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Doing Science within a Culture of Machismo and Marianismo¹

By Karen Englander², Carmen Yáñez³ and Xochitl Barney⁴

Abstract

Women have been joining the ranks of professional scientists in increasing numbers although international statistics indicate that women's participation varies substantially in different regions. Variation in rates of participation can be explained in part by cultural contexts, and in Mexico, dominant cultural ideologies of machismo and marianismo prevail. To understand the impact, if any, of these ideologies on the lives of women scientists in their professional interactions, a case study was conducted at one research institute. The results indicate that the women scientists report different interactions with men and with other women, and interactions vary with the status of the interactant: whether a senior researcher or administrator, a colleague of similar status, a technician, or a student, and whether a man or a woman. The interactions are strongly influenced by gendered ideologies. The women see themselves as non-traditional, while working in a professional context that continues to expect them to behave traditionally.

Keywords: scientists, women scientists, machismo, marianismo, discourse analysis, Latin America, Mexico.

Introduction

Women have been joining the ranks of professional scientists—i.e. the 23 fields of natural, exact, and social sciences and technology recognized by UNESCO (1988)—in increasing numbers in recent decades, but equity has not been obtained. International statistics indicate that women's participation varies substantially in different regions of the world: Asia and South Asia have the lowest representation of women at 15% and 12%, respectively; the United States reports women's participation is consistent with the overall world average at 27%; and the percentage of women scientists in Latin America is among the highest at 46% (UNESCO, 2006). In Mexico, the rate of participation is 32% (National Academies Committee on Women in Science, Engineering, and Medicine, 2011), which continues to be higher than the U.S. figure, but below Latin America as a whole.

¹ This paper is dedicated to the third author, Xochitl Barney, who is greatly missed by her colleagues, friends and family.

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⁴ Xochitl Barney, B.A. was a recent graduate of the Bachelors degree in the Teaching of Languages at the Universidad Autónoma de Baja California. Her sudden passing is a great loss

Mexican women's participation in science can be understood in light of the limited access to higher education that affects most of the population (Kuznelstov & Dahlman, 2008). Thus reaching professional status is somewhat restricted for all Mexicans, and so it is girls (and boys) from well-to-do and highly educated families who are likely to receive the cultural message to become highly educated themselves. But girls also receive the message to fulfill traditional gender expectations to marry and have children (Etzkowitz & Kemelgor, 2001).

Gender expectations in Mexico are especially interesting because of the ideology of *machismo*⁵ that affects men's behaviors (Fragoso & Kashubeck, 2000; Gutmann, 1996, 1999; Montalvo & García, 2006) and *marianismo*⁶ (Stevens, 1973) that affects women. The terms machismo and macho (the latter is both a noun as in "he is a real macho" and an adjective "he is really macho") have entered the English-speaking world as general descriptors of undesirable male aggressive behavior (Oxford English Dictionary, 2012). Marianismo is less well-known and is the cultural ideology in which women are judged against an ideal of the Virgin Mary (Stevens, 1973).

The impact of such gendered ideologies on the lives of professional women in Mexico is still under-researched. Women whose professional lives are centered in the geosciences are particularly interesting because they have chosen a discipline that attracts few women. In this paper, we offer an analysis of culturally specific gender expectations vis-à-vis the workplace experience of a small group of women scientists in a geoscience division in a Mexican research institute. Our aim is to understand their lived experience through their expression of positive and negative professional interactions with male and female colleagues, administrators, technicians and students. We also want to examine these scientists' descriptions of themselves in their research environment. Finally, we want to understand the relationship of the discursive gendered ideology of machismo and marianismo to the women's interactions and self-descriptions. We undertook a qualitative, discourse analytical study, with the following research questions:

RQ 1: What are the type and frequency of positive and negative interactions that women geoscientists in a Mexican research institution report as having with the other women and men in their professional lives?

RQ 2: How do these women geoscientists describe themselves?

RQ3: What do these characterizations of self and others reveal about the gendered ideology of machismo and marianismo as it is experienced by these women geoscientists?

We look specifically at the women scientists' discourse because "discourse names, orders, and defines experience" (Wood, 1994, p. 17) and it shapes the experience of individuals and societies.

This paper proceeds with an overview of women scientists around the world, an explanation of the ideology of machismo and marianismo, and presentation of this particular study with methods, results, discussion and conclusions.

⁵ See the section below for a more detailed explanation of the terms macho and machismo

⁶ See the section below for a more detailed explanation of marianismo.

Women Scientists around the World

Research concerning the lack of parity in most parts of the world between the number of men and women scientists indicates that obstacles remain for women's equal participation in science. The obstacles can be considered structural and cultural.

Structurally, the "leaky pipeline" is a metaphor used to indicate the phenomenon in which women enter science education in relatively large numbers, but then abandon the field before obtaining full professional status (Barinaga, 1992). While discussion of women's advancement in or abandonment of science has been characterized as individual choices and decision making (Rosser, 2004), research indicates that (sometimes insufficient) educational support and (sometimes unwelcoming) learning and working environments are institutionalized elements that limit women's progress through the pipeline (Rosser, 2004) (Alpay, Kambouri, & Ahearn, 2010). For those who achieve their doctorates, entering and remaining in the full-time scientific workforce can also be difficult. Managing the balance between career and family, problems due to the small number of women in their field, the current environment of tight resources, and overt discrimination and harassment are reported by women scientists in large-scale studies conducted in the United States (Rosser, 2004) and Britain (Alpay et al., 2010). Globally, the situation varies by country, and includes being disadvantaged due to stereotyping, including managing the career/family balance, labor market conditions, governance of women's employment and the status of researchers in society (UNESCO, 2007).

