argued that power is just as frequently institutionalized in these relationships among women as they are among men and certain forms of femininity have become institutionalized as more worthy, complete, and superior forms. Those who take up a position of "hegemonic femininity" are not just coerced into this conception of femininity, but they also consent to it. It is actively taken up from within (Chen 1999). From within, it is also shaped and molded. It therefore has a hegemonic power over other femininities and has ascendancy over them in the social order.

Martin (2006) claimed it's useful to claim the existence of a hegemonic femininity and perhaps of a plurality of subordinate, marginalized, complicit femininities. The literature on femininity and engineering has no recognition of these complexities. It did not acknowledge the many ways women engage hegemonic femininity, nor the variety of femininities that are produced by such an engagement.

My interest is not just in knowing how femininity is done in variety, but how "it is done systematically and with social consequence" (Fenstermaker & West 2002). In other words, how gendered practices and interpretations contribute to the reproduction

of the particular femininity complying to and accommodating women's subordination to masculinity of engineering structure. On the other hand, class, ethnicity and gender are connected with one another as activities and accomplishments; they derive their particular meanings through everyday social interactions located in particular engineering culture. In other words, I try to understand accomplishment of femininities combined with ethnicity and class as "outcomes of and rationales for rendering social inequality legitimate"(…).

METHODS

I have been conducting 14 in-depth interviews at one American university engineering school[3]. The interviewees were female graduates students who graduated from universities in People's Republic of China. Given the focus of the research, most of the interview participants were women; however, many other men were involved in the informal activities under observation. All of them were under 30-years-old and most were single. All female interviewees but one came from middle-class families. The class backgrounds of male interviewees were more multiple. In addition, participant observations took place in the engineering offices, labs and informal parties.

An effort will be made to include students from all levels of the graduate program and main ethnic groups. The observation will continue in every very public settings where a variety of students could be observed in both social (cafeteria) and

[3] I plan to do 30 interviews.

academic (classes, lectures) contexts.

The engineering school I studied is characteristic of the status between manufacturing-related orientation and fundamental academic orientation. Time and structure of engineering work varies according to specific areas and how the advisors organize it. For medical engineering, the comparatively long-term nature of product development means that daily deadlines are the exception, not the norm. In many processes, success does not depend primarily on the basis of hours put in, but on the care and creativity with which the work is done and the results recorded. This is in sharp contrast to other work, such as computer engineering especially software design. For the latter, more hours are translated to more code and directly equated hours with productivity. Also, product development cycles in computer engineering tend to be much shorter, which changes the day-to-day pressures on female students as well as professors.

PRELIMINARY FINDINGS[4]

The professionalization process can be understood as a career, marked by rites of passage, symbols, and rituals indicating progression and culminating in a transformed identity (Trice 1993). Haas and Shaffir (1991) describe this progression as one that includes

> Rigorous processes of selection and preparation, initiation, testing, and threats of humiliation… give the aspirant considerable practice in communicating competence… Symbolic changes in wardrobe or costume, props, script, and demeanor both affirm the new role and identity and help to sustain it. Audiences legitimate this performance and thus help to shape an

[4] I don't have enough data for this part yet.

emerging professional identity and a changing conception of the self (4-5).

This career model, based on Goffman's (1959) analysis of self-presentation, works well to explain the "work hard" culture of engineering. It is a ritual ordeal that requires the student to demonstrate confidence in the face of strenuous challenge, anxiety, and self-doubt. Through this process, the engineering student eventually internalizes the professional persona of confidence. Many studies pointed out, the two crucial factors of engineering culture—work hard and confidence—construct the basic contradiction for engineering women (…).

I. Working Hard as a Part of Chinese Femininity

Previous studies noted that the self-confidence of the engineering women is strongly tied to their success outside of work (…). By placing emphasis on their hard working, engineering women may be undermining a deeply-held cultural premise; this could easily have negative consequences for their sense of self—it is especially true for single female graduate who place more emphasis on work than on other aspects of their lives but are not trying to combine work with family in reality because working hard is connected with masculinity opposed to femininity (…). My study reveals the opposite results because of the intersection between ethnicity and gender as well as the women's various concern with femininity.

