Body Projects of Young Women of Color in Physics: Intersections of Gender, Race, and Science

MARIA ONG, *Harvard University*

Most research on underrepresented members in science focuses on gender or *on race/ethnicity, ignoring intersections embodied by women of color. This article, which draws from a qualitative, longitudinal study, addresses this gap by focusing on ten minority female physics students who negotiate three incongruent realms: field of study, gender, and race/ethnicity. It examines ways in which these students sense that their belonging and competence in science are questioned because their bodies do not conform to prevalent images of the "ordinary" white male physicist. To persevere in physics, they engage in bodily projects of (1) approximating ordinariness through fragmentation, which entails using strategies of racial or gendered "passing," or (2) rejecting these practices in favor of multiplicity, which entails employing stereotype manipulation or performances of superiority. By highlighting accounts of individuals who persevere in the elite physics field, this article provides insight into how university departments should reform to promote more women and underrepresented minorities in science.*

> You never see someone that looks like me as a scientist. No matter how long I stay here. When I walk through the campus, no one's ever gonna look at me and just think that I'm a physicist . . . I guess the things that have made other people find it hard to see me as a scientist are making it hard for me to see *myself* as a scientist, too.
>
> —Sofía Caldo, Chicana college senior[1]

Women of color who seek degrees in science are constantly and unavoidably aware that that they are seen as "different." They are typically distinguished by gender, race, and ethnicity, facets of the self that are much more salient for them than for their white male counterparts. Work in the lab or on a challenging problem set might allow them to forget these perceived differences temporarily, but they are likely to be reminded of their extraordinary status by both blatant and subtle challenges to their competence and membership in the scientific community. Harvard University president Lawrence Summers offered one such sobering reminder at a January 2005 National Bureau of Economic Research meeting addressing minorities' and women's underrepresentation in science and engineering. In his remarks, Summers suggested that women with family concerns might be unwilling to work the 80-hour weeks demanded of elite scientists. He further speculated that women might not possess the "intrinsic aptitude" for science and engineering (Summers 2005).

The author wishes to thank Carol B. Stack, Sara Lawrence-Lightfoot, Wendy Luttrell, Anne MacLachlan, Brian Pierce, Jennifer Rosenblum, Corrine H. Taylor, Yevgeniya V. Zastavker, Eleanor Kim, Christine Bang, James A. Holstein, and the anonymous reviewers for their invaluable feedback on earlier drafts of this manuscript. She is also indebted to the students who participated in the study. The manuscript was completed as part of the author's postdoctoral fellowship at Harvard University. The project was funded in part by the Harvard Graduate School of Education Postdoctoral Fund, the American Educational Research Association, and the National Science Foundation-University of California at Berkeley Program in the Social Studies of Science and Technology. The article is a revised version of a paper presented at the ASA Meetings, Atlanta, 2003. Direct correspondence to: Maria Ong, TERC, 2067 Massachusetts Avenue, Cambridge, MA 02140. E-mail: ong.mia@gmail.com.

1. All student names are pseudonyms.

***Social Problems*, Vol. 52, Issue 4, pp. 593–617, ISSN 0037-7791, electronic ISSN 1533-8533.**

In effect, Summers employed both genetic and socialization arguments to hold women responsible for their own lack of progress in science and engineering. Further, he framed the arguments so as to obscure structural and interactional sources of inequality, including societal assumptions and expectations that women must put more time into family care than do men and that "normal work success [in science and engineering] has time demands that cannot be redefined" (Hubbard 2005). In other words, from structural and interactional points of view, the achievement of "normal" or "ordinary" womanhood clearly stands at odds with the achievement of "normal" or "ordinary" success in scientific fields.

The structural/interactional argument is not new (Eisenhart and Finkel 1998; Zuckerman, Cole, and Bruer 1993). However, research of this kind has consistently emphasized the barriers women face in pursuing science degrees and careers. Scholarship has virtually ignored the strategies women employ to negotiate viable scientific identities that are, at the same time, gendered and racialized. Furthermore, most research on women in science has focused almost exclusively on middle-class white women (Harding 1991). Very little empirical attention has been paid to the intersection of ethnicity, race, gender, and the scientific culture (Hammonds quoted in Hamilton 2004).[2]

This article fills these gaps by describing and analyzing the narratives of ten undergraduate and graduate physics students who self-identify as Chicana, Latina, Filipina American, or African American.[3] The narratives show how, with varying degrees of success, they attempt to embody simultaneously the identities of ordinary women, ordinary persons of color, and ordinary aspiring scientists. Drawing upon data from an eight-year longitudinal study, I delineate how, under extraordinary circumstances of multiple conflicting demands, their attempts to be viewed as ordinary scientists, women, and persons of color often involve situationally specific, extraordinary practices. The situation is oxymoronic in science: performances of ordinary femaleness or race/ethnicity by women of color are hardly compatible with displays of ordinary scientific practice (Bug 2000; Ginorio 2001). In response, the women engage in various body projects of showing themselves to be ordinary scientists in order to surmount immediate barriers posed by race/ethnicity and gender in the context of the local physics community. By focusing on accounts of students who persevere in, rather than drop out of, the elite physics field, I describe some individual, collective, and institutional strategies that ostensibly enable nontraditional students to overcome these challenges.

I employ a multi-disciplinary approach to analyze the students' reported strategies for managing the perceptions of themselves by others. These strategies often lead to practices of

2. Rare exceptions include Clark et al. 2000; Clewell and Campbell 2002; Ivie and Ray 2005; Leggon 2001; MacLachlan 2001; Malcolm, Hall, and Brown 1976; Nelson 2003.

3. In this article, the ten participants identified as "women of color" or "underrepresented minorities" include members of groups that were identified as underrepresented at the university where the students earned their bachelor's degrees: African Americans, Latinas, Chicanas, and Filipina Americans. Native Americans, Native Alaskans and other minority groups (e.g., Cambodians, Native Hawaiians) were also underrepresented at the university. But during the duration of the study, few, if any, members majored in physics-related fields, and none participated in the study. Asian Americans and Pacific Islanders (with the exception of Filipino Americans who, because of their political history in the state, maintained a separate demographic status from other groups) were not considered part of the women of color focus group in this study. In the university setting, the broadly defined category of "Asian Pacific Americans" (APAs) was widely perceived by the administration, faculty, and students as being well represented (even overrepresented), especially compared to other minorities on the campus. This was particularly the case in the sciences, where the perceptions were aided by the presence of a large number of foreign/international students and several Asian and Asian American faculty members. Moreover, physics community members (among others) followed a common practice of conflating APA subgroups that seemed well represented in physics courses (e.g., Chinese, Korean) with those that were not (e.g., Filipino, Vietnamese, Native Hawaiian). The prevalent "model minority" stereotype also erroneously contributed to the idea that APAs were doing fine throughout the academic pipeline (Lee 1996). However, perceptions cloud the reality of representation. For example, in 2001, APAs who are U.S. citizens and permanent residents received only 5.3 percent and 6.0 percent of all bachelor's degrees and Ph.D.s awarded in physics in the United States, respectively (NSF 2004). Universities, science departments, and science education scholars must take more careful measures to track members by subgroup/ethnicity and nationality, and then to identify, report, and serve APAs and other underrepresented U.S. students in order to retain them in physics and other fields where they are critically needed.

fragmentation or multiplicity (Lugones 1994). Fragmentation strategies include gendered passing and racial passing. Multiplicity strategies include stereotype manipulation and performances of superiority. I argue that the women of color employ these strategies to achieve one of two performance-related goals: (1) to organize themselves to be seen as community members or non-members, or (2) to organize the appearance of competence. The effort and attention they invest in managing how they "get seen" as a community insider or outsider in the realms of gender, race/ethnicity, and science throw the incongruity of these memberships into high relief. Furthermore, the ways in which women of color organize themselves to appear competent in the context of physics specify invisible rules about the strict boundaries around local scientific communities. The strategies enable their perseverance in an elite field. However, as I later describe, perseverance can come at potentially great personal cost. The strategies often force students to compromise their identities as women, as minorities, or both. The outcomes of fragmenting strategies in particular solidify—rather than undermine—gendered, racial, ethnic, and scientific boundaries. The risks and ramifications illuminate structural ways that physics culture discourages nontraditional students from persevering in the field. I conclude with recommendations to reform academic scientific environments to support the efforts of young women and minorities to construct and maintain mutually reinforcing community participation and identities.

The New Call for Supporting Women and Underrepresented Minorities in Science

A new, broad call supporting women and underrepresented minorities in science stems not from affirmative action rules or liberal sensibilities, but rather from the practical recognition that, in the long run, the position of the United States as a world leader rests partially upon its ability to educate and train its own members (Broad 2004; Jackson 2004). Currently, the country faces general demographic shifts toward majority female and non-white populations across both states and college campuses (NSF 2004). Simultaneously, it is experiencing a shortage of students entering scientific fields, particularly those in the physical sciences and engineering. Stricter immigration rules that resulted from the terrorist attacks of September 11, 2001, coupled with growing technological opportunities elsewhere in the world have further exacerbated the shortage (Broad 2004). Agencies such as the National Science Foundation, the American Society of Engineering Education, and the American Physical Society have responded to this set of circumstances with a practical, yet dramatically unprecedented proposal: for the United States to cultivate its domestic resources that explicitly include women and minorities. As never before, both diversifying the scientific workforce and educating young, talented women and ethnic minorities have emerged as explicit goals for the sake of national security and sustained scientific leadership.

However promising this resolve might sound, the national call for recruiting and retaining a diverse scientific body rarely translates into an inviting institutional climate for nontraditional students (Budil et al. forthcoming; Whitten, Foster, and Duncombe 2003). Despite some impressive and hopeful gains in representation at the bachelor's level over the last two decades in specific fields, such as biology and chemistry, women and underrepresented minorities remain far from achieving equity with their male and nonminority counterparts. Overall female and minority enrollments in the natural sciences do not yet reflect their respective college-attending populations. For example, in 2001, women made up 57.4 percent, and underrepresented minorities[4] composed 16.3 percent of all bachelor's degree recipi-

4. The National Science Foundation recognizes the following groups as "underrepresented minorities": blacks, Hispanics, American Indians, and Alaskan Natives. The reports on underrepresented minorities that cite NSF as a source reflect only on data only about the above groups.

ents. However, these groups received, respectively, only 46.0 percent and 15.0 percent of all natural science degrees awarded (NSF 2004).[5] Furthermore, their participation in science education decreases with each stage of advanced education, a phenomenon that has become known as the "leaky" academic pipeline (Hanson, Schaub, and Baker 1996; Ivie and Ray 2005; Ivie and Stowe 2000; NSF 2002, 2004).