Another structural reality is that not all the fields of science attract equal numbers of women. A "feminization" of the biological and life sciences is identified in Europe and the United States where women earn the majority of doctorates (UNESCO, 2007; Schiebinger, 1999; Burrelli, 2008). The situation is very different in the physical sciences: In the U.S. women obtain only 29% of those doctorates (Burrelli, 2008). The low percentage of women in geosciences (i.g. geology, oceanography and atmospheric sciences) motivated a study to determine, "Where are all the women professors of geoscience?" (Holmes and O'Connell, 2003). Among the findings was the unfortunate fact that there is often only one and rarely more than three women geoscientists in any university's department. This creates difficulties of isolation for the lone or paired geoscientist that women in other sciences may not face because there are often more women working together in the other scientific fields. .

Cultural context and cultural norms worldwide regarding gender and science also contribute to women's varying participation because attitudes vary tremendously. For instance, in a comparison of scientists in the former East Germany, the former West Germany and the United States (Hanson, Fuchs, Aisenbrey & Kravets, 2004), the scientists in the former East Germany with its socialist tradition of egalitarianism were the most progressive regarding women and work; West Germany with its "traditional notions that women should devote their lives to *Kinder*, *Kuche*, and *Kirche* (children, kitchen and church)" (p. 108) was the least progressive; and the U.S. scientists with its "cultural notions of family" (p. 123) placed in between. In India, women scientists must combat the prevailing "patrifocal ideology" in which men are accorded more dominance than women, but the mother-in-law, for instance, has dominance over the daughter-in-law (Gupta & Sharma, 2002, p. 901). In Cameroon, traditional "ways of knowing" intensify the "gender and social class" obstacles for women's entry into science (Woodhouse &

Ndongko 1993, p. 131). In Japan, women transform the traditional good-wife, wise-mother image in order to participate equally as scientists (Kodate, Kodate & Kodate, 2010). Such studies demonstrate that sociocultural norms of gender and women's participation as scientists are embedded in particular contexts. Understanding how the ideologies of machismo and marianismo affect women geoscientists in the Latin American country of Mexico is the focus of this paper.

Machismo and Marianismo

Machismo and marianismo are terms for ideologies of gendered behaviors and characteristics that are associated with, respectively, men and women in Mexico. As explained below, machismo has positive and negative qualities in its performance; marianismo is either complied with or not, and so providing women either "good" behaviors or "bad" ones.

Machismo

Machismo is a term used for the performance of masculinity in many contemporary, international contexts (e.g. Mahalingam, 2007; Salam, 2009; Allen, 2007) and it is used as a descriptor of unwelcome male behavior in much of the English-speaking world (Oxford English Dictionary, 2012). However, machismo is especially pertinent to Latin America and particularly Mexico where it was first used (Paz, 1950/1961; Gutmann M. G., 1996), based on the Spanish word "macho" literally meaning "male". According to Lancaster (1992, p. 19), machismo carries "a field of productive relations" (Lancaster, 1992, p. 19). The extreme form is manifested as hate and extreme physical and psychological violence against women, and it has been reported in a number of Latin American countries to differing degrees by the United Nations' specialist on violence against women (Larite, 2011). As the performance of men's gendered role in Mexico, machismo refers to two very different sets of behaviors, one of which is construed as positive and the other as negative.

The positive characteristics emphasize patriarchal expressions of "courage, generosity, and stoicism" (Gutmann, 1996, p. 223). They are associated with responsible fatherhood: being a provider, defender and progenitor (Ramirez, 2008). Other positive characteristics are dignity and pride (Segrest, Romero & Domke-Damonte, 2003). "*Respeto* [respect] that idealizes women" (Peña 1991, 37) is a positive characteristic that is performed through behaviors of courtesy and protectiveness towards the women who are significant in the man's life.

The negative characteristics are destructive. They comprise a "cult of virility" in which the "chief characteristics...are exaggerated aggressiveness and intransigence in male-to-male interpersonal relationships, and arrogance and sexual aggression in male-to-female relationships" (Stevens, 1973, cited in Gutmann, 1996, p. 223). Negative behavior is performed through the male body and through a man's ability to use his physicality for dominance. Sexual episodes, alcohol consumption, dare-devil behavior, fights and domestic abuse are typically attributed activities. Domestic abuse is such a common characteristic of machismo that when people refute the characterization of a particular man as being macho, they will often point out that he does not beat his wife and, therefore, he isn't a macho (Gutmann, 1996). Macho behavior is accompanied by macho

discourse, which includes “vulgar language, sadistic insults, [and] the utter degradation of women” (Peña 1991, 31).

There is a duality in the conceptualization of the archetypal Mexican macho. He can be either “the man who wants many (male) offspring and later abandons them, or the man who wants few, works hard to earn money for them, and calls these his manly duties” (Gutmann, 1996, pp. 238-239, parenthesis in original).

Contemporary ethnographic literature (e.g. Gutmann, 1996, 1999; Ramirez, 2008; Parrini-Roses, 2007) is careful to describe liminal spaces for men performing their masculinity. Whether they are in a working class neighborhood or university environment, men report that the limitations of machismo are not wholly true to their lives, and thus we must caution against hegemonic masculinity (Connell & Messerschmidt, 2005). Rather, as Vigoya (2003) points out, Latin American masculinity must be understood as occurring within a larger gender structure that is determined “not only by their sex but also by the place they occupy within class...and generational categories” (p. 50). Multiple masculinities (Connell, 2000) need to be considered.