For all female my interviewees, the most salient thing they have to manage is not their gender but ethnicity. When I asked them whether they felt comfortable to study and work in engineering, almost all of them offered answer similar with this:

> You know, it is fine. I feel comfortable to stay here. We have lots of Chinese

> students here. In class, Americans are minority and persons do not pay much attention to me as a Chinese. At the same time, I did not have many opportunities to get in touch with others (other than Chinese). (Interviewee—2)

For Chinese women, the challenge is not working with men, but working with men from different countries and areas. The proportions of different ethnical groups in engineering school are different depending on the specific areas. Asian graduates make the main graduate body. Mainland Chinese graduates, especially female graduates, concentrate in doctoral program. For example, in computer science, Chinese women constitute the main body of female doctoral students and Indian women constitute the main body of female master students. The only exception is environment engineering where the proportion of female graduates is the highest and that of Chinese graduates is the lowest. Interviewees always mentioned ethnicity automatically when they talked about their working environment and their own position. To be contrary, they hardly notice the existence of "gender":

> Our group is large. You know, I'm the youngest student of my boss (advisor). He is an Indian and all of his students are Asians. (Interviewee—5)
>
> I do not see any discrimination (towards Chinese). My boss is very sensitive to this. He cares about me very well. (Interviewee—2)
>
> I am the only Chinese in our lab. Persons are very nice to me. But you know, sometimes I am a little bit lonely. We get along well with each other but we do not have many common topics except research. But persons told me that it is better to stay in a non-Chinese environment. You know, at least I can practice English. (Interviewee—11)

Contrary to previous studies, Chinese female graduates' ambivalence to developing technical expertise is lower. Meanwhile, they are not learning to adapt to the work hard culture of engineering and to the predominance of males in their classes and offices. Rather, they integrate work into their ethnical and feminine identities to increase their confidence.

In observations, Chinese women kept on referring to males in other ethnical groups. For example, women talked about how long their Indian male officemates stay in the lab which constitutes their motivation to work harder. Or, a girl said that she was very proud that she as the only Chinese student in her area stayed in the lab alone on weekend. Or, they often laughed at American white men's laziness and arrogance. However, they never compared themselves with other Chinese guys while they also noticed how hard their Chinese male colleagues worked.

On the other hand, female interviewees confirmed the relationship between the work and "performative" of femininity. All of them said they do not have time to pay much attention to their appearance which they believe causes persons' stereotype images about engineering women.

However, instead of acknowledging that they were not feminine, women emphasized that they were morally "pure"—which is more important feminine criteria compared to attractive appearance. They differentiate themselves from women outside engineering. In interviews, most female interviewees automatically referred to other Chinese women in social science and humanities when. They mentioned that "those humanities women" always stayed in the dormitory, got up very late and did not need to work. They also talked that "those women" often hung around and resorted to places for relaxation or recreation and they were lack of those experience so they were behind the times but traditional and good. They said that—compared to those women—they had too much work to pay attention to appearance. However, they insist that they have the capacity to dress well.

All female graduates emphasize the significance of work. Firstly, they distance themselves from other ethnical groups, mark their intelligence privilege as a "Chinese" and eliminate the contradiction between femininity and work. Secondly, they admitted that engineering work, because of its time and organization, limits their time to display their femininity. But through separating hard working from the feminine stereotypes represented by women in humanities and social science, they reject the significance of appearance for doing femininity. On the other hand, they emphasize hard working and staying at labs all the time protected their femininity from contaminated.

In other words, they defined engineering femininity as "simple, clean and traditional but intelligent" the core of which is "purity" (*DanChun*). Therefore, "working hard" is constructed as a part of femininity for Chinese engineering graduates here.

II. Engineering Labor as a Part of Professional Femininity

The past three decades watched that the engineering work has been increasingly desk-based or visual-display-unit-based though the stereotypes of engineering involving a close relationship with heavy machine are partly true.

Some of my interviewees do have troubles with machines and hand tools depending on their particular areas. They manage the manual difficulties in two ways. Part of my female interviewees distinguished themselves from "women" as a general and collective category. They said they themselves as individuals had no problem with

these manual issues. Meanwhile, they said engineering was not fit for "women" and they would not encourage other women to pursue engineering career.

