

STATUS

A REPORT ON WOMEN IN ASTRONOMY

CONTENTS

Using a Legal Toolkit
by Charlotte Fishman
1

Denice Denton: A Personal Remembrance
by Meg Urry
1

Making Institutional Change
by Denice Denton
12

Does gender matter?
by Ben Barres
15

White men, white coats, little change
by Nancy Forbes
20

Spotlight: Lisa Frattare
by Joannah Hinz
22

Review of The Female Brain
by Rebecca M. Young & Evan Balaban
23

Snippets
24

Notes from a Life
27

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Using a Legal Toolkit to Fix the Leaky Pipeline: Overcoming Discrimination through the Interplay of Science and Strategy

By Charlotte Fishman

The Good News: The Social Consensus Supports Women in Science

In June 2003, in the wake of the United States Supreme Court's decision in the University of Michigan affirmative action case, New York Times reporter Linda Greenhouse analyzed Justice Sandra Day O'Connor's approach to the law:

In her new book "The Majesty of the Law," a collection of essays published the week after the Michigan cases were argued in April, Justice O'Connor wrote that "courts, in particular, are mainly reactive institutions." Noting that "change comes principally from attitudinal shifts in the population at large," [O'Connor concluded]



"rare indeed is the legal victory—in court or legislature—that is not a careful byproduct of an emerging social consensus."¹

It is instructive to consider these words in the context in which we find ourselves today. If you look around American colleges and universities, particularly in the fields of science, technology, engineering, and math (the so-called STEM disciplines), you find that women are present in the academy, but not in sufficient numbers compared to their availability in the relevant labor force. Now why should that be? It has been almost 40 years since the enactment of Title VII of Civil Rights Act of 1964, which barred gender discrimination in employment, and over 30 years since the 1972 amendments

Continued on page 2



Denice Denton: A Personal Remembrance

By Meg Urry

Denice Denton and I met for lunch in a noisy eatery in downtown Seattle. It was January 2003 and the American Astronomical Society was holding its winter meeting in the Convention Center there. On behalf of the CSWA, I had invited Denice to speak at our session that afternoon, at 1 p.m., and the lunch meeting was my way of getting acquainted first. She had been recommended

as a speaker by Julianne Dalcanton, a member of the CSWA and a colleague of Denice's at the University of Washington. I hadn't met her before, nor was I fully aware at that point of her many accomplishments. I did know she was the Dean of Engineering (and I knew there were not many women Deans of Engineering in our nation) so maybe I expected someone administrative - you know: business-like manner, deep authoritative voice, navy blue suit.

So Denice was, to say the least, a surprise. Funky glasses, curly hair, casual beach-style clothes, and slangy, hey-dude way of speaking. In my mind I affectionately dubbed her "surfer

Continued on page 10

Using a Legal Toolkit continued from page 1

made it applicable to colleges and universities. There has been a steadily increasing number of women obtaining Ph.D. degrees in “hard science” fields, yet in many academic departments they are scarce as hen’s teeth in the faculty ranks. Moreover, to the extent that they are present, they are over-represented in relatively low-status positions (adjunct, lecturer or soft money positions), and under-represented at the top (tenure ranks at elite research universities). What accounts for this troubling picture, which I would describe as admitting women to the (scientific) club, but treating them as second-class citizens after they join?

Second, what is an emerging social consensus, and how does it emerge? What changes have affected the treatment of women in the workplace? An example of attitudinal shift can be found in the development of pregnancy discrimination law, an area of great concern to the younger women at this conference, if discussion in the breakout sessions is a reliable guide. The evolution of federal pregnancy discrimination law provides us with an example of Justice O’Connor’s emerging social consensus. I am confident that no one in this room finds the idea of pregnancy discrimination problematic today, and in fact, I venture to say that there is consensus that where it exists it is a bad thing. Believe it or not, this was not always the case.

When Congress enacted Title VII of the Civil Rights Act of 1964, sex discrimination was prohibited along with race, and a host of other categories, but there was no specific prohibition against pregnancy discrimination. Those of us who worked in the plaintiff’s employment discrimination arena believed that pregnancy discrimination was sex discrimination, but there was no statute that said so. In 1972, the EEOC filled this gap by promulgating guidelines that prohibited policies and practices adversely affecting female employees because of pregnancy, childbirth, or related medical condition.² Thus, it may surprise the younger women in this audience to learn that the very concept of pregnancy discrimination was rejected by the United States Supreme Court two years later.