Despite these scholarly stipulations, everyday discourse about men is considerably less nuanced. Comments about male behavior in Mexico continue to invoke the terms “macho” and “machismo”. It continues to be alternately used as a pejorative reference to men as being “your typical *macho mexicano*” (Gutmann, 1996, p. 222) or a positive reference to “a hard-working, responsible and respected husband – a true man” (Melhuus, 1996, p. 242). Thus these words continue to be commonplace in discursal descriptions of men’s gendered behaviors in Mexico.

Marianismo

Marianismo is an ideology very different from machismo, and is used principally in the context of Mexico (Stevens, 1972/1998) although it has been extended to other Latin American countries (Gil & Vazquez, 1996). The term derives from the Virgin Mary, the woman in Catholic theology who was both a virgin and the mother of the savior Jesus, and she serves as a model of femininity. Through allusions to Mary (*Maria* in Spanish), marianismo presents behaviors and characteristics for women that are very different from machismo. Marianismo is performed through a collection of behaviors that are ascribed as positive. The idealized Mexican woman is the mother (Peña 1991, p. 33) – the source of boundless love and “absolute self-sacrifice” (Díaz-Guerrero, 1975, cited in Peña, 1991, 33). This maternal ideal is justified because women are “spiritually and morally superior to men”, so they should be “self-negating and martyrs for their children” (Dreby, 2006, p. 35). However, marianismo is not limited to mothers (Méndez-Negrete, 1999). All Mexican women are subjected to the “stereotypes of marianismo, such as submissiveness, abnegation, and passivity” (Méndez-Negrete, 1999, p. 30), including bearing “the indignities inflicted on them by men” (Stevens, 1972/1998, p. 130). In the family, marianismo requires making the male ego the center of attention, and mothers and sisters cater and defer to him (Stevens, 1972/1998). Performance of gendered womanhood through these behaviors constitutes the culturally positive ideology of marianismo.

The negative characterization of women’s behavior is seen in contrast to marianismo. The woman who repudiates marianismo is characterized as the shameless, treacherous woman (Peña, 1991). Her most notable characteristic is her promiscuity or

lack of sexual faithfulness to one man and fraternizing inappropriately with men generally. Other negative behaviors are “casual visiting, loitering and gossiping [*andar de metiche*]” (Melhuus, 1996, p. 245). Unlike the Virgin, then, she is categorized as a woman who has no shame, who is open and does not appropriately keep her distance (Melhuus, 1996).

We see that marianismo and machismo are strongly gendered ideologies that contain dualities of positive and negative behaviors and characteristics. Although the hegemony of masculinity through machismo and femininity through marianismo is contested in some ethnographic work, their existence continues to permeate the contemporary discourse of men and women.

Method

Participants

All ten women scientists working in the disciplines of geology, seismology, biological oceanography and physical oceanography of a renowned research institution in Mexico were invited by electronic mail to participate in the study. Nine agreed, including one who chose not to be interviewed but offered written responses to our questions. The participants had all completed their doctorates at least ten years ago and held tenured positions in the research institute.

Data Collection

Our aim is to understand the women geoscientists’ experiences, and thus an emic perspective (Pike, 1954) is adopted whereby the intrinsic knowledge of the participants is elicited through their behaviors and beliefs (Headland, Pike, & Harris, 1990). Collective interviews (Morgan, 1996) were adopted for data collection to foster deep conversation among the participants. Seven open-ended questions (see Appendix) were used as the basis for semi-structured group interviews that were conducted in Spanish, the mother tongue of most of the women. The interviews were video and audio recorded for further transcription.

Data Analysis and Member Check

Discourse analysis (Gee, 2005) with emergent categories was used to understand the relationships that occur in their professional environment. The interview transcripts were read iteratively by the three researchers in the original Spanish. All comments concerning the scientists’ professional interactions were coded. In a further round of coding, comments were identified as concerning female or male interactants; then concerning the status of the interactant as a colleague of equal or senior status, a student or technician; and an open category for other emerging data. The comments were translated by the two native-Spanish-speaking researchers into English for publication purposes. Member check (Maxwell, 2004) was performed by inviting the participations to a presentation of the preliminary findings. Two scientists attended that meeting and offered feedback.

Analysis of Results

We sought to understand how being one of several women geoscientists in a department in a Mexican research institution is experienced by these women. In particular, we were interested in their account of their interactions with the men and women who populate their professional lives. Here we report the comments made by the

geoscientists who participated in this study in response to our research questions. The comments are divided into three sections: interactions with others, self descriptions, and descriptions of men and women.

Question 1: What are the type and frequency of positive and negative interactions that women geoscientists in a Mexican research institution report as having with the other women and men in their professional lives?

The comments of the women scientists in this study indicated that they have interactions with men and other women in four distinct configurations: (1) colleagues of similar rank; (2) administrators and senior researchers; (3) technicians, who assist in their scientific work; and (4) students. Each category is further subdivided into male and female interactions. The frequency count of comments and examples of statements that indicate the positive or negative experience are presented in Table 1.

Interactant	Men	Women
Colleagues of Similar Rank	15 positive	2 positive
	25 negative	2 negative
Senior Researchers and Administrators	7 positive	2 positive
	5 negative	10 negative
Technicians	6 positive	1 positive
	11 negative	1 negative
Students	1 positive	11 positive
	1 negative	5 negative

Table 1. Frequency count of positive and negative comments by women geoscientists regarding their interactants. Highlighting indicates highest frequency.

