# A Moral Imperative: Retaining Women of Color in Science Education

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**Abstract**

This article considers the experiences of a group of women science students of color who reported encountering moral injustices, including misrecognition, lack of peer support, and disregard for their altruistic motives. We contend that university science departments face a moral imperative to cultivate equal relationships and the altruistic power of science.

**Résumé**

Cet article considère les expériences d'un groupe d'étudiantes en science de couleur qui rapportèrent avoir rencontré des injustices morales, y compris le manque de considération, le manque d'appui par leurs pairs, et le manque d 'égard envers leurs motifs altruistiques. Nous soutenons que les départements de science des universités font face à un impératif moral de cultiver des relations égales et le pouvoir altruistique de la science.

**Introduction**

The United States (US) National Academies reported recently that women are being held back in science for no good reason (National Academies 2007). Even after controlling for productivity and the significance of their work, women faculty members are paid less, promoted more slowly, given fewer leadership positions, and awarded fewer honors than male colleagues. Women of color fare even worse than white women. Similarly, the National Science Foundation (NSF) reports that Black, Latino, and American Indian students drop out of science majors more frequently than white and Asian students, even after controlling for academic preparation and financial need (NSF 2004).

We argue that reasons can be given (albeit not "good" ones) for such disparities between women's and minorities' demonstrated excellence in the sciences and their academic and professional recognition and retention.Taking our cue from one study, in which women science students of color cited lack of collegiality and community (Johnson 2001; 2006; 2007), we consider whether the inequities are partly explicable in terms of what Jean Harvey has called "relationships of moral subordination" (Harvey 2000). We conclude that the misrecognition of women in science is a fundamentally moral problem.

The moral imperative to recognize women in science is reinforced by two pragmatic reasons. First, it produces better science. Second, if science departments persist in misrecognizing women, they may increasingly abandon the sciences. In seeking solutions, we take as our starting point the interests and concerns of one group of women scientists of color. In interviews conducted in 1999-2000, fourteen women cited altruistic motives for their interest in

science. We conclude that these altruistic motivations may be central to their identities and may provide guidance in mentoring them. This indicates one direction for making science departments more hospitable to women: emphasizing within science culture the altruistic power of science.

**Moral Subordination**

In diagnosing the problem of women's inequality in science, we are not primarily concerned with overt discrimination, i.e., with barriers to women's access to science education and careers. Increasing numbers of women and women of color are entering the sciences (National Academies 2007). Rather, we concentrate on the problem of domination - the injustice women experience once they are in science departments (Kymlicka 1991; MacKinnon 1987). In particular, we highlight the character of domination as a distorted moral relationship. In liberal polities, it characterizes relationships among purportedly equal moral agents (citizens) in which some agents violate the legitimate expectation of others that they will be treated as moral equals.

The nature of the problem women in science face becomes clearer, then, when we acknowledge that members of liberal institutions have not only professional obligations to each other, but also a more basic obligation to sustain relationships of moral equality, stemming from our commitment to equal citizenship. However, the National Academies evidence suggests that science departments are not sustaining relationships of moral equality; the demonstrated equal contributions of women in science are not appropriately recognized as equal to those of men (2007). We posit that this is because science departments are insufficiently attentive to their obligation to promote moral equality. Violations are, accordingly, largely invisible to them.

Jean Harvey (2000) calls the phenomenon we are describing "moral subordination" and attributes it to the typically hierarchical character of modern social relationships, which erroneously conflate social/professional status with moral status. Consequently, socially privileged persons, wittingly or unwittingly, enjoy an elevated moral status that exceeds their proper status as equal moral agents. This elevated status derives from their "relationship power" over others who, as a consequence of the relation, are morally subordinated (Harvey 2000).

Relationship power is the power individuals possess, by virtue of their relative social positions, to determine the agency and ends of others. Harvey observes that in Western democracies the socially privileged generally enjoy direct (or assigned) relationship power over the less privileged - for instance, over employees and students. We readily grasp the link between direct power and women's subordination in science. Because men are assigned to most of the highest positions in science (National Academies 2007), they possess more direct power to determine the ends and agency of their female colleagues and students.