In 1974, in the case of *Geduldig v. Aiello* 417 U.S. 484, the United States Supreme Court ruled that a state law that excluded pregnancy from temporary disability benefits did not violate the Equal Protection Clause of the Fourteenth Amendment because legislative classifications based on pregnancy were not necessarily sex-based distinctions! Two years later, in *General Electric Co. v. Gilbert* (1976) 429 U.S. 125, Justice Rehnquist rejected the EEOC guidelines and extended *Geduldig*’s flawed reasoning to a Title

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VII case, holding that a company's refusal to cover pregnancy in an otherwise comprehensive medical benefit plan did not constitute sex discrimination under Title VII because the plan distinguished not between men and women, but between pregnant persons and non-pregnant persons. One year later, Rehnquist authored the majority opinion in *Nashville Gas Co. v. Satty*, 434 U.S. 136 (1977), which drew a distinction between the unequal provision of benefits (OK) and forcing pregnant women to forfeit seniority when they returned from childbirth leave (not OK):

Here...petitioner has not merely refused to extend to women a benefit that men cannot and do not receive, but has imposed on women a substantial burden that men need not suffer. The distinction between benefits and burdens is more than one of semantics. We held in *Gilbert* that [Title VII] did not require that greater economic benefits be paid to one sex or the other "because of their differing roles in 'the scheme of human existence.'" But that holding does not allow us to read [Title VII] to permit an employer to burden female employees in such a way as to deprive them of employment opportunities because of their different role.

Well, even 30 years ago, the Court's decision not to treat pregnancy discrimination as sex discrimination ran afoul of the social consensus, not to mention common sense, and Congress was finally moved to enact the Pregnancy Discrimination Amendment to Title VII in 1978. This Act explicitly defines sex discrimination to include discrimination on the basis of pregnancy, childbirth, or related medical condition. The PDA, as it has come to be known, also raised expectations and engendered lots of controversy in the feminist civil rights community about how far to go in pushing for "pregnancy accommodation."

There was a fierce debate about whether pushing for job-protected pregnancy leave was a good thing or a bad thing. The argument against pregnancy accommodation was: if we start insisting that employers give women time off to have babies, won't the consequences be bad for women's employment? Maybe we should just argue for "equal treatment." Maybe the price of women's equality is that women who want good careers will have to remain childless or be able to manage domestic responsibilities without involving their employers. People lost friendships over these arguments. Eventually, as we know, the pregnancy accommodation faction won out over the equal treatment faction. Since the sky did not fall, it is tempting to dismiss the losing arguments as ridiculous.

In fact, the losing arguments were *not* ridiculous. There was genuine fear that pregnancy accommodation would undermine women's equality in the workplace. That fear was not fanciful, and it tends to pop up again as the social consensus evolves and new issues surface. Now there are many young women in the workplace who assume that they will have both good jobs and families. This raises new problems—it turns out that in order to survive and thrive in the workforce in significant numbers, women need more than job-protected pregnancy leave. Babies become children, and they go to school. They have teacher conferences, school vacations, and they get sick. Who takes care of this in families where there is no stay-at-home mom/parent? Even for women who do not have children, spouses or partners or aging parents need care at one time or another. Well, who is the culturally normative person to take care of these needs? I don't have to tell you. So the same fear-based debate recurs, this time around "family friendly" job protections.

Only now there is a difference. Now we have a generation of families in which women left the home and went to work, a generation of people who are very familiar with the strain of everyone working and no one available to handle domestic responsibilities. And this difference is the "context" that, according to Justice O'Connor, affects the way the courts view the issues brought before them.

Keeping in mind that thirty years ago Rehnquist wrote the *Gilbert* and *Satty* opinions, and held the view that said denying medical benefits to "pregnant persons" is not discrimination on the basis of sex, let's flash forward several decades. In May of 2003, the United States Supreme Court issued a very important decision interpreting the Family Medical Leave Act, the federal law that permits workers to take time off from work to attend to their own or family members' serious medical needs. The case name is *Nevada Department of Human Resources v. Hibbs* 538 U.S. 721 (2003).

In *Hibbs*, the issue presented was whether a private individual (in this case, a man who was terminated from his job after he took a FMLA leave to care for his wife) could sue his state employer for money damages under the Act, or whether the State of Nevada was immune from such suits. The Court's decision was good news for employees—it ruled that Congress had intended states to be covered by the law. But what is more interesting for our purposes today is the language used by the Court in coming to that decision:

Using a Legal Toolkit *continued from page 3*

The impact of the discrimination targeted by the FMLA is significant. Congress determined: “Historically, denial or curtailment of women’s employment opportunities has been traceable directly to the pervasive presumption that women are mothers first and workers second. This prevailing ideology about women’s roles has in turn justified discrimination against women when they are mother or mother-to-be.” [Joint Hearing 100]

Stereotypes about women’s domestic roles are reinforced by parallel stereotypes presuming a lack of domestic responsibilities for men. Because employers continued to regard the family as the woman’s domain, they often denied men similar accommodations or discouraged them from taking leave. These mutually reinforcing stereotypes created a self-fulfilling cycle of discrimination that forced women to continue to assume the role of primary family caregiver, and fostered employers’ stereotypical views about women’s commitment to work and their value as employees. Those perceptions, in turn, Congress reasoned, lead to subtle discrimination that may be difficult to detect on a case-by-case basis.

...

By creating an across-the-board, routine employment benefit for all eligible employees, Congress sought to ensure that family-care leave would no longer be stigmatized as an inordinate drain on the workplace caused by female employees, and that employers could not evade leave obligations simply by hiring men. By setting a minimum standard of family leave for all eligible employees, irrespective of gender, the FMLA attacks the formerly state-sanctioned stereotype that only women are responsible for family care-giving, thereby reducing employers’ incentives to engage in discrimination by basing hiring and promotion decisions on stereotypes.