1a) Male colleagues of similar rank

15 positive comments. For example, “Communication [with male colleagues] is more direct; criticism is more open and neutral.” “I really trust a lot the men I work with.”

25 negative comments were made about their interactions with male colleagues of similar rank. For example, “Men who feel threatened are much less cooperative and occasionally they deliberately undermine women’s work.” Most of the comments concerned unwanted sexual overtures or bravado. One scientist described departmental seminar meetings where there is always wine and after a few glasses, “the gender jokes begin, sometimes really dirty ones.” Another remarked, “Machismo takes place every day; from the way they...meet you in the halls, how they touch you.” Another difficulty with colleagues is “sometimes they expect that a woman will be more soft, more compliant.”

1b) Female colleagues of similar rank

Two positive comments. For example, one scientist speaking of her relationship with a colleague in an American university said, “She used to help me a lot...she still sends me a journal I might be interested in...she connects me with people around the world to help me.”

Two negative comments were made about their interactions with female colleagues of similar rank. For example, "It is hard for me to agree with women; I tend to argue a lot." "I have never felt trust with any of my female colleagues."

They attribute the few comments about women colleagues to little interaction among each other because their "research interests are different."

2a) *Male administrators and senior researchers*

Seven positive comments. For example, "Men in higher job positions can be very helpful peers." "It can be very rewarding to work with these people who have a lot of prestige and who don't feel anything threatening from you." The women perceive lack of threat as a significant factor: "An older researcher, one more established isn't going to treat you badly because you aren't a threat to him; he is always going to support you." One woman consults a senior scientist in the faculty when she is writing a paper: "I come to him when I have a stage ready...I present my work orally to him and show him my draft and we work it together...he probably has respect for me." They reported that decisions regarding their own promotion and tenure were generally made fairly by the virtually all-male administration.

Five negative comments. One woman wanted to bring an action about an ethical issue, and recounted, "They told me in the Department, 'Keep your mouth shut or we are going to make your life hard', but if I were a man submitting some ethical issues, they would have taken me more seriously." "I had been invited to participate as a candidate for [a senior position] and there was a lot of...ridiculous [macho] behavior, a tremendous negative campaign against me; it was so hideous." "They tell you, 'you'd better behave if you want to succeed'."

2b) *Female administrators and senior researchers*

Two positive comments. The scientists reported there were women in other institutions who provided support and guidance, particularly concerning publishing their work. There were emphatically no positive comments about women in administrative roles.

Ten negative comments were made about their interactions with female administrators. For example, "I felt disdain from the only women [that held a very senior post]." "Women in senior positions are awful to their female colleagues. They may have had such a difficult time to get their current position that they think that other women have to work even harder than men at the same junior level."

3a) *Male technicians*

Six positive comments. For example, men are stronger and that makes them better in the field for moving and carrying equipment. "I am not as strong as a man; sometimes I lack certain abilities or agility like I don't know how to make a hole in a wall of rock." "I am grateful my technicians are men and not women." "I really think that men are better technicians."

Eleven negative comments. For example, "When a woman is the boss of a male technician, they don't like taking orders or direction; you have to treat them like kings." Out in the field, technicians think "she is giving orders and we want to enjoy ourselves."

“You have to be so careful of their egos.” One woman reported there is “inappropriate behavior with a female boss, like patting her on the shoulder; this is a kind of machismo.”

3b) *Female technicians*

One positive and 1 negative comment. One scientist said, “I have a laboratory filled with women, there is only one man; we are a very feminist team.” “Women are more precise” regarding measurements and procedures. Another woman said, “Although I know there was a woman technician that is now retired, and everybody was always happy with her, but I really think that men are better technicians.”

4a) *Male students*

One positive and 1 negative comment. The scientists rarely mentioned their relationship with male students. One remarked that male students don’t like taking orders from a female “boss”. Another said that she never has difficulties with male students. They always behave properly and are busy trying to learn.

4b) *Female students*

Eleven positive comments. For example, “I trust a woman more with the instrumentation.” “Women are more detail oriented” and therefore are good in the laboratory. One scientist said “I don’t have to worry so much about this ‘men’s pride thing’” with her female students. Women saw their role as positive role models to be important: “Due to the fact that I do something that many women don’t, I give them [female students] the feeling that, if they want it, they can do it, too.”

Five negative comments. Several statements were made regarding female students’ reluctance to participate fully in physically demanding field work. “Women go back to the old naughty ways: they start crying for any reason, or using any silly excuse.” Another counsels her students, “Look, if you have an affair with your professors or you sleep with them or you cry every time someone is hard on you, they are going to tell you, ‘You see? You are just behaving like a woman! You can’t do the work!’”

Summary

As shown in Table 1, the quantity of positive and negative interactions varied with the scientist’s role in relation to the interactant and gender. The women geoscientists’ statements indicated that interactions with men of similar rank were more often negative than positive. Interactions with women of similar rank were equally balanced between positive and negative. The number of comments regarding women colleagues of similar rank was much smaller than their comments regarding men of similar rank. Regarding interactions with male senior researchers and administrators, their reports were largely positive. In contrast, the comments regarding women in senior and administrative positions were overwhelmingly negative. When the geoscientists interact with male technicians, the women characterized these relations as difficult and more frequently negative than positive. They reported they had little experience with women technicians, although those relations were positive. Regarding the scientists’ interactions with students, male students were not much commented upon, with only one positive and one negative comment. There were more positive than negative interactions

with female students, and the negative comments concerned the female students out in the field doing research that was physically demanding.