We may be less aware of "indirect power" (Harvey 2000). One of its forms, "support power," involves the ability of peers either to reinforce or to thwart authorities' exercises of direct power. Harvey explains:

> [t]he black police officer, the woman priest or professor, the openly homosexual politician all have assigned powers because of their roles, but the first to move into such roles in some places may not be able to count on the support power that is taken for granted by their long-accepted colleagues, the white, male, physically able, heterosexual police officers, priests, professors, and politicians. When this phenomenon occurs, those concerned are doubted more often, ridiculed more often, supervised more closely, maneuvered into the least critical decision-making whenever possible, and when challenged in some outrageous rather than legitimate way by someone over whom they technically

> have direct power, find no minimal and fair-minded support from peers. (2000)

In short, women and minorities are frequently denied the peer support enjoyed by their white, male, able, heterosexual counterparts. This may explain why, even as women assume positions of power in science, their power is tangibly undermined. Even when women become professionally privileged, they may be morally subordinated by male colleagues and subordinates, who thereby entrench their own privilege and power to determine women's agency and ends.

We therefore stress the urgency of attending to the moral character of social and institutional relationships. Harvey identifies two paths to moral subordination: (1) through failing to recognize overtly others' equal moral status and (2) through blocking others' "effective moral empowerment," their ability to exercise basic rights, fulfill duties and obligations, and otherwise engage with other agents in properly balanced moral relationships. We are most concerned about the blocking of others' effective moral empowerment, which is far less visible than overt denials of equal status. Harvey explains:

> Some well-intentioned agents, not themselves victims, have worked against oppression by trying to amend the overtly recognized moral status of the victims. But these reformers have sometimes found themselves baffled as to why such amendments, especially if turned into law, leave the same groups of people marginalized and still oppressed in some way. For nonvictims it is genuinely difficult to see the second route to moral subordination, that via the lack of moral empowerment. Sanctions that involve neither physical force nor the use of law mask what is happening, and this difficulty is increased if the agents responsible are without malicious intent, which is more common than not. (2000, 180)

In other words, the focus of activists upon issues of legal equality and access, at the expense of attention to moral equality within institutions, leaves the problem of inequality largely unresolved. Meanwhile the privileged are baffled by women's and minorities' continued complaints of injustice. In particular, because educated and articulate women and minorities are achieving in increasing numbers, the privileged can't conceive of their being disempowered, except through overt legal discrimination and brute force. In Harvey's words: "If the person's overtly recognized moral status is all that it should be, and he/she has the attributes above [education, articulacy], what can go wrong?" (Harvey 2000).

What goes wrong is that our conflation of social and moral status culminates in seemingly benign institutional practices that perpetuate unjustified transfers of women's relationship power to men. One reason, then, for the achievement gap between white male scientists and equally talented and productive women and minority scientists is that the former not only enjoy the standard benefits of privilege - more prestigious positions, rewards, and higher salaries - but also, intentionally or not, increase their shares of these assets through transfers of relationship power.

We are obligated to reverse this trend. Relationships among colleagues, and among teachers and students, ought to promote our full moral equality. Science departments face a moral imperative to reform departmental cultures and structures that entrench relationships of moral subordination.

We might begin by decoupling the concepts of social/professional and moral status. Laurence Thomas suggests this is possible if the socially privileged display "moral deference" - if they embrace a "mode of moral learning" constituted partly of a disposition to listen to the articulated interests and needs of their moral equals, the socially

subordinated (Thomas 1992-93, 247). In the present case, dismantling moral subordination within science departments requires attending to the experiences, desires, and interests of women and minority scientists.

**Results of Moral Deference**

This kind of listening has at least two practical results. First, having more women and minorities in the sciences produces better science. As Sandra Harding says, science, as it is currently practised, serves the needs of the status quo (Harding 1991; 1993). Thus, those whose interests are best served are least objective about the products and practices of science; diversifying the scientific work force can lead to richer, more objective scientific insight. Margaret Walker notes relatedly, "Without claiming that a 'women's voice' is the voice of all women in any discipline - a discredited idea - nonetheless a link seems to connect the presence of women in [their] disciplines and certain changes in the content and methodology recognized in those fields." Changes include research into women's lives - into the bodies, experiences, and social situations of women - as well as interest in the work of women who were there before (Walker 2005).