Physics profoundly contributes to the problem of exclusion. A 1996 comparative study of seven economically developed countries (Hanson et al. 1996) revealed that the United States ranks at or near the bottom in preparing high school-age females to major in physics in college. Data on bachelor's degrees awarded in the United States in 2001 show that women's representation in physics (21.9 percent) remains low compared to that in the biological sciences (59.7 percent), mathematics (48.0 percent), and chemistry (48.6 percent; NSF 2004). Further, women are less likely than men to pursue graduate education in the physical sciences (24 percent vs. 38 percent; Xie and Shauman 2003). Underrepresented minorities fare even worse. Blacks, Hispanics, American Indians, and Alaskan Natives collectively earned 9.7 percent of all bachelor's degrees in physics awarded to U.S. citizens and permanent residents in 2001, a poor representation compared to underrepresented minority awardees in chemistry (16.8 percent), mathematics (14.0 percent), and biological sciences (16.5 percent) during the same year (NSF 2004).

Women of color suffer an especially low representation in physics. A recent report released by the American Institute of Physics (Ivie and Ray 2005) states that between 1995 and 2001 (and excluding 1999), out of about 3,800 bachelor's degrees in physics awarded each year, only 56 (1.5 percent) were awarded to African-American women and 23 (0.6 percent) were awarded to Hispanic women, on average each year.[6] Between 1997 and 2003, out of about 1,100 Ph.D. degrees in physics awarded annually, an average of fewer than three Hispanic women and fewer than three African-American women earned Ph.D.s in physics in the United States each year (Ivie and Ray 2005:17). Clearly, in the specific context of physics, an interactional effect of race/ethnicity and gender works to exclude women of color. The report concludes that "[n]umbers like these are of great concern for many policymakers and observers of the scientific community . . . Minority women especially represent a great, untapped resource that could be drawn on to increase the size of the scientific workforce in the U.S." (p. 18).

Although most young Americans do not pursue physics, or science in general—principally because of their weak academic preparation in K–12 science and mathematics (Fullilove 1987; Jackson 2004; Roach 2001)—research also reveals that widespread images of ordinary scientists as white men effectively discourage many talented young women and underrepresented minorities from exploring physics as an option (LaFollette 1988; Margolis and Fisher 2002; Seymour and Hewitt 1997). Like Sofía Caldo, the aspiring physicist quoted at the opening of this article, women of color who pursue science careers often perceive that their corporeal appearances stand at unfavorable odds with their identity claims as scientists. Being seen simultaneously as ordinary women, minorities, *and* scientists sometimes requires creative and painfully contradictory practices and performances.

Being Ordinary in Three Realms

Harvey Sacks was among the first to call attention to the challenges of conducting oneself so as to be considered thoroughly ordinary. Sacks (1984) writes that the seemingly passive status of "being ordinary" is produced by "the way somebody constitutes oneself and, in

5. "Natural sciences" is defined in this case as the following fields: biological sciences; computer sciences; earth, atmospheric, and ocean sciences; mathematics; and physical sciences.

6. Data were not provided for other underrepresented groups.

effect, a job persons and the people around them may be coordinatively engaged in" (p. 415). Thus, one may best describe being ordinary as an achievement—something a person does in order to claim the nature and benefits of membership in a particular community. According to Sacks, all individuals constantly engage in the job of being ordinary in everyday interactions in ways that are so profoundly mundane that this activity is practically invisible. Erving Goffman (1973, 1977) was similarly concerned with the everyday impression management and identity construction that constitutes mundane, everyday interaction. Despite differences in the way Sacks and Goffman construe the practices implicated in establishing ordinary appearances, they both point us to the work that goes into maintaining a sense of being thoroughly ordinary. The following sections briefly summarize literature on the impetuses, rewards, risks, and costs that women scientists of color encounter in the realms of science, gender, and race/ethnicity as they try simply to appear ordinary.

The Realm of Science

Historically, Western culture has popularized and celebrated the confident, and sometimes even arrogant, white male as the typical or ordinary icon of intellect and scientific competence (Fausto-Sterling and English 1986; Gibson 2003; LaFollette 1988; Mead and Métraux 1957). The media historically has propagated this monolithic image through scientific celebrities like Albert Einstein, Carl Sagan, and Stephen Hawking, and through films in recent decades such as *Back to the Future* (1985), *Jurassic Park* (1993), *A Beautiful Mind* (2001), and *The Day After Tomorrow* (2004).[7] This trend displays its staying power, even as the reality of who practices science in the United States grows more complex. Although women and racial/ethnic minorities have entered science at increasing rates over the past three decades, they remain largely unnoticed and marginal as white men predominate over women and all other ethnicities, including Asians/Asian Americans, at the highest and most visible levels in the majority of scientific fields (NSF 2004; Valian 2000). The National Science Foundation (2002) reports that, in 2000, the workforce of Ph.D.-level physicists comprised 93 percent men and 84 percent whites. These images—both the cinematic and the real—convey a subtle but powerful message about the pervasive "pale and male" appearance of an ordinary scientist.

All scientists inevitably face the task of establishing the appearance of possessing authoritative knowledge in their respective fields. However, this task challenges some more than others. Those in science who occupy nontraditional gender, racial/ethnic, and class categories must contend with common effects of low representation, including isolation (Seymour and Hewitt 1997; Valian 2000), doubts associated with tokenism (Etzkowitz, Kemelgor, and Uzzi 2000; Kanter 1977), tenuously balanced social identities (Margolis and Fisher 2002; Seymour and Hewitt 1997; Tobias 1990), and disproportionate skepticism from others—and themselves—about their qualifications and abilities to succeed in predominantly male and/or white fields (Correll 2004; Steele 1997).

In trying to appear professional and authoritative, women of color must relegate social and cultural identities to the margins. Scientists gain much of their authority and prestige in their fields and from the public by maintaining science's appearance as objective, universal, and context-free (Gieryn 1983; Haraway 1991; Harding 1991; Latour 1987; Merton 1973; Traweek 1988). Because they claim to inhabit a "culture of no culture," as Sharon Traweek (1988:162) has famously phrased it, physicists in particular seldom acknowledge that doing science entails subjective judgments, particularistic practices, and context-laden assertions

7. No shortage of movies portraying scientists as white males exists. Others from the past two decades include: *Ghostbusters* (1984); *Weird Science* (1985); *The Fly* (1986); *Honey, I Shrunk the Kids* (1989); *Apollo 13* (1995); *The Hulk* (2003), and *Spider-Man 2* (2004). Some movies portray women in secondary scientist roles. These include: *Real Genius* (1985); *Outbreak* (1995); *The Saint* (1997), and *Red Planet* (2000). *Contact* (1997), featuring Jodie Foster, is among the rare Hollywood films that feature a female as the primary scientist (although her promotion to this role comes only after the violent combustion of her arrogant, white, male colleague).

(Hess 1997). Matters of gender, race, ethnicity, social class, immigration status, and sexual orientation have no acknowledged place in this cultureless culture.

Nevertheless, a wealth of research demonstrates that science is not a culturally neutral forum. For example, historical studies about the gendered nature of Western science, such as the careful accounts offered by Londa Schiebinger (1989) and David Noble (1992), suggest that founders of the modern university deliberately associated masculinity with the qualities of rigorous intellectual inquiry and objectivity and associated femininity with emotion and subjectivity. Other studies show that this dichotomy perseveres, since contemporary practitioners of science commonly assume the superiority—and then reward the displays—of white-, middle-class-, and male-associated physical appearance (LaFollette 1988; Margolis and Fisher 2002), mannerisms like aggressiveness and arrogance (Georgi 2000; Gibson 2003), and values such as independence and competitiveness (Fausto-Sterling and English 1986; Traweek 1988; Valian 2000).

Women of color who work in science assume the burden that Susan Leigh Star observes is borne by women of color generally: the burden of responding to standards not traditionally designed for them (Star 1991). Star (1991) writes that, ironically, women of color take on the "invisible work of creating a unity of action in the face of a multiplicity of selves, as well as, and at the same time, the invisible work of lending unity" to those responsible for their hegemonic oppression (p. 30). To claim membership in the context of science, women of color must maintain the appearance of belonging to a culture of no culture.

The Realm of Gender

Gender scholars (Butler 1990, 1997; Garfinkel 1967; Goffman 1976, 1977; Kessler and McKenna 1978) argue that gender is a constructed, interactional accomplishment, and that every person assumes the challenges of managing acceptable gender identities. Generally, they stress that norms and values for men and women have neither static qualities nor ontological status; instead, "doing" gender is an ongoing project. According to Goffman (1977), on the one hand strong cultural disciplinary practices in Western culture produce docile, female bodies whose gender-appropriate displays include "frailty, fear, and incompetence" and dependence on men, while on the other hand Western culture rewards males who engage in acts of threatening, protecting, doing, and competently performing (p. 312, 320; see also Butler 1990; Goffman 1976). Even though Goffman's views are somewhat dated, they arguably still describe the general ends of the gender spectrum. Further, members of a given community keep the boundaries of appropriate gendered behaviors and appearances in tight check through constant surveillance. Research on transsexuals and lesbians particularly make this point by demonstrating how those who attempt to pass (i.e., appear and/or behave as a member of the opposite sex) assume potentially dangerous risks because they threaten established categorical boundaries (Garfinkel 1967; Kessler and McKenna 1978; Phelan 1993; Woody 2003).[8]

Women of color in physics similarly assume risks for crossing familiar, comfortable gender boundaries, though perhaps in a less dramatic fashion. In the science community, simply

8. Studies of transsexuality (e.g., Garfinkel 1967; Kessler and McKenna 1978; Phelan 1993) make strange, and therefore visible, the gendered interactional accomplishments of "doing 'being ordinary'" by highlighting the concerted, calculated social behaviors participants claim they must perform in order to pass as unmarked, ordinary members of the opposite sex. In one classic case study, Garfinkel (1967) describes Agnes, who, though born and raised as a male, begins to pass as a female in her teenage years. Even prior to her sex-change operation, Agnes achieves what Garfinkel labels as the "ascribed status of the natural normal female" through "active and deliberate management of her appearances before others as an object," such as wearing a bathing suit with an obscuring skirt to the beach and displaying passive reliance on her boyfriend (pp. 136, 141). Males dressing and performing as women in "drag queen" pageants serve as another extreme, but widely acknowledged, example of gendered passing as self-performance (Phelan 1993). Importantly, the act of gendered passing sometimes assumes risks because it requires appearances and behaviors that violate established categorical boundaries. For example, Woody (2003) found in a study of high school youth that lesbian students suffer isolation, ostracism, and derogatory jokes because their peers often perceive them as trying to usurp male privilege.

"acting like a man" can carry high risks and does not always lead to greater acceptance, since women are subjected to, and judged by, both standards of femininity and standards of scientific competence. Virginia Valian (2000) explains, "A woman who is very feminine runs the risk of seeming less competent; the more she typifies the schema for a woman, the less she matches the schema for the successful professional. On the other hand, a woman with masculine traits runs the risk of appearing unnatural and deviant. The more she typifies the schema for the successful professional, the less she matches the schema for a woman" (p. 15). Indeed, studies of work show that women who self-promote, act assertively, or dominate interactions are more negatively evaluated than are either women who behave in stereotypic ways or men who equally self-promote, act assertively, or dominate (Linehan and Seifert 1983). Research on women in science and engineering also found tensions between displays of scientific/academic competence and displays of femaleness (Barber 1995; Seymour and Hewitt 1997; Tobias 1990). Many of these studies conclude that women actively seek to resolve such tensions, usually by opting out of scientific and engineering fields.