Despite the overwhelming emphasis on the gender of interactants, there were a few comments on the unimportance of gender in interactions. For example, one scientist said, “I collaborate with men and women, I share the laboratory with a man, I don’t have any problems. On the contrary, it works really well, but I think they are matters of personality.” Recognition for good work was rewarded regardless of gender: one scientist said, “When one does the work well, you finally get people’s respect, no matter if you are a man or a woman.”

Question 2: How do these women geoscientists describe themselves?

In describing their reasons for their success as scientists, the women commented that they were “passionate” about their field. They were “hard-working and responsible” and “ethical” in their approach to research. There were three mentions of being “rebels” and one contrasted herself as being the “rebel” while her sister “was the good girl who obeyed our parents.” They said that to be scientists in their field, “we are not ‘nice’, we are tough people.” Another said that especially in field work, “it has always been very important to prove that I can do it.” They talked about being role models. In addition to being supervisors to female graduate students, they said that through the research institute’s summer program, they showed middle- and high-school students that women can be scientists.

Question 3: What do these characterizations of self and others reveal about the gendered ideology of machismo and marianismo as it is experienced by these women geoscientists?

Analysis within the geoscientists’ discourse of the adjectives and noun phrases attributed to men and women was performed by isolating the descriptive words, phrases and actions and the accompanying attributes. Two lists of the discourse data were made, one for men and one for women (Table 2).

Men	Women
<ul style="list-style-type: none"> • If strong = leader, ‘the man!’ • Older established = not threatened (x2) • Prestige, fair in promotions/assessments • Petty, Vindictive, Macho (x3) • Powerful men minimize an ethics claim • Threatened man = rude, minimizes your work, ugly relations • Threatened • Men’s pride easily hurt, more sensitive • Need to feel like kings • Need to be put on a pedestal • Ridiculous anti-woman comments • Lecherous, come-ons, tell ‘dirty 	<ul style="list-style-type: none"> • Women scientists = rebel (x3), pushy (x2), tough, not ‘nice’, not feminine (x2), persistent, feminine and tough • Passionate, dedicated • Responsible • Disciplined • If strong = bitch • Have to prove themselves (x2) • Demanding, more volatile • Suspicious of women in power, more demanding than of a man, despotic, not objective. • Model of achievement/role model (x5) • Competent women = more recognition

<p>jokes'</p> <ul style="list-style-type: none"> • Interruptions of women talking • Contemptuousness for women in men's groups. • Technicians reluctant to take instructions or orders (x2) • Men = Better technicians 	<ul style="list-style-type: none"> • 'Naughty' female students = cry for any reason, give silly excuses, have affair with professor, cries in response to criticism • Not interested in field work • Don't want to get their fingers wet • Not as physically strong, Pretend to be weak • More humble, conciliatory • Special precise laboratory skills, more careful, more detail oriented
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Table 2. Discoursal characteristics ascribed to men and women by women geoscientists. Parenthesis indicates multiple mentions.

The language of the women scientists indicated that men and women behaved differently, and that similar behaviors are perceived differently when performed by men or women. The clearest dichotomy was that strong men were considered leaders and called “the man!”, whereas strong women were considered to be “bitches”. Dichotomous characterizations of the same behavior were described by Lakoff (1975) several decades ago; it seems that these characterizations continue to be present here in this Mexican research institute.

The term “macho” was used three times in its negative sense to describe men. They were also described as being “petty and vindictive”. Other negative behaviors that men displayed include lecherous come-ons, interrupting women, and contemptuous talk of women. However, men were also described as having “prestige”, being “fair in decision-making”, and offering “assistance” to junior female scientists. Thus, the comments concerning interactions with men constitute both positive and negative aspects.

The comments regarding women also displayed positive and negative aspects, although the negative characteristics far outnumbered the positive. Positive phrases included “role model” “precise skills” and “more careful”. However there were many negative characterizations. Those negatives included being “pushy”, “not nice”, “crying for any reason”, “silly excuses” and “despotic”.

The results of the close analysis of the interviews indicate that women were largely characterized with negative words. Negative words were attributed to their own qualities, such as “bitch” and “pushy”, and to other women, such as “volatile” and “pretend to be weak”. Unlike the range of positive and negative qualities attributed to men, women are more often portrayed negatively, even when discussing themselves.

The few exceptions to the negative words even for self-descriptions occurred when the women were asked to comment in response to the question, “To what do you attribute your success as a scientist?” In this instance, they used positive words such as “dedication”, being “responsible” and being “passionate”.

Discussion

This investigation into the experiences of women geoscientists in Mexico sought to answer questions concerning how women scientists describe their interactions in their work environment, how they describe themselves, and what these characterizations reveal about gendered behaviors in this workplace. The analysis of the data collected indicates two factors that affect their interactions: gender and status of the geoscientist relative to the interactant.

When the woman geoscientist was junior to senior male researchers and administrators, the relationships were predominantly experienced as positive. The established researchers took on helpful roles to the junior researchers and reportedly take pride in the younger women's accomplishments. The women scientists expressed great satisfaction in these collegial relationships. They reported that the men behaved fairly and objectively when considering decisions regarding the women's tenure and promotion.