A second result of moral deference is retention of women scientists of color. Recruitment is certainly improving; despite existing inequities in science departments, increasing numbers of women, and women of color, are entering them (NSF 2005). Accordingly, one might argue that institutional reforms will occur naturally over time, as more women assume positions of direct and indirect power in science departments. Some research suggests that cultural shifts in institutions usually result from minority members reaching a "tipping point" of about 35% (Walker 2005). Of course, awareness of the impact of moral subordination upon retention rates of women tempers our enthusiasm over recruitment. Furthermore, if group cultures shift when minorities achieve a tipping point, then conversely, failure to reach this threshold may mean the culture will never change. Instead, the failure to increase the number and proportion of women of color in science will solidify the marginalization of those who remain. And if tipping points turn out to be unreliable, then growth in sheer numbers is inadequate, rendering our moral argument all the more imperative. Given that relationships of moral subordination might delay indefinitely the full and equal success and recognition of women in science - a trend that is, moreover, bad for science - we argue that science departments must strive to retain women in science by deferring, morally, to them.

**Listening and Moral Deference: An Ethnography**

If we defer morally - i.e., listen - to women scientists, what can we learn? Of the universe of possible answers to this question, we discuss the results of one study in which women science students of color explicitly connected their interest in science and their altruism. Because women of color experienced the "double bind" of being both female and of color in a field made up mostly of white men, we reason that their experiences will be particularly revealing.

These women, who studied science at a predominantly white Research I university, included three Black, four Latina, three American Indian and four Asian American women. Angela Johnson has studied this group of women since 1997. She worked with all but one when she taught physics seminars in an enrichment program for high-achieving students of color (she met the final subject through another). The women were invited to participate because they were all sophomores, juniors or seniors at the outset of the study, had come to college intending to major in science, and had already completed the physics seminar. All had adequate academic preparation to succeed in science; according to data provided by the university's department of institutional research, their average predicted first-year grade point average was higher than that of other students with first declared majors in science (2.96 vs. 2.90 on a 4.00 scale), especially other students of color (2.75). Data

was gathered in 1999-2000, using participant observation, ethnographic interviews and focus groups. Interview questions included "what are the most important things in your life right now?" and "do you want to continue in science? Why or why not?" The data was supplemented with email interviews to all participants, conducted in 2005 and 2006, in which participants were asked to report on their current situation and then to comment on versions of this and other papers which emerged from the original study.

Data was analyzed using Spradley's Developmental Research Sequence (1980). This involved searching through data for cultural domains. Relevant domains included "kinds of values students exhibit," "reasons for studying science," "reasons students were drawn to other majors," "kinds of student feelings about research," and "reasons for being pre-med (or not)." Through this process, common assertions emerged from a number of domains; these were constantly re-examined in light of new data (Erickson 1986). Findings were validated and further substantiated through member-checking and were presented to focus groups who had not participated in the original interviews, and to the original participants, all of whom have had the opportunity to comment on, correct and enlarge the findings.

**Altruism and Science**

Women in this study used words like "meaningful," "helping," "healing" when they talked about their goals. Jaya pictured a career "making people's lives better in some way." Jackie said, "No matter what I choose to do, I'm sure it will be something like a doctor, a teacher, a counselor, something where I'm involved with other people and working, trying to help other people." All but one connected their altruism to their desire to major in science or pursue a science-based career. Three considered becoming high school science teachers. Three more found their interest in science piqued by their environmentalism. Most of the women (ten) saw health careers as a logical extension of their interest in altruism and science.

The women manifested this science-altruism connection in the ways they talked about medicine; notice how the following quotes incorporate both a scientific interest in medicine and altruism: "...with medicine, I could have patients, and I could do clinical research, and stuff like that. Anything that I can do to help people would really make me feel good." Evonne, who recently finished medical school, emailed that she chose this path because "1. medicine is fun, fascinating, 2. it is a career that will keep me interested and challenged, 3. the opportunity to serve many different people.

Of the ten women interested in medicine, seven wanted to work with under-served populations; their altruism was not universal, but directed towards people in need. Evonne, raised in a rural community, wanted to work with people of color because "From what I see, they're the ones who don't have all the means necessary to keep them really healthy. [...] So I want to work with people of color. And I'm a person of color, and I want to see them be healthy, and do well, and help them succeed, just like I did."