Furthermore, collaboration, a practice commonly associated with femininity, has been appropriated by the scientific culture with the effect of chiefly helping men and harming women. Sociologist Gerhard Sonnert (1995), who conducted follow-up surveys of 699 male and female recipients of prestigious science postdoctoral fellowships, found that although collaborative research "correlated with positive career outcomes for men, it correlated with negative career outcomes for women" (p. 2). This discrepancy may be attributed to the likelihood that women occupied ancillary positions or took on more nurturing (and less valued) roles in their collaborations (Bailyn and Rapoport 1998; Sonnert 1995). Often, women scientists learn after the fact that they have been excluded from efforts to form potentially powerful and profitable research collaborations (Hopkins 2002). At the undergraduate level, research reveals that women in mixed-gender collaborative groups in physics courses, especially those women in the numerical minority, express frustration over being dominated by male partners, even when the women demonstrate greater scientific abilities (Heller and Hollabaugh 1992). One study found that women reported experiencing "clashes in temperament, being subjected to ridicule, fears that their partners didn't respect them, and feelings that their partners understood far more than they" (Laws, Rosborough, and Poodry 1999:S35).

The Realm of Race/Ethnicity

Ambiguously "colored" persons provide a forum for identifying race and ethnicity not only as culturally constructed, but also as inherently performative, interactional achievements. A rich literature in ethnic and cultural studies describes the historical precedent in the United States of racial passing and communication of whiteness as embodied performances for purposes of eschewing discrimination and reaping social and political benefits (e.g., Brodkin 1998; Dominguez 1986; Roediger 1991; Warren 2003; Waters 1990). Light-skinned individuals or individuals of mixed racial or ethnic heritage are often attracted to this option (Hunter 2002; Lawrence-Lightfoot 1995). Studies conducted by Mary Waters (1990) and Patricia Gándara (1995), among others, found that perceptions of racial and ethnic differences are so consequential in terms of social member benefits that people of color who can pass as white often do.

Gains in power and status afforded to those who successfully perform whiteness demonstrate how whites, who are usually not "racially seen and named," have become established as the "norm, the ordinary, the standard" (Dyer 1997:1, 3). Whiteness studies scholar Richard Dyer (1997) states that because whiteness is usually overlooked as a racial position in dominant (i.e., white) discourse, minorities often are considered to speak and act as representatives of their respective groups, while whites effectively speak as individuals. Consequently, particularly in the context of science, the successful achievement of being white allows the performer—especially a male performer—to speak from positions of neutrality, objectivity, and authority (Dyer 1997; Frankenberg 1993; Warren 2003). These, of course, are the positions of the accomplished scientist.

Fragmentation, Multiplicity, and Body Theory

Young women of color trying to establish their ordinariness in physics often utilize strategies involving the manipulation of their bodies that lead either to the fracturing or to the reconciliation of their female, racial/ethnic, and physicist identities. Three notions—fragmentation, multiplicity, and body theory—provide an analytic vocabulary for describing how women of color understand and negotiate the challenges of simultaneously appearing as ordinary women, persons of color, and scientists.

How—and how easily—a woman of color gains acceptance in the particular context of a physics community, and the quality of daily social interactions she has with other members, might either enforce a sense of *fragmentation* between her scientist and female/racial/ethnic identities or promote a sense of *multiplicity* (Lugones 1994). Philosopher Maria Lugones refers to fragmentation as a process of temporarily splitting oneself to minimize cultural differences between oneself and other members of a community. In the context of their local physics communities, women of color often engage in common and typical strategies of racial and gendered passing, which may result in fragmentation. These strategies force women of color to emphasize ways in which they match or approximate the image of a standard, generic physicist. In the process, they alter appearances and conduct in order to conceal differences that constitute their gendered, racial identities. In effect, they separate their gendered and racial selves from their scientist selves.

Multiplicity, in contrast, resists self-fragmentation in favor of a less stable but more holistic occupation of multiple, but sometimes competing, identities and memberships (Lugones 1994). A person who practices multiplicity displays all of her social, cultural, and professional identities at once, without apology; ideally, because she would not feel forced to hide parts of herself, she would more likely feel comfortable and encouraged to excel. Though rarely employed, some students' strategies of stereotype manipulation and demonstrations of superiority allow them to reject the ordinary scientist image in favor of a new ideal that consolidates seemingly conflicting gender, racial/ethnic, and scientist identities. Lugones and other feminist scholars (e.g., Ginorio 2001; Haraway 1991; Harding 1991; Star 1991) argue that achieving multiplicity empowers marginalized members more than does fragmentation and, thus, is the more desirable goal. My own research supports this claim, but I also suggest that, under particular circumstances, practices of fragmentation may enable women of color to persevere in physics, while practices of multiplicity may result in self-harm.

Body theory describes ways in which a person achieves fragmentation or multiplicity through bodily practice. This approach examines the corporeal entity as the object of interest and construes the body as part cultural product and part agential process (Balsamo 1996; Butler 1990; Grosz 1994; Phelan 1993). Cultural theorist Anne Balsamo (1996) describes the body product as "the material embodiment of ethnic, racial, and gender identities, as well as a staged performance of personal identity" and the body process as "a way of knowing and marking the world, as well as a way of knowing and marking a 'self'" (p. 3). Further, this framework conceives the body as both potentially active and passive. As such, body theory aids in understanding how a female minority physicist's active marking and performance of her corporeal self can, to a degree, communicate to others in the community something about her knowledge, ability, and competence in science. Equally, a woman of color might not have control over how others perceive her, but their perceptions might nevertheless affect her access and legitimacy (Waters 1990).

As both products and processes, women of color's visibly contrasting bodies—in terms of their feminine curves and/or darker skin tones—call for special attention and analyses in relation to the study of membership in the local physics community. The degree to which a young female physicist succeeds in gendered or racial passing depends on both the achievements of the body product and the body process. For example, a woman who approximates the bodily appearance (i.e., product) of a typical man may not completely fool the eye, but she may gain wider acceptance in the scientific community than one who adheres to typically feminine body shape, hairstyle, or dress. Similarly, a woman who actively makes her way in the science culture by appropriating the masculine behaviors of the science world[9] (i.e., process) communicates to others that she has acquired the "proper" scientist identity. In both cases of product and process, a woman of color's claim to legitimacy continually contests and negotiates the grounds she shares with other members of the community (Lave and Wenger 1991).

The Study

My primary research settings are the physics department and campus of a large, diverse research university. In 1996, when the study began, the campus enrolled about 20,000 undergraduates. Women composed about half of the undergraduate population, and Chicanos, Latinos, Native Americans, African Americans, and Filipino Americans made up about 20 percent of the student body. At the time, members of these ethnic and racial groups were underrepresented according to a ratio that measured the number of the state's high school graduates from the previous year against the number of current first-year students in the state's public universities. As a broad racial category, other Asian Americans, Asians, and Pacific Islanders—including both citizens and immigrants—composed roughly an additional 30 percent of the undergraduate population, but none of the subgroups were considered underrepresented.[10] In the specific context of physics, however, the undergraduate population more closely reflected the national figures in 1996, with about 18 percent women and below 15 percent underrepresented ethnic minorities in 1996 (NSF 2000). Since the study began, the student body has increased in size and diversity; like on most campuses across the nation, women now make up over half of the population. The representation of females and minorities in physics at the university's undergraduate level also has increased slightly, again reflecting the national trends, to about 22 percent and 16 percent, respectively (NSF 2004).

For the purposes of a longitudinal, in-depth study, I followed 36 aspiring physicists, from an original participant pool of 400 intended majors in engineering and the physical sciences.[11] I selected undergraduates who declared an interest in studying physics, dividing them by their gender and self-identified race/ethnicity into a purposive participant pool (Frankenberg 1993; Trost 1986). I oversampled for underrepresented members, including ten women of color, eight white women, and ten men of color. Data were mainly collected in the form of ethnographic fieldnotes and annual interviews.

Ten self-identified women of color participated in the study: one African American, four Latinas, three Chicanas, and two Filipina Americans. Like all study participants, they participated annually in two-hour, semi-structured, open-ended, audiotaped interviews about their interest in physics, academic performance and satisfaction, educational and career aspirations, sources of support and discouragement, and experiences and observations about gender- or race/ethnicity-related issues in doing physics. I also took fieldnotes on my observations of

9. Bug (2000) labels the highly valued masculinity that is traditionally associated with scientists "cartoonish" because, in many ways, it "stands in opposition to stereotypical masculinity in our society" (p. 237).

10. The university did not consider APAs, as members of a broad racial category, as underrepresented minorities. This classification and the common perception that Asians/Asian Americans were well represented, or overrepresented, on campus obscured the recognition that members of particular Asian subgroups were underserved in physics and other disciplines. See note 3.

11. This study grew out of two larger, NSF-sponsored projects assessing the impact of programmatic, departmental, and institutional reform efforts in undergraduate physics.

students interacting with others in classrooms, study groups, laboratories, and home residences. All students in the sample graduated with bachelor's degrees in physics or a related field, such as engineering physics. When participants left their undergraduate programs, I followed them to their new positions in graduate school, government laboratories, and private industry jobs. Where possible, I conducted follow-up interviews with students' parents, research mentors, and peers for purposes of analytic triangulation (Lawrence-Lightfoot and Davis 1997).

I coded all transcripts and fieldnotes for inductive categories, concepts, and themes (Miles and Huberman 1994). Then I organized codes into thematic matrices and created narrative summaries (Maxwell 1996) to assist in identifying emerging themes. Analysis included construction of within- and across-case matrices to further explore emerging patterns and inchoate themes. Additionally, matrices were used as starting points to identify solid outcome measures for within- and across-student comparisons over time. While I do not directly discuss the male and white participants, their perceptions have critically shaped the analysis by offering comparative, standard accounts in physics and by challenging me to identify which problems generalized to most young aspiring physicists, and which were unique to nonstandard members. Informal interactions I had with all of the participants over the past eight years as a researcher, former graduate student, and former coordinator of an undergraduate physics program further informed my analysis.

Challenges to Scientific Membership and Competence

Most students, regardless of their social and cultural backgrounds, learn early in their careers that ordinary qualities of scientific competence connect strongly to presentations of self. Relevant aspects of one's self-presentation (Goffman 1973) include style and content of speech, air of confidence, posture, type and style of clothing, hair length, skin tone, age, and body shape. Compared to a standard, generic image of the ordinary scientist, students often experience a threat of prejudgment based upon how they look and how they act. All students—and, indeed, all scientists—knowingly or not, find themselves subjected to this standard, but women and minorities experience more vulnerability due to stereotype threat or the stress accompanying the perception that, in their academic performances, they act as representatives of particular social categories (Steele 1997). While women, ethnic minorities, and women of color might display male- and white-associated appearances and practices, high attrition rates among members of these groups, especially within the physical sciences, suggest that more often they choose to leave the field rather than fragment themselves as a means of coping with stereotypes (Seymour and Hewitt 1997; Tobias 1990). Observations of, and narratives by, women of color in my study call attention to the myriad challenges to membership in the scientific community and the details of how achievement of that membership is an ongoing, complex, and embodied cultural process.