The exceptions to positive relationships with senior researchers occurred in two kinds of situations. One negative situation was when a woman scientist wanted to challenge a male researcher's ethics and behaviors; she was explicitly told to "behave" and to "just be quiet...or we will make your life hard." The other negative situation occurred when one of the women sought an administrative post. The men in her department coalesced into a group and waged a campaign of slurs against her. The researcher explained that the men formed a "boys club" to support each other and diminish her rise.

Difficult relationships were also reported with male colleagues who held a status similar to the women's. In these relationships, the women can be perceived as threatening specifically because both the male and female colleagues are competing for tenure, research funds, professional recognition and career advancement (Rosser, 2004). The women experienced the interactions with these men of similar status negatively because the men were described as malicious, petty, and harassing. As one woman stated, "It's as though they wake up at night and think, 'How can I make you feel miserable?'". Such behaviors towards female colleagues, which can be characterized as bullying or sabotaging, are not limited to Mexico (Morely, 2000) and are consistent with the covert discrimination that Hatchell and Aveling (2008) describe in their study with Australian women scientists. Sexualization of the workplace, imposition of a glass ceiling for women, and evidence of a boys club can lead to an unpleasant working environment. Like the Australian scientists, the Mexican women experienced the unwelcome interactions as inconveniences that they handled individually as part of their professional life. These kinds of difficult interactions accounted for the substantially greater number of negative versus positive comments that the scientists in this study reported in relation to their male colleagues (Table 1). According to Hatchell and Aveling (2008), women's efforts to take action against unwelcome behavior are "somehow un-scientist-like,... also complaining would act as a black mark against them" (p. 370). The Mexican scientist who attempted to complain about an unethical situation was chastised in a similar manner.

Apart from the sometimes difficult relationships with male colleagues of equal or senior status, women reported the most difficulty working with male technicians. This was a differentiated power relationship in which the geoscientist was the research leader and she served as the boss to the technician. All the women reported that, individually,

they had spent a great deal of time thinking about how to manage that relationship. The relationships were difficult because men want to be “treated like kings,” and the men did not readily accept taking instructions or directions from women. One scientist reported that the men expect to be asked politely to do things. For example, when they are in a boat collecting samples, it is not always practical to use the niceties of speech because events happen quickly at sea. Nonetheless, the men “get upset because a woman talks frankly” by giving instructions that require immediate responses. The women reported that, in contrast, the male technicians do not complain when they are given orders by male scientists. Another scientist commented that she must always be sensitive to male technicians’ “egos”. She must be careful to defer to their suggestions regarding research protocols even though she holds higher professional status. Women’s leadership—and the fact it is not recognized or valued—is reported in the Mexican business sphere as well as in science (Díaz, 2011). Women are not accorded the power and respect that men receive. In both science and business, it seems that women are not respected the same as men are, and the scientists’ situation was further complicated by the fact that the men of lower status still expect to be treated deferentially.

Male students, in contrast, rarely presented difficulties for the scientists. With male students we presume that the clear relationship of being a student and younger in age relative to the scientist does not present a challenge to their masculinity. They accept the role of apprentice to the experienced researcher and do not confront her.

As stated by one of the participants, overall, “the way in which your initiatives are received or treated has a lot to do with the age and level of success of the man you are working with.” The findings indicate that as long as women scientists are in a subordinated, junior position and are the recipients of well-intentioned help, the senior male researchers are experienced as genuinely helpful. When the men feel threatened by a woman’s competence or her unwillingness to adhere to the status quo, they behave negatively through obstinacy, harassment and/or threats.

Interactions with women displayed a different pattern (Table 1). First, the participants did not make many comments regarding interactions with women colleagues of equal status. There are not very many women scientists in the division (10 in total), and the women reported that there is not much interaction between them. The women geoscientists do not collaborate together on research projects because of the differences in their specialties.

Secondly, concerning women as administrators, the participants said that there had been two instances in the institution’s history where women were appointed to senior administrative roles. Only one of those administrators was in charge over the geosciences area. The scientists in this study found the interactions with the senior female administrator to be very negative. Through comments such as “She was much harder on us than on the men”, and “I never felt I could really trust her”, the women expressed their negative interactions with the woman administrator. She was viewed as arbitrary and difficult. Our study focuses on the self-reports of the participants, and so no attempt was made to determine whether this administrator was, in fact, more arbitrary or harder on the women scientists than the men. Other studies indicate that when women are in senior positions, they are often judged more harshly by subordinates, even by women subordinates, than men in senior positions (Lois & Dawson, 2009; Warning & Buchanan, 2009; Eagly & Karau, 2002; Jenquart-Barone & Sekaran, 2001). Perhaps the expectation

that women be warm, sensitive and supportive was imposed on the woman in her administrative post (Atwater, Carey, & Waldman, 2001), so that when she did not meet that expectation she was judged especially harshly. It is interesting to note that American studies show the level of despotism (whether actual or perceived) has decreased with the greater number of women in more senior ranks of business and professional life (Kunkel, Dennis, & Walters, 2003; Isaac, Griffin, & Carnes, 2010; Sczesny, 2003). However in this science division, since the time that the one woman held a senior post some ten years ago in that department, no other women have been appointed to senior administrative roles. Thus there has been no opportunity for alternate experiences of interacting with women in high positions.