Now, who do you think wrote that language? The answer is, Chief Justice Rehnquist. Rehnquist! Now that is the emerging social consensus at work thirty years from non-pregnant persons to this language about gender stereotypes. A pretty amazing transformation, isn’t it?

What accounts for this change? Personal history has a role. So does the rise of the two-parent working family. Whatever the

source, there is a social consensus that women belong in the workplace, including the scientific workplace, and an emerging societal consensus that workplace practices that hinder women’s advancement should be altered to accommodate their life circumstances. This is good news! It is true that we have a long way to go in terms of flexibility and social support for working families, but the *Hibbs* case is an example of how once radical ideas can gain acceptance over time.

Debunking Myths

So what stands in the way of women’s full equality as scientists in the academic workforce? In order to answer this question in a meaningful way, we are going to have to debunk a few myths.

Myth number one: It’s a pipeline problem.

One familiar myth, which we heard a lot about today, is that the dearth of women faculty in the hard sciences is a function of the lack of scientifically trained women, which is a function of the bad old past when people (not us!) thought women couldn’t be scientists. That myth surfaced about thirty years ago to explain the lack of women in science, and the “fix” was simply: put them in one end of the pipeline (i.e., admit them into science education programs leading to a Ph.D., then hire them into tenure-track positions), wait a few years and, voila! They will come out the other end as tenured professors, and heads of national laboratories. Everything will be fine; it is just a question of time! Well, it has been 30 years, and 30 years is enough time to tell you that it is a myth! The theory didn’t work: Just providing women scientists for the labor market did not mean that women scientists would succeed in that market. Of course some did, but women scientists have not risen to the top in the same proportion as similarly situated male scientists did. What is left of that myth is the image of a “leaky” pipeline, and new questions about how to stem the leak.

Myth Number two: Knowledge is power.

This is a follow-up to the leaky pipeline myth. The idea behind this myth is, OK, we were wrong about the pipeline, but we’re all people of good will here, and if you make people of good will aware of the existence of a problem, and particularly if you educate them about what their institution can do to address the problem, they will make the necessary changes. Now whether this notion (which I heard expressed at various points in this meeting), is really a myth, or whether it is simply an example of wishful thinking, it is nonetheless very hard to shake off its power. In this respect, you may even be at a bit of a disadvantage because of your scientific training, but I will tell you a true story that I hope will loosen its hold on the imagination.

When I first took the job as director of Equal Rights Advocates' Higher Education Legal Advocacy Project, I went to see a law professor who had been working on gender equity issues for approximately thirty years. I asked her to help me figure out how the project could help overcome gender bias in academia. I had lots of ideas of things we could do. Well, she reached into a file cabinet and pulled out a document that was 30 years old. It was yellow. It was crumbling around the edges. It was typewritten. It was duplicated using carbon paper or a mimeograph machine. What it contained was the anecdotal stories of women faculty of that university from 30 years ago—their stories of discrimination, and their stories of unequal treatment, and their stories of lack of mentoring. They had gotten together, they had written it, they had self-published it and they had sent it around to the powers that be. Let me tell you, seeing that document was a shock. Because despite the knowledge, the analysis and the dissemination of that information 30 years ago, the women at that institution are still complaining about exactly the same things today and they have reason to do so!

So, as in the case of the pipeline myth, if education and awareness were going to lead inexorably to change, it would have happened already. This is not to say that knowledge is useless—far from it! But the idea that knowledge alone will lead to change is a myth. In order to create change, you need to think of knowledge not as power, but as *ammunition*. In order to change your institutions you also need the right weapons and you have to pick the right battles.

Myth number three: Lawyers are bad.

I am sure you have all heard variants on that one. Lawyers are bad. Lawyers are greedy. Lawsuits do not benefit anyone but lawyers. Well, let me tell you why an academic might need a lawyer, and why subscribing to this particular myth might impede your scientific career.

First of all, universities are big, successful, elite institutions, and as a result they are worlds unto themselves. In addition, they are the favored institutions. They routinely receive special treatment from state legislatures, and as employers their decisions are treated with special deference by the courts. Thus, to some extent, they operate outside the boundaries of the law that applies to others. And, not to put too fine a point on it, sometimes they behave like outlaws! There are university faculty members and administrators who truly believe that the law just does not apply to them, and act accordingly. I have observed this sort of thinking in action, and let me tell you, it is one really interesting phenomenon!

Why does this happen? I think it has to do with the fact that everybody on the university

faculty and in the university administration thinks of himself or herself as smart. And in fact, many also think that they are smarter than everybody else. So, the thinking goes, "If we're smart, we can figure it out, whatever the subject." You may be an astronomer, but you think you can handle personnel policies too—after all, it's not rocket science! But of course, as some of you noted in the breakout sessions at this meeting, the Chair of the astronomy department may know nothing about the requirements of the Family Medical Leave Act, or the Pregnancy Discrimination Act, or his own university's family friendly policies. Worse, he may think it has nothing to do with his authority over the young women in his department, over whose lives he holds considerable power.