Meanwhile, part of my interviewees linked the unpleasant manual part of engineering work with working-class while they also said they got along with manual labor well. They joked with machines and hand tools. However, they described that their lab environment are similar with factories and one of them talked about her problems in working with workers during intern practice.

On the other hand, another change in the engineering career paths is engineers' moving into management. Different from previous studies (Carter & Kirkup 1990; Mattis & Allyn 1999), only one of my female interviewees ever considered going into a managerial position though all of them expressed a desire of supporting or pushing engineering men into it. To be contrary, mechanism for male interviewee's finding new development opportunities varies from formal to informal and from systematic to random. Women's low engagement in the queue for management training makes their routes for progression into management positions very hard.

Chinese women link management with "complex and dirty" personnel management which is not "pure" feminine at all. All claimed that they were not concerned with money so much. All but one said they prefer to deal with machine. They ranked technical expertise as more valuable and morally "pure" than knowledge of society. They described social sciences in womanly terms: soft, inaccurate, lacking in rigor, unpredictable, and amorphous. However, very few felt that their male peers were inadequate because they lacked knowledge of social systems. And they looked

proud of their own inadequacy and interpreted it as traditional and conservative--in other words, pure--when they talked about femininities of other women outside engineering. For example, one interviewee focused on social abilities and linked them with "open party girls" when she talked about why humanities women were more popular on campus.

One of the direct results for the indifferent towards management is Chinese women do not inclined to set up their network outside the Chinese community as their Chinese male colleagues. Many of them identified it as the main difference between Chinese engineering men and women. In a sense, these engineering girls are working under a comparatively isolating condition.

III. Solidarity: Performing Chinese Engineering Femininity

Dryburg (1999) talked about that engineering culture is defined by contrasting engineers with the "Artsy" which is a derogatory term referring to male students from the Arts and Social Sciences departments. The "Artsy" is impotent, cannot get a woman or job and cannot even do what he purports to do best.

Chinese engineering women shared this notion of "Artsy" though they did not use this word. They insisted that engineering guys are the best candidates for husbands. In this sense, Chinese men became the sexual objects of women. Meanwhile, they accepted themselves to be regarded as sexual objects for men. It is also linked with their commitment to the Chinese groups.

Further, women extend the notion of "Artsy" and applied it to women outside

engineering. They acknowledged that those women are feminine but diminished those femininities' values: Those women are sexually attractive but they cannot get job so as to be dependent on men; those women are good in managing appearance which are trivial.

The other problem is about women's interaction with men at labs. Basically, women intended to perform "tender, quiet, patient" and sometimes "dependent" even though they themselves were strong and decisive. Different women perform differently. On the other hand, Chinese men evaluated these women's "accomplishment of femininity" in different ways. For example, they were much more friendly to those "feminine" women and offer more help.

Almost all interviewees said that the most important thing about femininity is how to perform femininity in relation to Chinese men. They refused the feminine criteria scholars used in judgment, such as personality and appearance.

> She (another Chinese girl) is very feminine. You know, she is very independent and she knows all the things. But she just, just keeps on asking guys questions and looks like so tender and lovely. (interviewee 3)

All interviewees refused to take the American femininity or masculinity into account. On the one hand, they thought their American female colleagues and faculties were too masculine. In a sense, they equated "feminism" with "western". Many of them claimed that they did not like feminism and thought Americans were too sensitive to gender issues. On the other hand, they thought American women outside engineering and science were too open to be morally pure.

CONCLUSION

The same characteristics, which are treated as masculine in previous literature, can be interpreted as feminine by Chinese women. Chinese ethnicity and engineering factors are the core of femininity for Chinese engineering female graduates. On the other hand, women choose different reference groups to construct their femininity though it is always built in relations. This femininity is characteristic of morally "purity". It is contrary to Karin's study, appearance is not an important feminine criteria for Chinese engineering women.

Femininity is something need to be done. Women have different criteria to construct it. The problem is not about the content of femininity or masculinity but about their significance and positions in the identity construction.

I have tried to explore femininity in relationship to other axes of identity by exploring what utility come from thinking through gender as a performance and as performative and by exploring how the various gestures of femininity never exist outside of ethnicity and moral meanings. Gender is largely missing as a category of identity in the study, making it difficult to have a cultural or political identity.