Finally in regard to the pattern of interactions, the scientists frequently remarked on negative interactions with female students, especially when the students were not perceived as being as professional or hard-working as they themselves were. The scientists reported a number of instances of female students “feigning” incompetence, not wanting to “get their fingers wet” or simply crying when the work became difficult. It is possible that the scientists were similarly imposing tougher criteria in their judgments of the female students than their male students. If so, the tendency for women to be more demanding of other women may underlie not only the negative comments about the woman administrator, but the impatience expressed concerning female students’ behavior.

Discussion in Light of the Ideology of Machismo and Marianismo

Machismo and marianismo emerge as ideologies that affect the women scientists’ professional lives. As discussed above, the gendered ideologies have positive and negative behaviors associated with them. Machismo in its positive guise involves being a good provider, having dignity, and being responsible. Machismo in its negative guise involves abuse, sexual domination, insults and bravado. Marianismo as a positive characterization for women demands them to be saintly, humble, and submissive to men and their families. This ideology is captured by one of the participants saying, “The feminine Mexican role is that women have to be more tolerant...and receptive to accepting the rules.” The negative characterization of women’s behavior is being petty, emotional, untrustworthy, and sexually promiscuous. Surprisingly, however, the data that emerged in this study indicate that the ideologies do not map onto men and women in the culturally expected manner: men were not described as consistently performing machismo and the women were not described as consistently performing marianismo.

As shown in Figure 1, when the women talked about themselves, they invoked machismo. They characterized themselves as embracing both the negative qualities (i.e., being pushy, rebellious, not nice and tough) *and* the positive ones (i.e., being dedicated and disciplined, and performing honest and responsible work). The same characteristics of rebelliousness and determination are also used by women scientists in other parts of the world to account for their success (Hanson, Kennelly & Fuchs, 2007). We emphasize that here in the Mexican context, these are characteristics of machismo, which is a culturally normed male behavior. It is important to note that despite the discursive alignment with machismo, “Women never have the option of being truly macho in the sense that men do. Above all this is because a key component of a macho’s machismo is his relationship to female bodies,” (Gutmann, 1996, pp. 236-237). In other words,

women’s self-identification with machismo will always be circumscribed. A woman can never be fully accepted as a fellow macho even though she may identify with its characteristics.

Embracing or repudiation of marianismo was also referred to in the women’s interviews. The attributes of marianismo were only invoked when they spoke of having to defer to and reconcile their relationships with the male technicians. The positive aspects such as humility and self-effacement were described as capitulation to accommodate the men of lesser status. The negative characterization was for other women—particularly female students who displayed neither the positive nor negative attributes of machismo. Those women were petty, emotional, feigned incompetence and even had affairs with male researchers. Marianismo as a cultural archetype offers no role for women’s leadership. One of the scientists reported, “A Mexican woman is going to tell you, ‘I have to behave in a non-socially accepted way if I want to [be a leader].’” The lack of leadership roles for women in Latin cultures is similarly experienced by Chicana activists who “struggle with stereotypes of marianismo, such as submissiveness, abnegation, and passivity” (Méndez-Negrete, 1999, p. 30).

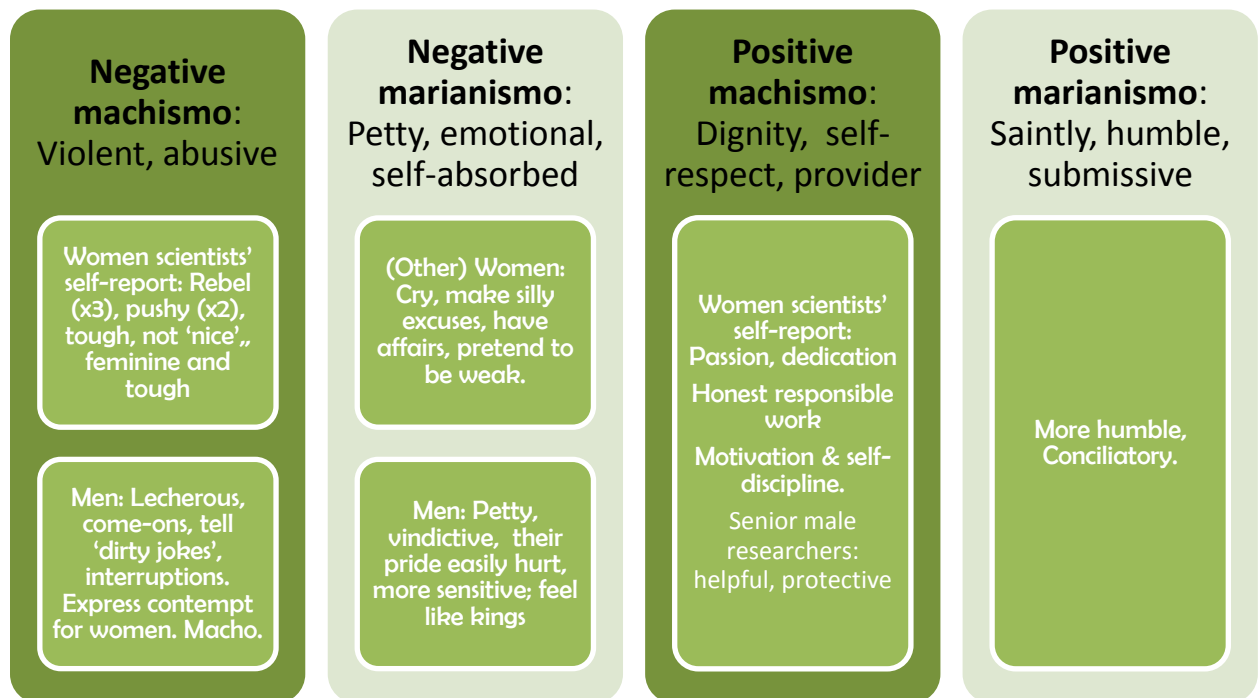


Figure 1. Machismo and marianismo in the discursual characterizations of women scientists’ interactions with men and women in their professional lives in Mexico.