Regardless of their actual abilities as measured by exam performances, grade point averages, and research mentor evaluations, women of color participating in the study said they perceived nearly consistent messages—with some rare exceptions—that because they lack the standard appearance of a scientist, they also lack the intellectual competence associated with such an appearance. The following three narratives serve as representations of dozens of collected accounts:

> I've noticed [my peers] in their tone of voice that they take with me . . . They feel the need to explain things that much more because, well, this black person won't get it. I see them doing it with Latino students and doing it to black students. They go into this extra detail: "Do you understand? Do you understand?"—as though my intellect is gonna be different from someone who's Asian or white. (African American junior)

> I think [my classmates] think that I'm a slacker. It just surprises them so much when I tell them what I've done. You know that they have the judgments about people based on their ethnicity . . .

> Like, I'll say "You know, Vlad got an *A*," and they'll say, "Well, yeah, he's Russian." They may not say, "You're dumb!" right back in your face, but their minds still work in that kind of way and you wonder, like, "Well, they think Russians are smart. What do they think about Mexicans? And how is that affecting how they treat *me*?" (Chicana senior)

> One of my graduate student instructors even said he doesn't know how to teach women. He doesn't think they will do well in physics. It's just a blatant statement like that. It's just unfair for the women to just now all of a sudden have this standard, like, "They're not gonna do well anyway, so why try?" You don't have to try anymore, and he's not gonna try to teach you . . . It's just frustrating, for them to always have low expectations of you. And a lot of times you rise to people's expectations, and if it's below where you already are, where do you go with this? And then you have to work even harder to try and bring up their expectations. (Chicana junior)

From these experiences, students see that they are vulnerable to being judged against prevailing societal stereotypes: blacks and women have inferior intellect; Mexicans are lazy. Women of color who persevere in physics, then, assume the additional, invisible, and sometimes draining work of trying to see themselves through the eyes of others in the physics community, and of taking action to disprove stereotypes that call into question their scientific or academic competence.

Despite the pervasive discouragement, these three students, as well as the other women of color in the study, successfully completed bachelor's degree programs in physics or in physics-related fields.[12] They have each gone on to pursue scientific careers either through graduate school, medicine, or industry. What strategies did female minority students report employing to persevere in physics, despite perceptions that they did not readily belong as members in the scientific community? Their narratives suggest that they constructed embodied performances to organize the appearances of scientific membership and scientific competence. Often consciously, but occasionally unaware, they either approximated or manipulated the standard image of the ordinary scientist by using practices that resulted in fragmentation or multiplicity. Below, I briefly describe and analyze each of these strategic practices.

Meeting Challenges through Fragmentation: "Passing"

"Passing" refers to the act of establishing a false social identity through corporeal self-presentation, performance, and management of social interactions. The accomplishment of passing enables the actor to eschew discrimination associated with his or her original (usually marginal) group, and to enjoy, instead, benefits as a member of another (usually dominant) group. However, passing is an inherently fragmenting practice. Because persons who pass in a given context must constantly manage their appearance and behavior in order to appear ordinary to others, they are forced to deny or downplay parts of their cultural and social selves. I found evidence of both the benefits and costs of racial and gendered passing in the present study.

Although some students participating in the study would be more accurately described as having mixed racial or ethnic backgrounds, all ten women of color included in the study self-identified as ethnic minorities upon entering the university. Moreover, eight of them voluntarily participated in the physics department's minority support program at some point in their careers, as students, tutors, and/or instructors. However, not all of them felt the effects of race and ethnicity equally. Specifically, some exercised their ability, by virtue of their lighter skin color, to pass as white. While they did not deliberately misrepresent their ethnicity or race to their peers and instructors, many of them did not actively advertise themselves as persons of color. Nor did they object when others perceived them as white. They had locally meaningful reasons for doing so: their racial passing helped establish their scientific competence. One student explained:

12. "Physics-related majors" include engineering physics and astrophysics.

> I definitely know that if I had been brown-skinned and [given] the typical skewed view that the United States has about Latin America, then it would've been a lot harder. You know, as difficult as women have it in the sciences, white women have it better than women of color, definitely . . . All of a sudden, people would think that I would come from some first-world nation, and even though I'm a woman, it's still higher . . . I have pale skin, people are interested in me until they find out that I'm from Central America. (Latina, one year post-baccalaureate)

A mixed-race senior reported:

> I don't look very Chicana. My dad's English, so I have an English last name, and I have his complexion. I look a lot like him, so usually it doesn't come out that I'm of any other ethnicity. So I haven't had too much trouble there.

As these narratives illustrate, performing whiteness clearly aided these women in their acceptance by the physics community. As long as the first student quoted did not reveal her Central American background, her colleagues remained "interested" in her, and she enjoyed the benefits of their favorable assumptions, which likely included judgments about her cultural enrichment and intelligence. Similarly, passing as white helped the second student avoid what she meaningfully called "trouble." These students have come to understand the rewards of passing as unmarked, ordinary members of the local physics community: it afforded them the benefit of the doubt in establishing their neutrality, objectivity, and authority (Dyer 1997).

Among women of color in the study, those who appeared lighter-skinned, or who were able to pass as white, reported feeling that race or ethnicity constituted far less of an obstacle, if any at all, in gaining membership to the local physics community. In contrast, their darker-skinned counterparts, who could not racially pass, reported a strong sense that their race or ethnicity contributed to their different social treatment by faculty and peers. However, all of the participants stated that gender seemed to matter more than race or ethnicity. Thus, gendered passing became a more-or-less constant preoccupation for most of the women.

Gendered passing capitalizes on the understanding of gender as a social construct within historically and culturally provided boundaries (Butler 1997; Goffman 1977; Kessler and McKenna 1978). In science, the process of gendered passing takes on less lively or shocking qualities than it does in, say, the passing of transsexuals in typical settings of everyday life; nevertheless, comparable challenges arise. Similar to the way that lighter-skinned ethnic minority students may pass more readily into the physics culture, women of color who approximate or manipulate masculine behaviors and appearance may also pass as legitimate scientific community members. For example, an African American student in the study noted:

> All the women I found in the sciences—oh man, it's really sad, actually—are not quote-unquote very feminine . . . The ones that ask a lot of questions and are really out there and being seen seem to be very forceful, have very masculine tendencies. Like I do myself. Like I talk a lot, I'll ask questions in class. I'm loud . . . And I found that the women that ask questions are the exact same way. It's almost like we have become more quote-unquote masculine in order to make it.

Displaying "masculine" tendencies—and thus succeeding, according to this student—includes appearing forceful, loud, and visible by asking a lot of questions (Gibson 2003; Traweek 1988). In contrast, she described women in the physics courses who "did not make it" as "dainty and petite," and as having "soft voices and never ask[ing] questions." In other words, this student understood that local performances of femininity equated to performances of self-exclusion from the physics culture.

Behavior and appearance considered ordinary, or at least culturally appropriate, for females frequently clash with behavior and appearance considered ordinary for scientists. As the two narratives shared below by study participant Elena Ramírez will demonstrate, women who strive for membership in science contend with these persistent challenges; they must contend with the contradictory social orders of science and femaleness (Bug 2000; Ginorio 2001).

Product and Process Strategies of Gendered Passing: Elena Ramírez

Elena Ramírez's narratives demonstrate two typical challenges attendant to living as a woman scientist. Below, I analyze how Elena's experiences encompass both product (body-styling and performance) and process (active bodily marking) forms of gendered passing. Elena is a middle-class Latina who immigrated to the United States as a teenager for the express purpose of studying astrophysics. Her goal emanated from a childhood curiosity about the stars and sky, developed on nightly walks with her mother in their native country. I would describe Elena as uncommonly attractive: lithe body; fair skin; shoulder-length, wavy, auburn hair; and a soft, lilting voice. Her usual feminine dress and demeanor highlight the contradictory state of the female body in science.

Masking the Female Body. In an interview with me while she was a senior, Elena recalled:

> One evening wearing a mini-skirt, I realized I had lab . . . That evening I went out and bought pants, because there was no way I was walking into a lab with 13 males, who have said sexually derogatory things to me before. I just feel like, "Okay, you cannot be attractive *and* think."

Elena's comment illustrates the hard realization that her femininity, or sexiness—as suggested by the contours of her skirt—was antithetical to her identity as a scientist. By purchasing and wearing pants instead of a skirt to the lab, Elena attempted to make herself appear more "masculine," or at least more "androgynous," and thus purchased (literally) her credibility as a scientist. She virtually changed her body product. However, her credibility came at more than an economic cost: she temporarily had to fragment herself by diminishing or erasing a highly prized (in some circles) gendered identity in order to emphasize her scientist identity. Arguably, though, she willfully and strategically chose fragmentation because in the context of physics, it enabled her to pass and continue her quest to be seen as an ordinary student in her astrophysics course (see also Ong 2001).

Furthermore, Elena's comments indicate that she was aware that passing was a performance and that her performance was temporary and for the specific purpose of not being singled out (again) by her classmates. By sarcastically remarking that one cannot "be attractive *and* think," Elena parodies herself (and her classmates) and casts the scientific culture as intolerant of beauty and intelligence within a single body. She knows that wearing a skirt would not alter her scientific understanding or ability in the laboratory. But she also knows that her male peers use sexually derogatory remarks to maintain rigid boundaries in the lab. Consequently, she chose to consciously, and temporarily, fracture identities as a means of achieving her goal of scientific membership.[13]

Performing Masculine Speech. In a second example, Elena reported that she selectively demonstrated scientific competence through a common process strategy of performing masculine speech:

> What I learned from my male classmates is, don't even say, "This is what I thought." Say, "This is the way it is." (*Interviewer: Did you learn to speak like that?*) Fortunately or unfortunately, I learned to speak some of it. Because for me, it was a survival mechanism. I see the older women in the field,

13. The presentation of my analysis of Elena's skirt at the "Careers of Women in Science: Issues of Power and Control" Conference at Berkeley, CA (May 2001) has elicited some controversy. One established physicist from a prominent linear accelerator laboratory stated that when she was in graduate school mini-skirts were "in" and she wore them to the lab every day without any problems from her male colleagues. Another participant said that wearing a skirt was "provocative" and, therefore, a woman who wore a skirt was inviting harassment. A biologist pointed out how my analysis throws into high relief the significance of sexualized bodies in the scientific laboratory and the extra work that women often do to mask their femaleness, such as gaining significant weight and dressing to deemphasize breast and hip curves. All of these interesting comments about whether or not a skirt should "matter," I believe, speak to the sociohistorical context of the sexualized female body and its stark, contradictory presence in the supposedly cold, neutral (i.e., masculine) territory of a physics laboratory.