Like Evonne, most of these women had first-hand experience of medical service in impoverished areas. Magdalena had already traveled internationally to provide health care, and wanted to dedicate her life to doing so. That kind of experience, she said, "really changes you." Monica and Merima both have family in areas with little access to health care and cited this as a motivation. Only two women in the study connected their interest in medicine with a desire to earn a high salary. Two others said they wanted to become either a teacher or a doctor, which suggests that money and status were not primary considerations.

**Altruism, Race and Science**

Five participants linked their altruism with their experiences as women of color. Evonne touched on this theme above. Jackie said, "If you're often put in a lesser position…and you manage to get above that, but you see other people being subjected to it, then you want to do what you can to help

them out of it, and make them see that there's another way."

Kathy envisioned using the skills she would learn in pharmacy school, her grandmother's knowledge as a healer, and her family's respected role in their community as a way to help her tribal elders to take their medications.

**Altruism and Persistence in Science**

These women shared a positive characteristic: a desire to serve others through the vigorous pursuit of science. But they also shared a sense that their science departments were alienating, particularly in the first few years of their majors. Seymour and Hewitt (1997), in their study of well-prepared science students at seven universities, found that most students at all institutions reported similarly unpleasant conditions: hard subject matter (sometimes complicated by poor teaching), competitive classes, fast pace, heavy work loads, and an unsupportive culture. Comments from the women in this study corroborated these findings.

These women reported an additional layer of difficulty, arising from their perceived and actual isolation from the rest of the science students (Johnson 2007). Alethia said that as an African American, "I get the feeling I do when I walk through somebody's house with shoes on. Like I'm in somebody else's home and I'm improperly walking, when I'm in science." Johnson attended an exercise physiology lab with Conchita and observed this phenomenon: the women students formed themselves into four lab groups, three all-white and one all-Latina. Even when the teaching assistant urged the white women to join the Latinas, no one did.

At least five women used their altruism to cope with these discouraging conditions; their altruism was, in Alethia's words, "a protective factor":

> Sophomore year was like the year I was going to switch and become a teacher, and get my master's - I don't know what I was going to do, but it was going to be something else, and [a mentor] was like "no, there is a way to find the union between social issues and science. Just stick with it." And on that faith, on faith that he was right, I decided, "well, I'll try it."

For Alethia, this union turned out not to be the urban health clinic she had envisioned, but the field of public health. After she spent a semester in Latin America, she realized that access to good health care was irrelevant without, for instance, access to clean water.

In response to the question whether her science department supported her goals, Evonne echoed Alethia:

> I don't really have a feel for the science department. But working with other people, and being active with other communities of color, you learn about their struggles...and so when you apply both of them together - biology and working with people - I can see that medicine is one way to connect them all. So that's helping me achieve my goal.

For Alethia and Evonne, altruism motivated them to persist with science. It guided Conchita and Chris to an interest in scientific research. Six years after college, Chris is an experienced researcher, with two peer-reviewed publications, several abstracts and three patents. She is pursuing a doctorate in pathology because she is "more focused on the discovery side of medicine." But this focus on research began with an interest in helping endangered species. As a freshman, Chris, with a professor, studied a parasite which was killing off a local endangered species. During her sophomore and junior years, she studied an endangered toad. For her senior year, she worked on a project which didn't involve any environmental concerns - determining the difference between several closely related species. Reflecting on this transition from an interest in altruism to an interest in science, Chris said:

"I wasn't as excited to work on plants as I was to work on animals, just because it didn't really affect me whether or not this family belonged to this family or not, but now that I've been doing it, it's really interesting, just like seeing the way that they go about doing it."