So, how do lawyers come into this? First, one role that lawyers, legal organizations, and professional associations employing lawyers play is to be credible sources of information about your rights. For example, Equal Rights Advocates, has a website (www.equalrights.org) and an advice and counseling hotline that responds to inquiries from all over the country. Other organizations with websites containing legal information helpful to academics are the American Association of University Women (www.aauw.org) and the American Association of University Professors (www.aaup.org). Let's say you need to negotiate a family leave with the dean of your college or the Chair of your department. There is a world of difference between going in as a supplicant who needs a favor, and as an advocate for yourself saying, "I am entitled to this, how are you going to arrange it?" backed up with information about what you are entitled to under the law, under university rules, or in accordance with statements of principle from organizations recognized by your institution. You will make a better deal if you obtain independent information from a legally knowledgeable source.

Second, although much has been said about the well-disposed Chair or other authority figure who has your best interests at heart, there also seems to be no shortage of curmudgeonly characters who are out to sidetrack the careers of young women scientists, even today. If you should happen to run into one of those, and the leadership of your institution fails to come to your aid, you have a problem that a lawyer can help you solve. This is lawyer as "ghostbuster" for discrimination—i.e., when the pipeline leaks, "Who you gonna call?!" What does a lawyer do in this role? Well, first and foremost, lawyers are strategic thinkers. A good lawyer can help you sort through the situation, identify the strengths and weaknesses of your position, and help you devise a strategy that will

Using a Legal Toolkit *continued from page 5*

maximize your chances of obtaining the result you wish without a lawsuit.

I have found in both my private practice and my current position, that if you get a strategic thinker in on your case early, you are much more likely to be successful. You are much more likely not to need a lawsuit. Why would this be true? Well, short of riding into town with a shotgun, the key to bringing The Law into the Wild West of a recalcitrant department is the gathering and presentation of comparative data. A lawyer can help you figure out what kind of information you need and how to get it. I am not just talking about numbers. I am talking about anecdotes. I am talking about policies and practices. I am talking about university reports on the underrepresentation of women. I am talking about identifying micro-inequities in the treatment of male scientists versus female scientists. Who gets the bigger lab? The summer money? The research grant? The plum assignments? You get the idea.

Lawyers help frame the issues and identify biases that you may have overlooked. It has been my experience that frequently academics do not appreciate the importance of the information they have. For example, at one of the breakout sessions, a young woman was talking about office space. When she joined her department, all the young scientists were given offices and she thought hers was just fine. Then all of a sudden, she noticed that all the men who had joined the same year had better offices. Her reaction was, "I was really happy with my office, and so I didn't care that I didn't get a better office, I was just happy doing my science." My reaction was "Something is wrong here. Something is *very* wrong here. If all the men have found better offices, they know something that this young woman doesn't know. And what this young woman doesn't know *will* hurt her." My advice to you is, you have eyes, you have ears, you have to watch and listen! This is not a question of mentoring; this is a question of observing, of getting together with other women, sharing information within a department, across department lines, across institutional lines. And of course, where disparate treatment exists, record what you observe, because you may need it later, and memories fade with time.

Lawyers can also help you figure out when and where to pursue your complaint to maximize your chances of success. With a good record of discrimination, a well-organized group of women, and a legally informed presentation to the right people on the right issue, it is possible to win without filing a formal discrimination complaint. This doesn't always happen, but sometimes it does. If you go to the dean or the provost and you

say, "You know, in this institution, we've noticed that the women faculty's salaries are lower than the male faculty salaries. You have explained this by telling us that the way faculty members get raises in this institution is to get an outside offer, and women tend not to seek outside offers. Well, we've noticed that in our department women do seek outside offers, but the Chair only matches outside offers obtained by the men; here are the data for the last five years. I have an outside offer from X university and the Chair says there's no money in the budget—what are you going to do about it?" You may not get immediate satisfaction, but change is more likely to happen when you collect the relevant data and present it in a legally informed way.

Another example from the breakout sessions concerns rules. Many of the young women graduate students were focused on learning the unwritten rules of their department. But here is something especially for young faculty members: the typical woman who come to see me after she has been denied tenure, or something else bad has happened to her, does not know the *written* rules of her *institution*! Think about that, they don't know the written rules. They come in, and something has happened to them in the tenure review process, and I say, "What are the official criteria for tenure? Where is the university's procedure manual?" At the University of California it is called the APM. Lots of times the answer is, "What's the APM?" So their first assignment is to get the APM, to sit down and read it, and to make a note of everything that happened that does not seem to be in accordance with these rules. If I had my way, every faculty member would be given the institution's published criteria for tenure, and the whole Academic Personnel Manual or whatever its equivalent is, the minute they walk in the door. And what's more, they would read it, and take it to heart. Because often the university-published criteria are different from the department's unwritten criteria, and this may help you early on to rein in a runaway department before it does too much damage to your career. But most women do not learn this until they are already in trouble.

Finally, lawyers are an alternative power source. While no one wants a lawsuit if they can avoid one, sometimes there is only the choice between suing and leaving. I will discuss this aspect of lawyering under the headings, the "D" word and the "P" word.