> and I see they've appropriated [the language] as their own. And I'm against that because I think that goes against my very nature as a female. I don't feel that . . . The words that indicate you're not confident—*I think, I am not sure, but*—That's such a part of scientific thought, to have some space, but that's not part of the male ego. But it's very much a part of how I think.

As Elena's comments suggest, in the physics community, patterns of uncertain speech are culturally unacceptable. The local culture promotes and rewards interactional displays of self-assurance. Thus, feigning confidence widely serves as an effective strategy for appearing competent. Although most students (and scientists) utilize this method, traditional outsiders often have more difficulty learning the nuances and subtleties involved with such a strategy.

Elena's reactions also display a critical awareness of the scripts of the local academic physics community. She has developed a healthy critique of this culture—as one that punishes performances of femininity—but she also continues to cope with it without fully sacrificing the gendered facet of her fragmented self. Elena's final remark indicates that she has maintained habits of thought and speech more in the spirit of serious science than in the typically arrogant male-speak that dominates physics culture (Gibson 2003). The scientific method anchors itself in uncertainty—such as the "uncertainty principle"—and good scientists find it wise to maintain a level of skepticism about everything they think they know about the physical world.[14] It is ironic that Elena feels constrained scientifically by her peers even though *she*, more than anyone, has faithfully employed the scientific method. In later years, during her master's program in astrophysics, Elena endured similar frustrations, but concurrently elaborated her sophisticated critique of the gendered and ethnic/raced aspects of the physics community. Sharing her views with other women and minorities helped her stay in science. Now, as a first-year Ph.D. student in her new subfield of atomic physics, she has found a more supportive environment among her peers and co-advisors.

Elena Ramírez's story highlights the enormous thought and energy that traditional outsiders often invest in belonging, or in arranging their bodies and voices to appear to belong. My study found further evidence of multiple forms of gendered passing beyond trouser-wearing and ways of speaking. For example, women of color, consciously or not, used strategies that included weight gain, wearing loose clothing, sporting short haircuts, minimizing make-up, and avoiding female-associated wardrobe colors such as pastels. They also spent hours preparing to preempt others' potential doubt that might be associated with their gender or race/ethnicity. These strategies were successful because they helped women of color appear scientifically competent, but they came at the cost of time and effort that could have been invested in learning and doing physics. Moreover, they involve the profound cost of denying or diminishing other facets of their selves.

Confronting Challenges through Multiplicity

> The fact that I don't have things in common with the guys in the [research] group, is that because I'm a woman, or is that because I'm a minority? Or is that because I'm both? I can't really tell. Or is that because I'm poor, that I never had a computer to play with, or Atari? I can't really separate the three. I'm all three.
>
> —(Latina fifth-year graduate student)

The previous sections treated race, ethnicity, and gender as largely separate phenomena because existing analytic frameworks tend to categorize discrimination as solely race-based or gender-based (Collins 1986; Crenshaw 1993; Hamilton 2004; Malcolm, Hall, and Brown 1976), and because students tend to report those particular experiences as shaped by a single, overriding factor. However, women of color like the Latina student quoted above embody the intersection of multiple marginalized categories, among them race, ethnicity, gender, nation of

14. Thanks to Colin McCormick and Jean Lave for their assistance in developing this analysis.

origin, and class. This intersectional experience, understood as “greater than the sum of racism and sexism,” has only recently gained attention in the spheres of law, academia, and the popular press (Wei 1996:771; see also Collins 1986; Crenshaw 1992; Hamilton 2004).

By focusing on practices of multiplicity specific to membership in a scientific community, this article aims to contribute to the growing literature in intersectionality theory. The following accounts of stereotype manipulation and demonstrations of superiority show how three women of color actively managed their marginality to achieve multiplicity—the balance of gendered, racial/ethnic, and scientific identities within the local physics community. I also discuss the challenges, rewards, risks, and costs that accompany their efforts at multiplicity.

Stereotype Manipulation: Kendra Russell in “Character”

Multiplicity may emerge in the form of exaggerated and hyper-visible cultural performances that deliberately manipulate stereotypes (Phelan 1993). Kendra Russell offers an exceptional illustration of this strategy. As a sophomore, Kendra offered an account of the “little things” that kept her from feeling like she belonged in the physics major:

> It’s the little things that get you, like walking into a classroom and seeing no one there but whites and Asians. Maybe this isn’t where I’m supposed to be at. Or you walk in and it’s all men, there’s one female. What’s wrong with her? It’s really subliminal, and it’s not something I think the university does, but the experience is the same. There’s this real message that you’re not supposed to be here. Like, I get a serious message saying, “You’re not supposed to be in physics.”

During this initial interview, Kendra consistently voiced concern about how her position as both a female and a racial minority created cultural dissonance and led to “serious” messages that she did not belong. Throughout the remaining two years of her undergraduate career, however, her concern with seamlessly fitting in dissipated as she found creative ways to secure membership in the physics community.

In public, Kendra generally identified herself as African American or black. But in our first private interview, she offered a more complicated picture. Gesturing to her Asian eyes, then her cropped Afro, she explained:

> My [now deceased] mother was born in Korea. And she was a daughter of a Korean and an American G.I., and so, I’m very, very mixed. On my dad’s side, he’s half black, half Native American. So it’s not like I’m all black. But my skin color is dark, hence, I’m gonna be [labeled as] black . . . I have to actually *work* to get my hair this curly. It doesn’t naturally go like this. I actually have to go and get it curled this tight.

Kendra worked to achieve blackness through deliberate self-presentation and performed the role as an African American female through her deliberate self-stylization, including her choice of dressing in Kente cloth, her hairstyle, and even her speech and mannerisms (Butler 1990; Goffman 1976). Over two and a half years following this initial interview, I observed Kendra in interactions with peers and instructors in classrooms, at formal departmental gatherings, and informal homework sessions, during which she increasingly used her racialized and gendered body as a resource to persevere and succeed in her major (Collins 1986). Whenever and wherever she could employ it to her advantage, Kendra linguistically and experientially code-switched from her own middle-class persona to a persona more like that of “those loud black girls” (Evans cited in Fordham 1993:3).

In other words, Kendra reinvented herself as a character. Similar to the Mesquaki youth who performed the “noble, silent Indian” role as an act of resistance in Douglas E. Foley’s (1996) analysis of a mixed Mesquaki and white classroom, Kendra intentionally assumed a strategic, situational character—the “loud black girl”—as an act of resistance. However, unlike the Mesquaki students, whose ethnic identity construction via their discursive “silent rebellion" often led to academic underachievement or failure (Foley 1996:87), Kendra created and maintained mutually strong academic and cultural identities (Ong 2001).

To achieve this self-as-character, Kendra increased her visibility through a calculated effort to enhance her blackness; in doing so, she outwardly resisted compliance with the appearance of the standard physicist. Nevertheless, her strategy enabled her to be accepted, not shunned, by others in her department. As she increasingly assumed the features of the "loud black girl," she embodied for her faculty and fellow students a recognizable and comprehensible stereotype. Her colleagues' abilities to "make sense" of Kendra culturally, combined with her appearance as visual anomaly and diversion in the department (what Foucault might call "spectacle"), further combined with her status as the solitary black female in her department, rendered her less of a threat to the local membership boundaries in physics. In other words, she could be a point of entertainment or altruism without toppling the existing order. Simultaneously, Kendra strategically used her character identity to accrue credibility as a scientist, since she aligned her loudness and visibility with talking about physics and displaying her knowledge to faculty and peers in the department (Ong 2001). She began approaching professors on campus, asking questions during large lectures, debating fellow students during discussion sections, joining peer study groups, and attending physics teas where only a handful of undergraduates usually feel welcome. In fact, by her fifth and final year, professors with whom she had never had a class were sending her applications and encouraging her to apply to various graduate schools and summer research programs.

One could argue that through her performances, Kendra ultimately harmed herself as well as other African American women by perpetuating a negative stereotype. In doing so, she sacrificed opportunities to disrupt prevailing attitudes toward blacks as well as to practice resistance against oppressive dominant cultural practices (Byng 1998; Gagné and Tewksbury 1998; Hollander 2002; McFarland 2004; Schulz 1998; Stombler and Padavic 1997). My assessment, however, is somewhat more sanguine. I believe that Kendra successfully achieved ordinariness in three cultural and social realms through a set of extraordinary but situationally appropriate practices. She made the journey from passive concern about fitting seamlessly into the predominantly white, male physics world to an active embrace of multiplicity that she could use strategically to achieve her objective: to be a black female physicist.

Adopting Patricia Hill Collins's (1986) perspective of the "outsider within," one could further argue that Kendra chose to "value aspects of [strong] Afro-American womanhood," and, therefore, located herself among those able to "embrace their assertiveness, to value their sassiness, and to continue to use these qualities to survive in and transcend the harsh environments" (pp. S17–S18). In doing so, Kendra Russell represents a rare breed of students who have found creative ways to use their appearances as women of color to their advantage and simultaneously reconcile their often-conflicting academic, gender, and ethnic identities.

At the time of this writing, Kendra has entered the final stages of her doctoral program in business and science, and has managed to found (and later sell) her own candle-making company. To this day, she still considers herself first and foremost a physicist, since both the thesis and the candle work have forced her to "consider the chemical and physical properties" of her materials. Even with her busy schedule, she makes time to serve as a student government leader and recruiter of underrepresented students to her graduate school. She has remained active in promoting women and minorities because of her own undergraduate experiences of marginalization: "When you're black in a black community or female at an all-female college, it doesn't really matter. But when being a black woman is the very thing that separates you, your race and gender become paramount."

Performances of Superiority

In sociologist Willie Pearson's study (2005) of the lives and careers of black Ph.D. chemists, respondents reported that superior work overcame discrimination in their institutions.

My study supports this finding. Students whose work received positive recognition through high grades, fellowships, or inclusion on a professor's research team felt less socially vulnerable in their physics communities than those whose work did not. Performances of scientific superiority may provide traditional outsiders with opportunities to exercise multiplicity, as opposed to the all-too-frequent practice of fragmentation. Below, I briefly relay two instances in which these performances have occurred.

The Public Success of Amy Lauren. Amy Lauren provides another account of performing superiority. Amy, when a first-year undergraduate, found herself enrolled as the only female and minority in her introductory honors physics course. A petite, dark-haired, dark-eyed Chicana with an athletic build and perennial smile, Amy represented her family as a first-generation college student. Her parents chose to home-school her through high school because public schooling interfered with her training as an aspiring professional tennis player. She said she built strong relationships with the teachers connected with her home-school program, particularly in physics and chemistry, but she missed out on the common messages pervasive in high school that women or minorities lack the intellectual competence to succeed in science (Margolis and Fisher 2002).