Conchita's story is similar. As a senior, Conchita educated Latinas about diabetes. This interest led her to pursue a Master's degree in public health while working in a kinesiology lab. She now has three peer-reviewed publications. Thus, an initial interest in using science to help others led to scientific research skills and employment. She said in an email, "i remember studying about genetics and the base primers and blah blah, and here i am, doing it in real life...like a mad scientist. i used to think, this is just a job to provide the means for the ends (graduation). But now i am doing so well in this job and have learned how the worlds of hard science meet public health.... [sic]"

For these women of color, science and altruism are closely linked and a major factor in their lives as they pursue science. Seven have channeled their altruism into research careers - studying AIDS prevention, maternal and child health, prevention of organ transplant rejection, infection treatment in American Indian populations, audiology, and underlying chemical reactions of drugs used to treat critically ill infants. Five are employed in health professions. One is engaged in scientific research without immediate altruistic applications but is involved in organizing women scientists. One is preparing to enter med school. Their interest in altruism was not just a passing phase but an enduring aspect of their scientific work. Nor is this an isolated pattern. It holds true among the larger group of women in the original study (Johnson 2001) and a still larger group of women of about the same age from the same college enrichment program - they are physician assistants, teachers, optometrists, veterinarians (Johnson 2006). Other researchers have noted that girls and women tend to associate science with altruism, more so than boys and men (Barlow and Villarejo 2004; Brickhouse *et al.* 2000; Eisenhart and Finkel 1998; Scholer 1998; Seymour and Hewitt 1997).

Science professors who don't defer morally to women and minorities are likely unaware of this connection. Indeed, the women studied reported little support for their altruistic goals; some pre-med students reported disdain from their professors. Walker argues that "the presence of concerns, texts, and images that acknowledge women within undergraduate classrooms, graduate training, and professional media allow women students to feel that a discipline, literally, comprehends them, that it is a space that they are free to enter and expected to enter" (Walker 2005). To convey that the science community comprehends women scientists with altruistic motivations, the culture of scientific study should change to recognize altruism as central to these scientists' work.

**Altruism and the Professionalization of Women of Color**

Indeed, many of us who have mentored women have not encouraged altruism as a virtue in their professional development, perhaps because, although altruism is presumably a good for both sexes, it is a traditionally feminine virtue. This is not to say that when men are altruistic they are seen as feminine. Rather, the altruism of women is burdened with femininity in a way that the altruism of men is not. Contemporary ideals of femininity, especially in English-speaking cultures, are organized around historical depictions of women as other-oriented, and so the feminine virtues include "self-sacrifice, vulnerability, and altruism" (Hoagland 1991). Sarah Hoagland, in observing that altruism is a feminine virtue, says, "As one might suspect, altruism accrues to those with lesser power" (Hoagland 1991). In an individualistic society in which professional status both reflects and reinforces one's power - and in which women are vulnerable to moral subordination - women's altruistic behavior may be detrimental to their success.

In the academy, this is a familiar story. The evidence suggests that women,

especially in junior positions, tend to pursue service activities that compete with scholarship, prioritizing teaching and an open door over screening calls and researching in solitude. This is exacerbated by the disproportionate burdens of house- and child-care on women as compared to men in academia (Mason and Goulden 2003). As Jean Grimshaw (1986) notes, "Women in particular are often prone to feelings of guilt if they try to seize a bit of space, time or privacy for themselves, away from other people," in part because the very impulse that motivates altruism in science can also motivate one's sense that she is not doing enough from day to day. For these reasons, women researchers are regularly encouraged to "be more selfish" and consciously and carefully prioritize activities that will further their personal success over their duties to others. This is not to say that the upper echelons of scientists do not do research that serves others. However, it is apparently more difficult to enter the ranks of those upper echelons if one devotes energy to service and caring for others at early stages of one's career. To give the world a cure for cancer could be an altruistic act, but a quite difficult achievement for one whose service during her most productive years of study and publication is misrecognized and is in this way a barrier to, for instance, access to research support.

The advice to be more selfish seems prudent, then. We could even argue that prioritizing one's own well-being and protecting oneself in the short run is not selfish at all, if the ends justify the means. Yet this sounds like a terribly regrettable loss, as it suggests that those of us in a position to mentor young women would do well to discourage the motivations that led some of the women in Johnson's study to pursue science in the first place. We are faced with uncomfortable implications, including the possibility that as mentors we should discourage the very attitudes and motivations that buoyed women as they studied science in college, and that those attitudes are themselves limits on the sorts of successes women can ultimately enjoy in professional scientific endeavors.