The "D" Word

The "D" word, "discrimination," is a dirty word in academia. It is not supposed to exist in the academy. When pressed to explain the failure of the pipeline theory, and the continuous flow of white males to the top of the university

pile, universities prefer to attribute the current situation to “unconscious bias” or “cultural attitudes” or “chilly climates.” Granted, these things play a part in the relative absence of women in the top echelons of science, but there is such a thing as intentional discrimination, and it exists too. Despite the emerging social consensus that women belong in the scientific workforce, there are still people who do not want you in their club. I am sure the older women know this, and the younger women need to know this too. If you don’t believe that men will fight to keep women out of their club, just look at Martha Burke and the Augusta National Golf Tournament!³

So the bad news is that there are still people on university faculties and in university administrations that do not want you in the club, and while they are not part of the emerging societal consensus, they are part of the power structure. Now some discrimination is subtle, and some discrimination is not subtle. You will probably have to deal with both kinds in your professional lifetime. How are you going to handle it? Sometimes you really need a lawyer. Sometimes there really is no other way.

Here are two examples from my private practice where the lawyer wears the white hat and vindicates the victim of discrimination. Not everyone gets burned by the legal system. Sometimes a lawsuit, or the credible threat of a lawsuit, can have beneficial results for all concerned. The first example is the case of Professor Eleanor Swift, law professor at University of California, Berkeley (Boalt Hall). Professor Swift came to me and Mary Dunlap, one of the founders of Equal Rights Advocates, now deceased, to help her decide what to do. She had been denied tenure at the law school, but being the brilliant and politically savvy woman that she was, she had already taken her case to the university’s Privilege and Tenure Committee, and had received a prima facie finding that discrimination had occurred in her case. This was already an unprecedented victory, but it was clear that the law school was not going to back down.

What to do? Well, nobody wants a lawsuit! They are terrible and horrible and you would prefer almost any other approach. But sometimes you don’t have a choice. Was Prof. Swift going to fight for tenure, or was she going to walk away branded as someone who couldn’t cut the mustard? Well, Boalt Hall had not tenured a woman in fifteen years. She decided that this was a battle she needed to fight. Since the essence of a discrimination case is comparative data, we demanded the tenure files of the men. We said, “You’re saying she’s not qualified, that she doesn’t meet the standard for tenure at this university. Okay, let’s look at the files of the men who did.” Of course they did not want to give

us these data. They argued privacy. They argued that people do not receive tenure because they are as good as other people; they get tenure if they match some platonic ideal. But we pushed and pushed and pushed. And that pushing for data caused them to settle rather than go through a big, brutal trial.

The settlement was not one of these we’ll-give-you umpty-ump-million-dollars-to-go-away situations. Rather, the settlement involved crafting a level playing field for her tenure review. The settlement was achieved because we were able to show that her tenure process had been tainted by gender bias through the introduction of material that should not have been there and through other procedural irregularities. As a result we were able to obtain a new review in which a sanitized version of her file (with all the taint removed) was provided to a “virtual” department (experts in the field outside the university with no prior knowledge of the case). This virtual department also got versions of the male tenure files during the appropriate time period, and a copy of the university criteria for tenure. The committee was then asked to do the following: “Looking at the standard for tenure as it was actually applied in the law school to the other candidates, was she qualified for tenure?” That was it! The virtual department derived the actual standard by looking at who got tenure, then evaluated her file using that standard and made an appropriate recommendation to the Chancellor. The result of this process was that Prof. Swift was awarded tenure. And not only did she win tenure, she won acceptance. And not only did she win acceptance, she became Associate Dean of the Law School for a time. She became a valuable and valued colleague. What’s more, she has helped literally hundreds, if not thousands of women all over the country, both through her own efforts, and because the settlement document was not made confidential. Once the settlement became public it was used by other women to get tenure—it is a powerful technique—and I recommend it should you find yourself in a similar situation.

The second example I want to share with you is the case of Professor Lynn Ponton, a professor of psychiatry at UCSF. When she came to my office she had held for many years an adjunct position that was part teaching, part clinical service. It was in the middle of the semester, and she was about to lose her job. She was told she would be laid off, that there would be no more funds for the adolescent inpatient clinic, we’re sorry. Without going into great detail, through the framing of appropriate questions and the gathering of comparative data, we discovered

Continued on page 8

Using a Legal Toolkit continued from page 7

a number of gender-based discrepancies. For example, while both men and women were hired as adjunct faculty, men were given regular tenure-track appointments and women were not. Also, we discovered that when the budget crisis forced the closing of programs, similarly situated men did not lose their positions. We filed an EEOC charge using these comparative data, and the EEOC issued an unprecedented finding of class-wide discrimination against women in the UCSF psychiatry department. Once this was established, we were then able to demonstrate that the budget crisis had been a pretext to get rid of Prof. Ponton. This is how: If there is a budget crisis, and the reason that you are being laid off in the middle of an academic year is that there is no money to continue the program that employed you, then if you go out and develop a self-sustaining equivalent program you would not expect the department Chair to say (in effect), “No thanks, we’re not interested.”