Unbeknownst to her at the time of her first undergraduate physics course, Amy's male peers regularly referred to her—among other unprintable names—as the "big-breasted sorority chick" and avoided working with her in or out of class. Extramural study groups are important in fields such as physics, because the dynamic of group discussion integrally facilitates learning and complex problem-solving. In those early weeks of her honors class, Amy's isolation negatively affected her sense of her own competence, especially regarding where she stood in relation to others' understanding of the material. When she later reflected on the class, she said:

> It was a little intimidating because I was the only woman and . . . before the first midterm, I had this complex that I was totally overwhelmed, that all these people were way smarter than me, that they knew everything a hundred percent better than me because the homework was so difficult. I didn't realize it was difficult for everyone else . . . It was just, after the midterm—I got the only A-plus—when I realized that they weren't all geniuses, that I could compete with them.

Amy reported that people in her class began sharing and comparing their grades, and "I wasn't afraid to tell my score." Soon after, she received an invitation to join a classmate's study group. A year later, a woman of color colleague who had learned of others' derision of and nicknames for Amy told me that she actively reinforced her friend's competence by advertising that Amy had won a coveted multi-year research award. Following these events, and for the rest of her undergraduate career, Amy received numerous invitations to participate in study groups and other gatherings held by her fellow physics majors.

Amy's account echoes Judith Butler's (1997) claims about the performative quality of gender and its attendant transformative powers. For Amy, confidence ultimately came with performance—the performance of both her competence and her status as an elite student. She used demonstrations of superiority to appear more publicly involved in her roles as both a tutor and an undergraduate teaching assistant with the physics department's minority retention program.

Following her graduation from college, Amy mentioned that she felt fortunate to have a nontraditional appearance, particularly as a female: "One girl in a sea of guys, you stand out. I think, if anything, being a girl has been to my advantage in this day and age. I feel lucky . . . I think there's a lot more opportunities out there for me, like money, fellowship-wise, things like that." Amy's comments illustrate how women of color do not necessarily experience or react to their hybrid identities in science the same way: while many other women and minorities strive for ordinariness in the scientific context by not being noticed, Amy found, in retrospect, that standing out—corporeally as well as academically—proved to be an advantage.

As Pearson's (2005) study found, the public performance and recognition of superior work can aid in overriding others' preconceived notions about the scientific competence of students of color, and can aid in the reconciliation of seemingly contradictory identities. Amy's narrative suggests that performances and actualization of superior achievement are mutually reinforcing, and that these actions can promote practices of multiplicity. At the time of this writing, Amy's success continues as she completes her second year in a top-ranked graduate physics program.

Tory Baines: The Cost of Multiplicity. Unfortunately, graduate school does not always offer a safe environment for practicing multiplicity. Nationally, between 1997 and 2003, women of color, both citizens and permanent residents, made up less than one percent, on average, of all Ph.D. recipients in physics each year (Ivie and Ray 2005). The narrative of Tory Baines, one of the more advanced participants in the study, illustrates possible negative outcomes of striving for multiplicity at the Ph.D. level.

Tory is tall, sturdy, and light-skinned with short, dyed-red hair and thick, cat-eyed glasses. She self-identifies as Hispanic or Chicana, though her ancestry consists of a mixture of English, Spanish, and Mexican. For the eight years I have known her, she has been active in programs for women and minorities in physics, first as an undergraduate beneficiary of women's groups and minority support services, and later as a teacher, mentor, and coordinator. Tory has worked hard to maintain an enviable balance of school, laboratory work, and widely ranging social activities, including hiking, cooking, and spending time with her husband, a fellow graduate student. Four years ago, Tory graduated with a bachelor's degree in physics from a top research university and immediately entered a prestigious Ph.D. program. Currently, she serves as the senior-most graduate student researcher on an optics project that encompasses two laboratories and has seven white male graduate students, an Asian male postdoctoral researcher, and their white male advisor.

Tory's feelings of confidence and competence as an experimental physicist have waxed and waned throughout her graduate career. She spent her first year learning not only how to meet the tremendous demands of a new subfield, but also how to present herself as a promising member to her new community. While nearly half the females in her cohort quit the Ph.D. program within the first two years, Tory, one of the two minority women, resolved to finish. Much to her surprise, she scored in the top quarter of her class on the qualifying exam during her second year. In her fourth year, she proudly gave me a tour of her laboratory and announced that she and her research partner had constructed a fully operational experiment that recently had begun generating data. Sporting jeans and a baggy, brown, cable-knit sweater, Tory explained how the tangle of foil-covered cylinders, suspended hoses and wires, precision lenses, and powerful lasers worked together to produce data. She also reported that her confidence in her abilities had begun to grow concurrently with the progress of her research. She did not "feel stupid all the time," she said, and she learned that she performed some tasks, like fixing the experiment, rather well. Two weeks earlier, their experiment had severely broken down, but Tory efficiently addressed, analyzed, and corrected the problems. According to her, this demonstration earned her the respect of the postdoctoral fellow whom she felt before had treated her with condescension. She then used the opportunity to "educate" him about the myriad, hidden complexities a woman may experience in the laboratory.

Three months after my guided lab tour, Tory met me for a follow-up interview. Instead of her usual unflattering lab clothing, she was dressed in a light pink twin set. When I mentioned I had never before seen her in pink, only in black, browns, and grays, she answered that she recently felt "inspired" by an article she had read in the *L.A. Times* (Cole 2004) that hailed a "cultural shift" in physics. The article featured a group of young physicists of various ethnicities, including four females, who "bucked the trend" of trying to approximate scientific ordinariness, or the "pale and male" uni-dimensionality of studying physics (p. E28). The author described physicists as "surfer dudes, sky divers, rock climbers" and featured one prominent female physics professor who wore makeup and jewelry to work (p. E28). Although the article presented an inaccurate and overly optimistic view of growing diversity in physics, it emboldened Tory to embrace multiplicity and make claims to femininity at work. "I like pink," she said. "I own a lot of it in my closet. I just didn't wear it to work." Now, she declared, she had begun to wear pink all the time.

The superior work she recently had produced in the laboratory had afforded Tory space, albeit an ultimately limited amount of space, to balance performances of female and scientist identities. Less than a month after her pink-wearing began, she contacted me to report that one of her research colleagues had posted a pin-up of a young, scantily clad white woman in one of their communal offices. Five graduate students actively shared the office, and no one else had protested the décor. For Tory, though, the pin-up created what she called a "hostile work environment" because it made salient her own body and self as sexual objects. This stood in the way of becoming a full peer to her colleagues. Trying to get the picture removed, Tory appealed to her research partner, but soon found herself embroiled in a lengthy discussion with him and the postdoctoral fellow about freedom of expression versus censorship. A few days later, frustrated, suffering from anxiety attacks, and thinking of quitting, Tory complained to their research mentor about the offensive picture. The advisor immediately removed it, without discussing the matter further with other laboratory members. Following this action, however, the other group members avoided Tory. "I feel really on the outside," Tory lamented. Cynically, and sadly, she added, "I've been keeping with the party line, trying to convince myself that our group was open to women and these types of things would never happen. And then they did. I feel because I'm around, our group is riding on this message, 'This [laboratory] is a great place for women to work' . . . but it isn't."

Could it be purely coincidental that a man with whom Tory had worked closely for two years decided to post the pin-up just a few weeks after Tory brought the pink clothes out of the closet? Perhaps. But in Tory's eyes, the events were clearly connected. If her suspicions are correct, the pin-up was a "gendered expression of power" (Uggen and Blackstone 2004:64) of sexual harassment that was, at least in part, intended to punish and discipline Tory's outward expressions of femininity and her new claims to multiplicity (see also Chetkovich 1997; Dellinger and Williams 2002). Arguably, the picture served to reclaim the physics environment as a white, male (and heterosexual) space, and to send a message that Tory did not fully belong. The passivity of Tory's other colleagues with respect to the pictures, along with their subsequent avoidance, confirmed that this was a widely held viewpoint.

Conclusion

Being "ordinary" simultaneously in the realms of gender, race/ethnicity, and professional work involves a complex social choreography of all persons in all disciplines, occupations, and professions. The achievement is especially dramatic for women of color in predominantly male and white fields like physics. Minority women's experience at the intersection of gender, race, ethnicity, nation of origin, and class can amount to much more than "the sum of racism and sexism" (Wei 1996:771; see also Collins 1986; Crenshaw 1993; Hamilton 2004; Malcolm et al. 1976). The violations they commit by occupying and emerging from intersections of multiple and contradictory scripts often produce challenges and costs in terms of cultural and psychic fragmentation. Occasionally, however, minority women have the opportunity to practice positive aspects of multiplicity and to work toward transformation of a community's cultural practices (Lugones 1994; Star 1991). The experiences and perspectives reported by young women of color in this study further suggest that until such transformation occurs fragmentation can be the most favorable option and multiplicity can be detrimental in many instances.

This study calls much-needed attention to a largely invisible group of women of color while yielding sharp images of the strictly guarded sociocultural boundaries around membership in the science community. Their narratives teach us that the body matters, even in a community whose members operate as if physics were "a culture of no culture" (Traweek 1988:162). Social identities are inscribed on the body (Alcoff 2000; Goffman 1977). People cannot check their bodies at the door when they enter a classroom or laboratory. Moreover, the body—as product and process (Balsamo 1996)—virtually signifies who complies with and who violates the historically standard cultural criteria of scientific competence and membership. As such, minority women's bodies are typically daunting contradictions in physics.

This article also has highlighted a culturally performative dimension of science work that goes far beyond "in-the-head" intelligence and social and political networking (Latour 1987; Latour and Woolgar 1986). For young women of color in physics, displays of "ordinary" womanhood and racial/ethnic identities are not readily consistent with displays of their emergent scientist identities. If they persevere in the field, then, they must concede to time- and thought-consuming work on and through their bodies to achieve, approximate, or purposefully reject ordinariness in physics. The real and perceived costs and consequences of such embodied social practices often discourage them from pursuing physics in higher education.

We should not conclude, however, that it is necessary for women and minorities to employ racial or gendered passing, stereotype manipulation, and/or demonstrations of superiority in order to succeed in science. Prescriptions for success and change should not necessarily be written at the individual level. Far-reaching institutional change is in order. Because of their sociohistorical location at the junction of three realms, the students described in this article used ultimately costly and imperfect solutions to persevere in physics. Their experiences, leading to fragmentation and multiplicity, strongly suggest that scientific communities need structural and cultural reform so women and persons of color will not need such tactics. Schools and departments interested in diversifying membership in the science community must radically change structural, institutional, and interactional facets of that community. I suggest four steps in this direction:

(1) Reform Hiring and Recruiting Policies. Being the only woman or racial/ethnic minority, or even one among a few, often creates a sense of non-ordinariness—of not belonging and of feeling incompetent—which demands that students devote time and energy to socially performative strategies that will enable them to pursue their chosen field. Academic departments should change hiring and recruiting policies so as to build a "critical mass" of women and minorities at the undergraduate, graduate, and faculty levels. Studies (e.g., Fox 1998; Sonnert 1995) show that a critical mass in a discipline can help attract minority members, lend a sense of legitimate membership, provide a ready-made base of mentors and role models, and change qualitatively the experiences of underrepresented members.