The women geoscientists mostly characterized the men in the negative aspects of both machismo and marianismo. Men displayed the negative machismo of sexual bravado, insults, and interrupting women’s talk. Men displayed the negative aspects of feminine behavior when they were petty, vindictive, easily upset and had fragile egos. Positive macho attributes were reported only in relation to senior male researchers in their role of providing guidance and support.

In sum, we see that the women themselves more fully identified with the characteristics attributed to machismo: both the positive qualities of passion, dedication

and responsibility, and the negative qualities of rebelliousness, pushiness and toughness. The women's self-identification with machismo may have resulted from their participation in a male dominated field (science) and especially a male-dominated subfield of science (geoscience). Further the ideology of machismo allows for power and leadership (Stobbe, 2005). The qualities of marianismo were viewed in a negative light and its manifestation was largely allocated to scorned behaviors of other women such as feigned helplessness and sexual wantonness. Marianismo does not allow for credible self-determination.

Overall, the participants' discourse lacked the nuanced multiplicity of gender that is called for in contemporary socio-ethnographic literature (Ramirez, 2008; Gutmann, 1996). The lack of nuance is consistent with the experience of women in science and engineering departments generally, where there can be a conflict "between being 'feminine' and being 'business-like'" (Evetts, 1994, cited in Gupta & Sharma, 2002, p. 902). It is encouraging to note that two of the younger scientists emphasized they were still being "feminine" while being "tough". If marianismo represents the ideal feminine in Mexico, adhering to it is not a behavior that allows for professional success although it is sometimes invoked to manage the relationship with technicians. For success, the women identify with machismo. The women's discourse supports Gutmann's (1996) contention that the "dominant ideas and practices [of machismo]...are so pervasive as to constitute common sense for members of society" (Gutmann, 1996, p. 19).

Finally, the status of their interactant—whether of equal status, higher or lesser—is a key factor in the positive or negative nature of the interactions. Generally, the more powerful the man is in his status, the more positive is the women's relationship with him. The number of interactions with women is far fewer as there are few women present in the geoscience department, and the most positive ones are with students to whom the scientists are role models. The positive and negative qualities and behaviors of machismo, and marianismo's positive qualities and its repudiation can be traced in all these relationships.

Conclusion

In this paper we explored the questions of how women geoscientists experience their interactions with men and women in their professional lives. The interactions provide specific data about a specific context in a particular era, but we don't think they are simply idiosyncratic; rather they can be seen as illustrative of broader experiences of professional women. The results demonstrate that the women see themselves as *not* performing the gendered role of marianismo, or repudiating it through pettiness or wantonness. Femininity does not allow for determined action by women because marianismo is fundamentally an ideology of self-sacrifice. Instead scientists characterize themselves in terms consistent with machismo, in its negative and positive elements. Yet women do not wield sufficient power to be machos among men, and men still expect women to perform the behaviors of marianismo. The women speak of themselves as non-traditional, while working in a professional context that continues to expect them to behave traditionally. We wish to emphasize that many of the women have established supportive and collaborative working relationships with men. The women stated that the personality of different individuals is crucial in these relationships. The genuine affection

for their colleagues in this context is expressed by the scientist who said, "I love the men I work with."

This study was conducted with a small number of women who work in the field of geoscience. This discipline was chosen for investigation because it is a field of science that usually attracts few women. In this Mexican institution, there were ten women in the geoscience division overall and there were four women in two of the departments. It was hoped that this relatively large number of women would ameliorate the difficulties of isolation that American women scientists report (Holmes & O'Connell, 2003). The findings demonstrate that the gendered ideologies of the culture are not lessened by being one of four women in a department, or being one of the 10 women in a division of 50+ men. The scientists did not report strong relationships with women colleagues, whether in formal research collaborations or informal support networks.

All the participants remarked consistently on their pride of being role models for female graduate students and girls in their families, and such modeling is associated with the success of female science students (Holeran, Whitehead, Schmader, & Mehl, 2011). Perhaps, a new ideology of women in professional positions in Mexico will develop. The limited range of readily acceptable behaviors for women in science today emphasizes the need for creation of such new cultural ideologies so that women's interactions are not so difficult, and they can conduct their scientific work without constraint.

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APPENDIX

Gender in Science Research – Interview Questions

1. Please tell us a little about how you became a scientist and who your role models were in pursuing science as a career. To what do you credit your success as a scientist?

2. Your research involves field work that often takes you away from home. In what ways has being a woman affected your research in the field when working with male colleagues?

2a. Do you ever specifically seek out female colleagues for field work?

3. In learning to write scientific articles, were your most important mentors and collaborators men or women? Do you think that the gender relationships were important? In what way(s)?

4. One of the interesting things about [name of institution] is the relatively large number of women in geosciences and oceanography. In most American departments, there is often only one female. Do you feel there is a ‘strength in numbers’ here, and how does that affect your professional life?

5. Have you ever been affected by *machismo* in your discipline? How does it affect you directly? How do you deal with that?

6. Do you feel you approach science differently because you are a woman?

7. Do you have pressures –professionally or personally – that are different from your male colleagues?