For the Ponton case we went through a university hearing procedure with an outside arbitrator. The arbitrator issued a thirty-page decision detailing really duplicitous behavior on the part of the Chair. But, as is typical in these situations, the arbitrator’s decision was only advisory to the Chancellor. Since the Chancellor would not overturn the Chair, we had to sue the University for the Chancellor’s abuse of discretion, and we won.⁴ Not only did we win the lawsuit, but Prof. Ponton returned to her department as a Full Professor in Residence, a position of much greater prestige and security than the adjunct status she held when she first came into my office. Science and strategy—sometimes you need both to succeed.

The “P” Word—Understanding Power

“P” stands for power. It is a great word, and has been implicit in everything I have said so far, but now I want to be a bit more explicit. It is important for women to understand power in all its variety. There is a lot of self-help literature out there that focuses on personal power—the ability to get what you want, the ability to stand up under adversity—and that is important for success in life. There is intellectual power—the power of a good idea, the power of an analytical mind—and that is essential for success in a scientific career. Within an institution, however, power seems to come primarily in one of two forms—entrenched, or structural power, and insurgent power. Women scientists need both. You need women who will take the leadership training and put themselves forward for chairs, deanships and other high administrative positions, so that, having taken the reins, they can use that institutional power

to help others. You also need women who fight in the trenches, who network and organize and through collective action raise a “great, big, noisy fuss,” as Beverly Cleary’s Ramona would say, in order to push a large, slow-moving institution to take seriously its obligation to level the playing field for women.

But power is also found outside the university, and this is another way in which lawyers, particularly lawyers in the corridors of power, can help. In order to fix a leaky pipeline, you have to crawl under the sink and shine a powerful light on it from the outside. In California, we have the wonderful example of State Senator Jackie Speier, who did just that. Senator Jackie Speier is the Chair of the California Senate Committee on Governmental Relations. In that capacity, she exercises oversight over the University of California and the California State University system. Senator Speier became concerned that after Proposition 209 passed in California, there was a dramatic drop in the hiring of women into the University of California tenure-track faculty. Well, talk about power! Her concern translated into an audit of the entire university system. The Legislative Analyst collected data and issued a report containing appalling statistics about the under-representation of women in tenure-track and tenured appointments.

Senator Speier held three hearings over a two-year period. She invited people from all the campuses of the University to testify about the problem. How serious was it? What caused it? What was being done to fix it? She heard from faculty and administrators. She demanded that the President of the University appear before her, and he did. She told him, “This data is terrible! What power do you have to affect the hiring decisions of the people beneath you?” Now that was a powerful moment! What’s more, the result of those hearings was real institutional change. Because of Jackie Speier’s legislative oversight, the following things happened: The President held a summit of senior women faculty to discuss their perspectives on the problem. The University conducted a survey of faculty and adopted a number of family-friendly policies with centralized funding. The statistics on the hiring of women are improving, at least in some parts of the university. Talk about power!

Having said this, I would be remiss if I did not credit the insurgent power of the women who collected the initial statistics that showed the precipitous drop in hiring, who organized an informal statewide network of faculty to work on the issue, and who courageously came forward to testify at the hearings about the problems women faced. But without that political forum, without that light shining from without into that

cobwebby and disgusting area under the sink, I think it would have taken a lot longer to plug those particular leaks in the pipeline.

Looking Toward the Future: A New Social Consensus on Cognitive Bias

If we hire women into tenure-track positions, and we adopt family friendly policies, will that fix the leaky pipeline problem? The bad news is, not necessarily. Not all disadvantages experienced by women scientists come from garden-variety, old-fashioned “keep women out of the club” thinking of the type challenged by Martha Burke when she attempted to penetrate the Augusta National Golf Tournament. Over the past 30 years, social psychologists have learned a lot about how unconscious bias and stereotypes affect how people perceive, explain, remember and evaluate the behavior of others. This new knowledge is useful in understanding the failure of the pipeline theory and the persistence of the glass ceiling for women in academia. It has particular relevance to women in the sciences, where, despite the explosion of Ph.D.s granted to women in science, technology, engineering and math, the idea of a woman scientist is still culturally anomalous.

One of the effects of being a cultural anomaly is that you are “damned if you do and damned if you don’t”—that is, if you exhibit certain culturally stereotyped “feminine” characteristics, you may be liked as a colleague or a teacher but your science may not be taken seriously; if you exhibit certain culturally stereotyped “masculine” characteristics associated with being a good scientist (e.g., assertiveness in pursuit of your scientific research) then you may be disliked as a colleague. This point is illustrated by two recent lawsuits brought and lost by women scientists who had been denied tenure. In the first, *Weinstock v. Columbia University*⁵, a female Barnard College chemistry professor was denied tenure by Columbia University despite positive recommendations for tenure by (1) the Barnard Chemistry Department, (2) the Columbia Chemistry Department, (3) the Barnard College President, and (4) the Columbia University ad hoc committee convened to consider her tenure application.