(2) Sustain Support Structures. Until the ordinariness of women and minorities in the sciences is fully realized in practice, the onus will be on these individuals to conform to the appearance and behavior norms of the white, male scientific communities. Achieving acceptance often comes at too high a price, demanding identity fragmentation. As a consequence, too many nonstandard members choose to leave the field. To retain them, departments should provide opportunities for multiplicity by structurally and financially supporting these members' participation in local associations, such as formal groups for women or minorities (Fox 1998; Solórzano, Ceja, and Yosso 2000). Ensuring a cultural environment that allows underrepresented members to associate with and support one another is nearly as important as building a critical mass (Etzkowitz et al. 2000). Furthermore, departments should encourage attendance at national conferences as well as at events sponsored by national organizations for underrepresented members, such as the American Physical Society's Committee on the Status of Women in Physics, the National Conference of Black Physics Students, and the Society for Advancement of Chicanos and Native Americans in Science (Ong 2004). Rather

than operate as if they were "cultures of no culture," departments that acknowledge the social and cultural aspects of doing science can better promote women and minorities.

(3) Change Traditional Patterns of Interaction within the Community. As this study shows, it is often the "little things" that make minority women feel that they do not legitimately belong in the physics field. This article has noted several subtle and not-so-subtle practices of social exclusion and displays of doubt that affect minority scientists' opportunities as well as their self perceptions. Professors, graduate student instructors, and tutors should set a tone of "zero tolerance" for discriminatory behaviors in their classrooms or informal departmental settings (Whitten et al. 2004). They should be made aware of subtle cues that often discourage women and minorities from feeling like they belong (Georgi 2000; Valian 2000). The Harvard University Task Force on Women in Science and Engineering (2005), for example, has recommended required pedagogical training for doctoral students that would include a component on gender bias. Furthermore, chairs and other community leaders should be knowledgeable about reports on science career trajectories and social science research to counter common arguments that diversification is tantamount to lowering professional standards.

(4) Create a More Hospitable Environment for All Students. The United States' continued security and world scientific leadership depends heavily upon its ability to recruit and retain in science the best and brightest students among its domestic population. Especially as the demographic balance of college attendees begins to shift toward female and non-white populations, the scientific community ought to take serious stock of the pedagogical, social, and cultural practices that attract or discourage potential science majors. Simply assigning value to the processes of teaching and learning can have a tremendous effect. Departments that generally have greater success in retaining more students as majors generally pay attention to the quality of undergraduate education, have a diverse faculty who genuinely care about the well being of their students, and hold periodic social events that appeal to all students (Whitten et al. 2003). Departments that recruit and retain top students will inevitably yield more women and underrepresented minorities.

The suggestions above are not new to physics, or to science education. However, the analysis I offer provides a unique impetus for reform in the scientific community because it introduces a lens with which to view and critique the standardized and often invisible sociocultural practices required to become an ordinary member of a scientific culture. With greater structural and interactional support in their science communities, women of color could take the enormous amount of time and energy they expend on survival strategies and invest them, instead, in productive scientific problem-solving.

References

Alcoff, Linda M. 2000. "Who's Afraid of Identity Politics?" Pp. 321–44 in *Reclaiming Identity: Realist Theory and the Predicament of Postmodernism*, edited by Paula L. Moya and Michael R. Hames-García. Berkeley: University of California Press.

Bailyn, Lotte and Rhoda Rapoport. 1998. "Moving Organizations toward Gender Equity: A Cautionary Tale." *DSpace*. Retrieved February 6, 2005 (https://dspace.mit.edu/bitstream/1721.1/2714/1/SWP-4021-40966830.pdf).

Balsamo, Anne. 1996. *Technologies of the Gendered Body: Reading Cyborg Women*. Durham, NC: Duke University Press.

Barber, Leslie A. 1995. "U.S. Women in Science and Engineering, 1960–1990: Progress toward Equity?" *Journal of Higher Education* 66:213–34.

Broad, William J. 2004. "United States Starting to Lose Dominance in the Sciences." *New York Times*, May 3, pp. A1, A19.

Brodkin, Karen. 1998. *How Jews Became White Folks and What It Says about Race in America.* New Brunswick, NJ: Rutgers University Press.

Budil, Kimberly S., et al. Forthcoming. "Women in Physics in the United States: A Progress Report." In *The Proceedings of the 2nd IUPAP International Conference on Women in Physics, Rio de Janeiro, May 2005*, edited by Beverly K. Hartline and Ariel Michelman-Ribeiro. Melville, NY: American Institute of Physics.

Bug, Amy. 2000. "Gender and Physical Science: A Hard Look at a Hard Science." Pp. 221–44 in *Women Succeeding in the Sciences: Theories and Practices across Disciplines*, edited by Jody Bart. West Lafayette, IN: Purdue University Press.

Butler, Judith. 1990. *Gender Trouble: Feminism and the Subversion of Identity*. New York: Routledge.

———. 1997. *Excitable Speech: A Politics of the Performative.* New York: Routledge.

Byng, Michelle D. 1998. "Mediating Discrimination: Resisting Oppression among African-American Muslim Women." *Social Problems* 45:473–87.

Chetkovich, Carol. 1997. *Real Heat: Gender and Race in the Urban Fire Service.* New Brunswick, NJ: Rutgers University Press.

Clark, Casey, Ileana Howard, Sarah E. Lazare, and Doreen A. Weinberger 2000. "A Peer Mentoring Program for Underrepresented Students in the Sciences." Pp. 149–67 in *Women Succeeding in the Sciences: Theories and Practices across Disciplines*, edited by Jody Bart. West Lafayette, IN: Purdue University Press.

Clewell, Beatriz and Patricia B. Campbell 2002. "Taking Stock: Where We've Been, Where We Are, Where We're Going." *Journal of Women and Minorities in Science and Engineering* 8:255–84.

Cole, K. C. 2004. "A Quantum Leap." *L.A. Times*, April 11, pp. E1, 28–29. Retrieved April 11, 2004 (http://www.latimes.com/features/lifestyle/la-ca-cole11apr11,1,1110866.story?coll=la-headlines-lifestyle).

Collins, Patricia Hill. 1986. "Learning from the Outsider within: The Sociological Significance of Black Feminist Thought." *Social Problems* 33:S14–S32.

Correll, Shelley J. 2004. "Constraints into Preferences: Gender, Status, and Emerging Career Aspirations." *American Sociological Review* 69:93–113.

Crenshaw, Kimberlé. 1993. "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory, and Antiracist Politics." Pp. 383–95 in *Feminist Legal Theory: Foundations*, edited by D. Kelly Weisberg. Philadelphia: Temple University Press.

Dellinger, Kirsten and Christine L. Williams. 2002. "The Locker Room and the Dorm Room: Workplace Norms and the Boundaries of Sexual Harassment in Magazine Editing." *Social Problems* 49:242–57.

Dominguez, Virginia. 1986. *White by Definition: Social Classification in Creole Louisiana.* Piscataway, NJ: Rutgers University Press.

Dyer, Richard. 1997. *White.* London: Routledge.

Eisenhart, Margaret and Elizabeth Finkel. 1998. *Women's Science: Learning and Succeeding from the Margins.* Chicago: The University of Chicago Press.

Etzkowitz, Henry, Carol Kemelgor, and Brian Uzzi. 2000. *Athena Unbound: The Advancement of Women in Science and Technology.* Cambridge: Cambridge University Press.

Fausto-Sterling, Anne and Linda English. 1986. "Women and Minorities in Science: An Interdisciplinary Course." *Radical Teacher* 30:16–20.

Foley, Douglas E. 1996. "The Silent Indian as a Cultural Production." Pp. 79–91 in *The Cultural Production of the Educated Person*, edited by Bradley A. Levinson, Douglas E. Foley, and Dorothy C. Holland. Albany: State University of New York Press.

Fordham, Signithia. 1993. "'Those Loud Black Girls': (Black) Women, Silence, and Gender 'Passing' in the Academy." *Anthropology and Education Quarterly* 24:3–32.

Fox, Mary Frank. 1998. "Women in Science and Engineering: Theory, Practice, and Policy in Programs." *Signs* 24:201–23.

Frankenberg, Ruth. 1993. *White Women, Race Matters: The Social Construction of Whiteness*. London: Routledge.

Fullilove, Robert E. 1987. *Images of Science: Factors Affecting the Choice of Science as a Career.* Washington, DC: Office of Technology Assessment Contractor Report.

Gagné, Patricia and Richard Tewksbury. 1998. "Conformity Pressures and Gender Resistance among Transgendered Individuals." *Social Problems* 45:81–101.

Gándara, Patricia. 1995. *Over the Ivy Walls: The Educational Mobility of Low-Income Chicanos.* Albany: State University of New York Press.

Garfinkel, Harold. 1967. *Studies in Ethnomethodology.* Englewood Cliffs, NJ: Prentice Hall.

Georgi, Howard. 2000. "Is There an Unconscious Discrimination against Women in Science?" *APS News Online.* College Park, MD: American Physical Society. Retrieved July 5, 2004 (http://schwinger.harvard.edu/~georgi/women/backpage.htm).

Gibson, J. Murray. 2003. "Arrogance: A Dangerous Weapon of the Trade?" *Physics Today*, February 23, p. 54. Retrieved May 19, 2004 (http://www.physicstoday.org/pt/vol-56/iss-2/p54.html).

Gieryn, Thomas F. 1983. "Boundary-work and the Demarcation of Science from Non-science: Strains and Interests in Professional Ideologies of Scientists." *American Sociological Review* 48:781–95.

Ginorio, Angela B. 2001. "Proud to be an Oxymoron!: From Schizophrenic to (Un)disciplined Practice." Pp. 14–21 in *Feminist Science Studies: A New Generation*, edited by Maralee Mayberry, Banu Subramaniam, and Lisa H. Weasel. New York: Routledge.

Goffman, Erving. 1973 [1959]. *The Presentation of Self in Everyday Life.* Woodstock, NY: Overlook Press.

———. 1976. *Gender Advertisements.* Washington, DC: Society for the Anthropology of Visual Communication.

———. 1977. "The Arrangement between the Sexes." *Theory and Society* 4:301–31.

Grosz, Elizabeth. 1994. *Volatile Bodies: Toward a Corporeal Feminism.* Bloomington: Indiana University Press.

Hamilton, Kendra. 2004. "Faculty Science Positions Continue to Elude Women of Color." *Black Issues in Higher Education* 21(3): 36–39.

Hanson, Sandra L., Maryellen Schaub, and David P. Baker. 1996. "Gender Stratification in the Science Pipeline: A Comparative Analysis of Seven Countries." *Gender and Society* 10:271–90.