Contemporary debates about the merits of an ethic of care for feminism take up similar questions. Nel Noddings (1984) famously articulates a care-based theory, arguing that our relations to others are essentially constitutive of persons. Noddings appeals to the neglected importance of the values of attachment to argue that the relation between caregiver and person cared-for should be the focus of how we think about right and wrong. Altruism, like caring or patience, "is not in itself a virtue," on her account, but "must be assessed in the context of caring situations....The fulfillment of virtue is both in me and in the other" (Noddings 1984). She suggests that the experience of joy is empirically linked with altruism and argues for "reflective joy," the altruistic person's response to the reception of her caring (Noddings 1984). Noddings points to the narrative of a midwife who loves helping others and cares what they think of her as an example of "beautiful altruism" (Noddings 1989). Key to understanding this concept of altruism is the element of joy in one's affirmed connection to others. It is not the expectation that one will accomplish an altruistic act which brings the joy Noddings describes, but the observation of one's efforts on others, the realization that one is connected to the world. Noddings' beautiful altruist is joyful because she is reminded that she is not alone, she is acknowledged, and she is fulfilled.

On this account, altruism is not just a moral or social good; it is fundamental to the identities of women who identify altruistic motivations for going into science, and whose happiness is uniquely fulfilled by altruistic professional activity. Yet altruism is more than a motivation and an aspect of identity; seeing its realization in the world and in others is the point of the life of science for these women. If so, discouraging altruistic motivations might both fail to redirect the motivation to do science and positively conflict with the actual goals and outcomes of scientific endeavors. The advice to be more selfish no longer seems so prudent.

Those of us who have issued just

such advice to our students would make a distinction between altruism in one's goals and altruism in one's daily life, and argue that all we recommend is that women in science take care of themselves. Noddings herself suggests as much, if only because no one could be an effective altruist if she is exploited to the point of uselessness. Yet this sense that the altruistic woman is in danger of being used remains; in an individualistic and self-interested culture, the egoist stands to benefit greatly from someone with the other-directed "habit of the heart." The insular coworker can leave the support work to others. As Sarah Hoagland (1991) argues, "the feminine is not an antidote to the masculine. Rather, it is a supporter and nurturer of the masculine. ... [In] a patriarchal world we need something far more radical."

Hoagland concludes that among other things, an ethic of care "must have a vision of, if not a program for, change" (Hoagland 1991).If women in science are to be both joyful and altruistically motivated, if they are, in short, to be themselves, then we would do well as their educators, their mentors, and their coworkers to find ways to prevent their exploitation and to foster their contributions. Such suggestions are already well taken by many, but may merely shift some of the burdens, often to senior women in science who now adopt the mentoring job in addition to the previous caring jobs they may have shouldered. This is not yet a vision for change.

More promising solutions would involve changing institutional habits that currently reward self-promoting or isolating behaviors. This can include, at a minimum, recognizing altruistic motivations as central to the identities of women, especially women of color, in science. One method of moral empowerment might involve offering concrete or monetary rewards for work and specialization in fields of study which advance connection-promoting behaviors, the well-being of others, and interdisciplinarity. Changing the culture of science must also involve changing practices of identity recognition, so that women and women of color, especially, feel welcomed. In keeping with Walker's argument for "the presence of concerns, texts, and images that acknowledge" our students, successful strategies could include publicizing images of women and women of color in science programs, including women role models within and affiliated with the departments, both students and faculty. Departments should also develop and promote diverse curricula, especially those relevant to altruistic pursuits. Of course, the achievements and service of women, including their careers in helping professions, should be publicly recognized. Departments might promote these women and the value of altruistic science careers by hosting conferences to which female and minority high school students and undergraduates are encouraged to apply. All such strategies contribute to changing the climate of science learning.

We have indicated one method of moral empowerment as an important direction for making science departments more attractive and hospitable to women: infusing the culture of the departments with an emphasis on the altruistic power of science. We noted that women of color in science have not yet attained the critical mass which aids in shifting the cultures of their disciplines. We described the ways in which women of color may be embedded in relationships of moral subordination which prevent their retention and, therefore, the maintenance of a tipping point even if it is achieved. And we argued for overt recognition of women's altruistic motivations as central to their identities, including material reward for altruistic work. We invite other considerations and possibilities.

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