The Second Circuit Court of Appeals’ majority and dissenting opinions in this case provide sharply contrasting views about gender stereotyping as evidence of employment discrimination. The majority was actively hostile to the idea that gender stereotyping could be inferred from describing a scientist as “nice” and “nurturing,” a “pushover” rather than a hard-driving scientist. Said the majority, “‘Nice’ and ‘nurturing’ are simply not qualities that are stereotypically female. Any reasonable person of either sex would like to be considered ‘nice.’”⁶ Meanwhile, the dissent

pointed out that Weinstock’s case was the “mirror image” of *Price Waterhouse v. Hopkins*⁷, in which a wildly successful female broker was denied partnership because of her supposedly abrasive “masculine” qualities. Weinstock, on the other hand, was denied tenure because “a stereotypically ‘feminine’ person is not viewed in a male dominated field as a driven, scientifically-minded, competitive academic researcher.”⁸

In the second case, University of Nevada Las Vegas biology professor Marcella McClure was denied tenure despite the fact that she had developed a new field and brought in \$1.4 million in grants for her research on viral evolution. Her assertiveness while overcoming obstacles placed in the path of her bio-informatics research resulted in her being deemed insufficiently “collegial” to be granted tenure. Examples of the supposed “uncollegiality” included losing her temper at technical support workers who, six months into her employment, still had not provided adequate electricity or computing capacity to her research facilities, and requesting that the smashing of rock samples, an activity that was taking place in a lab directly overhead, be moved to another location. The Nevada Supreme Court upheld the use of “collegiality” in addition to the traditional university criteria of teaching, research and service criteria in her case.⁹ Professor McClure left UNLV to become an associate professor of microbiology at Montana State University at Bozeman.

Explicit gender stereotyping is only one form of cognitive bias. Others include in-group favoritism and polarized evaluations. Perhaps you have noticed that men tend to be evaluated on their “potential” as much as their performance, whereas strict adherence to the rules is reserved for women and minorities. Perhaps you have noticed that women and minority teachers either get stellar evaluations or really bad ones—there is no middle ground for academics who are perceived as “different.” Everyone in universities, from graduate students to young women starting out in their first jobs, to tenured faculty, to administration, needs to become more conscious of how cognitive bias can adversely affect the careers of women and others of minority status, and to take affirmative steps to ensure that decision making is not infected by it. The literature in this area is expanding, and extremely instructive. I especially recommend an article discussing the legal implications of the psychological research: UC Berkeley Law Professor Linda Krieger’s “The Content of Our Categories: A Cognitive Bias Approach to Discrimination and Equal Employment Opportunity.”¹⁰

Returning to the point with which I began, i.e., Justice Sandra Day O’Connor’s notion that

Using a Legal Toolkit continued from page 9

law reflects an emerging social consensus, I suggest that institutions that ignore the effect of cognitive bias on their faculty's decision making do so at their peril, because today's ignorance and unconscious bias is tomorrow's invidious and intentional discrimination. Academic institutions, especially research universities, have no excuse for ignoring the latest scientific thinking on how women and minorities are disadvantaged. If they do, I predict they will be held legally responsible for failing to take the necessary steps to prevent discrimination from occurring. Worse, they will have failed this wonderful generation of women scientists and impeded the advancement of science by failing to fully utilize their talents and abilities.

So using your eyes and your ears, your powers of observation and your terrific scientific minds,

let's work together to insure that that does not happen! ❖

- ¹ "Context and the Court," NYT, 6/25/03
- ² The guidelines are codified in the Code of Federal Regulations at 29 C.F. R. section 1604.10.
- ³ In 2003, Martha Burke, Chair of the National Council of Women's Organizations, challenged the Augusta National Golf Club's exclusion of women from membership, resulting in a highly acrimonious public dispute with club Chair Hootie Johnson during the Club's annual Masters Tournament.
- ⁴ *Ponton v. Regents*, San Francisco Superior Court No.700565-3 (unpublished Order granting petitioner's writ, 10/2/92).
- ⁵ Citation to federal appeals court and supreme court opinions are set out in footnotes. The Weinstock opinion, issued in 2000, begins on page 33 in Volume 224 of the Federal Reporter, Third Series, i.e., 224 F.3d 33 (2000).
- ⁶ 224 F.3d at 44
- ⁷ 490 U.S. 228 (1989)
- ⁸ 224 F. 3d at 57
- ⁹ *McClure v. State of Nevada* (Nevada Supreme Court Docket No. 36435 unpublished Order of Affirmance, March 29, 2002).
- ¹⁰ 47 Stanford Law Review 1161 (1995).



Denise Dee Denton (August 27, 1959–June 24, 2006) was the ninth Chancellor of the University of California, Santa Cruz (UCSC). She held the position from February 14, 2005 until her suicide 16 months later. She was a pioneer in the support of women and science in engineering, and was an inspiration to many of our readers. Meg Urry gives her personal remembrance of Denise Denton, followed by a transcript of her presentation to the Women In Astronomy II conference in June 2003.

Denise Denton continued from page 1



Photo of Denise Denton when she was on the faculty at the University of Wisconsin-Madison (1987-1996).