Haraway, Donna J. 1991. *Simians, Cyborgs, and Women: The Reinvention of Nature*. New York: Routledge.

Harding, Sandra. 1991. *Whose Science? Whose Knowledge?: Thinking from Women's Lives.* Ithaca, NY: Cornell University Press.

Harvard University Task Force on Women in Science and Engineering. 2005. *Report from the Task Force on Women in Science and Engineering: Executive Summary.* Retrieved June 17, 2005 (http://www.news.harvard.edu/gazette/daily/2005/05/wise_summary.pdf).

Heller, Patricia and Mark Hollabaugh. 1992. "Teaching Problem Solving through Cooperative Grouping. Part 2: Designing Problems and Structuring Groups." *American Journal of Physics* 60:637–44.

Hess, David J. 1997. *Science Studies: An Advanced Introduction.* New York: New York University Press.

Hollander, Jocelyn A. 2002. "Resisting Vulnerability: The Social Reconstruction of Gender in Interaction." *Social Problems* 49:474–96.

Hopkins, Nancy. 2002. "A Study on the Status of Women Faculty in Science at MIT: A Progress Report." Presented in the *Gender and Science* speaker series, Wellesley College, Wellesley, MA, November 18.

Hubbard, Amy. 2005. Posting to Sociologists for Women in Society listserv, January 18. Retrieved January 18, 2005 (http://listserv.uconn.edu/sws-l.html).

Hunter, Margaret. 2002. "'If You're Light You're Alright': Light Skin Color as Social Capital for Women of Color." *Gender and Society* 16:175–93.

Ivie, Rachel and Kim Nies Ray. 2005. *Women in Physics and Astronomy, 2005.* AIP Publication Number R-430.02. College Park, MD: American Institute of Physics.

Ivie, Rachel and Katie Stowe. 2000. *Women in Physics, 2000.* AIP Publication Number R-430. College Park, MD: American Institute of Physics.

Jackson, Shirley A. 2004. "Sustaining Our National Capacity for Innovation." Presented at the Harvard University Kennedy School of Government, Cambridge, MA, May 3.

Kanter, Rosabeth M. 1977. "Some Effects of Proportions on Group Life: Skewed Sex Ratios and Responses to Token Women." *American Journal of Sociology* 82:965–90.

Kessler, Suzanne J. and Wendy McKenna. 1978. *Gender: An Ethnomethodological Approach.* New York: John Wiley and Sons.

LaFollette, Marcel C. 1988. "Eyes on the Stars: Images of Women Scientists in Popular Magazines." *Science, Technology, and Human Values* 13:262–75.

Latour, Bruno. 1987. *Science in Action.* Cambridge, MA: Harvard University Press.

Latour, Bruno and Steven Woolgar. 1986. *Laboratory Life: The Construction of Scientific Facts.* Princeton, NJ: Princeton University Press.

Lave, Jean and Etienne Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation.* Cambridge: Cambridge University Press.

Lawrence-Lightfoot, Sara. 1995. *Balm in Gilead: Journey of a Healer.* New York: Penguin Books.

Lawrence-Lightfoot, Sara and Jessica Hoffman Davis. 1997. *The Art and Science of Portraiture.* San Francisco: Jossey-Bass.

Laws, Patricia W., Pamela J. Rosborough, and Frances Poodry. 1999. "Women's Responses to an Activity-based Introductory Physics Program." *American Journal of Physics Supplement* 67:S32–S37.

Lee, Stacey J. 1996. *Unraveling the "Model Minority" Stereotype: Listening to Asian American Youth.* New York: Teachers College Press.

Leggon, Cheryl. 2001. "African American and Hispanic Women in Science and Engineering." *Making Strides* 3:7.

Linehan, Margaret M. and R. F. Seifert. 1983. "Sex and Contextual Differences in the Appropriateness of Assertive Behavior: Fact or Myth?" *Psychology of Women Quarterly* 8:79–88.

Lugones, Maria. 1994. "Purity, Impurity, and Separation." *Signs* 19:458–79.

MacLachlan, Anne. 2001. "Careers of Minority Women Scientists from the University of California, Berkeley." *Making Strides* 3:1.

Malcolm, Shirley M., Paula Q. Hall, and Janet W. Brown. 1976. *The Double Bind: The Price of Being a Minority Woman in Science.* Report No. 76-R-3. Washington, DC: American Association for the Advancement of Science.

Margolis, Jane and Allen Fisher. 2002. *Unlocking the Clubhouse: Women in Computing.* Cambridge, MA: MIT Press.

Maxwell, Joseph A. 1996. *Qualitative Research Design: An Interactive Approach*. Thousand Oaks, CA: Sage.

McFarland, Daniel A. 2004. "Resistance as a Social Drama: A Study of Change-oriented Encounters." *American Journal of Sociology* 109:1249–1318.

Mead, Margaret and Rhoda Métraux. 1957. "The Image of the Scientist among High-school Students: A Pilot Study." *Science* 126:384–90.

Merton, Robert. 1973. *The Sociology of Science.* Chicago: University of Chicago Press.

Miles, Matthew B. and Michael Huberman. 1994. *An Expanded Sourcebook: Qualitative Data Analysis.* Thousand Oaks, CA: Sage.

National Science Foundation (NSF). 2000. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2000.* NSF 00-327. Arlington, VA: National Science Foundation.

———. 2002. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2002.* NSF 03-312. Arlington, VA: National Science Foundation.

———. 2004. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2004.* NSF 04-317. Arlington, VA: National Science Foundation.

Nelson, Donna. 2003. *A National Analysis of Diversity in Science and Engineering Faculties at Research Universities.* Norman: University of Oklahoma. Retrieved May 9, 2005 (http://cheminfo.chem.ou.edu/djn/djn.html).

Noble, David F. 1992. *A World Without Women: The Christian Clerical Culture of Western Science.* New York: Knopf.

Ong, Maria. 2001. "Playing with In/Visibility: How Minority Women Gain Power from the Margins of Science Culture." *Women in Higher Education* 10(11): 42–44.

———. 2004. "Capital, Community, and Social Justice: Women of Color Scientist-Activists." Presented at the annual meeting of the American Educational Research Association, San Diego, CA, April 14.

Pearson, Willie. 2005. *Beyond Small Numbers: Voices of African American Ph.D. Chemists.* Amsterdam: Elservier Science Ltd.

Phelan, Peggy. 1993. *Unmarked: The Politics of Performance.* London: Routledge.

Roach, Ronald. 2001. "A Focus on Physics." *Black Issues in Higher Education* 18(15): 24–28.

Roediger, David. 1991. *The Wages of Whiteness: Race and the Making of the American Working Class.* London: Verso.

Sacks, Harvey. 1984. "On Doing 'Being Ordinary.'" Pp. 413–29 in *Structures of Social Action: Studies in Conversational Analysis*, edited by J. Maxwell Atkinson and John Heritage. Cambridge: Cambridge University Press.

Schiebinger, Londa. 1989. *The Mind Has No Sex?* Cambridge, MA: Harvard University Press.

Schulz, Amy. 1998. "Navajo Women and the Politics of Identity." *Social Problems* 45:336–55.

Seymour, Elaine and Nancy M. Hewitt. 1997. *Talking about Leaving: Why Undergraduates Leave the Sciences.* Boulder, CO: Westview Press.

Solórzano, Daniel, Miguel Ceja, and Tara Yosso. 2000. "Critical Race Theory, Racial Microaggressions, and Campus Racial Climate: The Experiences of African American College Students." *Journal of Negro Education* 69:60–73.

Sonnert, Gerhard. 1995. "Gender Equity in Science: Still an Elusive Goal." *Issues in Science and Technology* 12(2): 53–58. Retrieved February 6, 2005 (http://www.findarticles.com/p/articles/mi_qa3622/is_199501/ai_n8721330).

Star, Susan L. 1991. “Power, Technologies, and the Phenomenology of Standards: On Being Allergic to Onions.” Pp. 27–57 in *A Sociology of Monsters: Essays on Power, Technology, and Domination*, edited by John Law. London and New York: Routledge.

Steele, Claude. 1997. “A Threat in the Air: How Stereotypes Shape Intellectual Identity and Performance.” *American Psychologist* 52:613–29.

Stombler, Mindy and Irene Padavic. 1997. “Sister Acts: Resisting Men’s Domination in Black and White Fraternity Little Sister Programs.” *Social Problems* 44:257–75.

Summers, Lawrence H. 2005. “Remarks at NBER Conference on Diversifying the Science and Engineering Workforce.” Presented at the meeting of the National Bureau of Economic Research, Cambridge, MA, January 14. Retrieved March 10, 2005 (http://www.president.harvard.edu/speeches/2005/nber.html).

Tobias, Sheila. 1990. *They’re Not Dumb, They’re Different: Stalking the Second Tier*. Tucson, AZ: Research Corporation.

Traweek, Sharon. 1988. *Beamtimes and Lifetimes: The World of High Energy Physicists.* Cambridge, MA: Harvard University Press.

Trost, Jan. 1986. “Statistically Non-Representative Stratified Sampling: A Sampling Technique for Qualitative Studies.” *Qualitative Sociology* 9:54–57.

Uggen, Christopher, and Amy Blackstone. 2004. “Sexual Harassment as a Gendered Expression of Power.” *American Sociological Review* 69:64–92.

Valian, Virginia. 2000. *Why So Slow?: The Advancement of Women.* Cambridge: MIT Press.

Warren, John T. 2003. *Performing Purity: Whiteness, Pedagogy, and the Reconstitution of Power.* New York: Peter Lang.

Waters, Mary C. 1990. *Ethnic Options: Choosing Identities in America.* Berkeley: University of California Press.

Wei, Virginia W. 1996. “Asian Women and Employment Discrimination: Using Intersectionality Theory to Address Title VII Claims Based on Combined Factors of Race, Gender, and National Origin.” *Boston College Law Review* 37:771–87, 792–97, 801–12.

Whitten, Barbara L., Shannon R. Dorato, Suzanne R. Foster, and Margaret L. Duncombe. 2004. “What Works for Women in Undergraduate Physics?” Presented at Wellesley College, Wellesley, MA November 18.

Whitten, Barbara, Suzanne R. Foster, and Margaret L. Duncombe. 2003. “What Works for Women in Undergraduate Physics?” *Physics Today* 56(9): 46–51. Retrieved November 17, 2004 (http://www.physicstoday. org/vol-56/iss-9/p46.html).

Woody, Elisabeth. 2003. “Homophobia and Heterosexism in Public School Reform: Constructions of Gender and Sexuality in California’s Single Gender Academies.” *Equity and Excellence in Education* 36:148–60.

Xie, Yu and Kimberlee A. Shauman. 2003. *Women in Science: Career Processes and Outcomes.* Cambridge, MA: Harvard University Press.

Zuckerman, Harriet, Jonathan Cole, and John Bruer, eds. 1993. *The Outer Circle: Women in the Scientific Community.* New Haven, CT: Yale University Press.