Credit: Jeff Miller/University of Wisconsin-Madison

babe" Years later, when it was announced that Denise was going to Santa Cruz, I thought, oh yeah, makes sense. The whole laid-back California hippie thing seemed like a great fit.

Her style was as effective as it was refreshing. That afternoon in Seattle she had us all riveted to our seats (when we weren't rolling in the aisles with laughter—her comic timing was spot on), describing her program to increase diversity in the School of Engineering at the University of Washington. You can find her very useful "toolkit" for hiring on the UW web site (www.washington.edu/admin/coo/forms/ftk_01.html), as well as resources associated with the larger NSF Advance project she led (www.engr.washington.edu/advance/resources/index.html). Much of her advice was common sense: go search for candidates, don't wait for their resumes to come in over the transom; sell applicants on your institution, don't act as if it would be their privilege to join you (even if it would be); consider the situation of spouses and partners, if needed (and learn how to assess that need without offending the candidate or breaking the law!); talk to search committees about how to search, what to say, and especially what not

to say; and most of all, let everyone know the Dean is fully engaged in the process.

Denise's talk generated so much discussion and so many questions she got through fewer than half her viewgraphs. But it was enough, even without the additional hour of questions she patiently answered after the hour-long session ended. Realizing now the demands of her job, I marvel that she even found the time to come speak to us in the first place. It's a sign of her deep dedication to improving things for women and minorities in science and engineering, a dedication that was recently recognized with the 2006 award from the Maria Mitchell Society of Nantucket. (Mitchell was a famous woman astronomer of the 19th century, and the award recognizes a person or organization who has helped to advance women in science.)

When it came time to plan the 2003 Women in Astronomy II conference at Caltech, Denise was at the top of my wish list of speakers. To our delight, she agreed to speak, and in the event, kept us all laughing with her talk, even as she fed us a very serious message. I can still picture her in her trademark surfer-dude style, light green jungle-print pants with matching loose top, curly blond mutton cut, those funky glasses, referring to the old guard as "bubbas" and

Denice Denton earned her bachelor's, master's, and Ph.D. degrees in electrical engineering from MIT. She was appointed to the faculty at the University of Wisconsin at Madison in 1987, where she earned numerous awards as an outstanding teacher and educator. While there, she was the recipient of a NSF Presidential Young Investigator Award. She moved to the University of Washington as Dean of the College of Engineering in 1996, and was instrumental in the University's ADVANCE program and in developing programs to enhance equal opportunity for women in engineering. She received the Presidential Award for Excellence in Science, Mathematic and Engineering Mentoring in 2004. That same year, she was appointed as Chancellor of the Santa Cruz campus of the University of California. Just this year, Chancellor Denton received the Maria Mitchell Women in Science Award for her achievements in increasing opportunities for women in the sciences.

For more information, and for many tributes to Denice's accomplishments, as well as interviews and articles, please see the following web sites:

Links to many remembrances

<http://chancellor.ucsc.edu>

Wisconsin

<http://www.news.wisc.edu/12679.html>

Washington

<http://www.engr.washington.edu/advance/>

http://www.mmo.org/subcat.php?cat_id=14&subcat_id=54&art_id=173

"Leadership and Strategies for Cultural Change in a High Tech Environment" speech given by Denice Denton at Google in 2005

http://www.anitaborg.org/news/publications/cultural_change.php

The "Faculty Recruitment Toolkit" Denton inspired at the U. of Washington

http://www.washington.edu/admin/eoo/forms/ftk_01.html

Denice Denton on cultural change

http://www.prism-magazine.org/sept01/dean_own.cfm

implemented it. She showed us that, instead of worrying endlessly about what to do, getting distracted by all the many areas that needed attention, instead of trying to fix everything at once, you could just do this, you could hire a diverse faculty. Most importantly, she showed once and for all that diversity does not come at the price of excellence. Her faculty of color and her women engineers, with success upon success after their arrival at UW (Denice described the abundance of NSF Career Awards that followed), demonstrated explicitly how diversity enhances excellence. Her school's reputation climbed, and Denice's did, too. Val Kuck, one of the leaders of the women chemists' movement, wrote me that, "At UW, the female faculty couldn't say enough good things about her work and how she really drove the reforms in the engineering community." Tons of emails like that flew around after the announcement of her death.

Everyone in "the movement" knew Denice. We all admired her dedication, her energy, and her success. Whenever faculty hiring is discussed at my institution, Denice's work follows in the next breath. She taught us excuses are no longer acceptable. In large part because of her pioneering work, we don't buy the claim that "there aren't any candidates" or "we asked Sandy Faber and she wasn't available." We know we can do better.

But Denice did more than transform academic hiring. By example she taught us to be tough, to shake off criticism and get on with what has to be done. Denice apparently had some hard times early in her career. How much more impressive, then, her confidence, her authority, her unhesitating attack on a difficult problem. She triumphed where others might understandably have retreated. Even without specific opposition, it's very stressful being a pioneer. All bystanders are natural critics (especially scientists!) and those whose oxen are being gored don't take kindly to change. I wonder sometimes if the majority can ever understand how difficult it is—how much energy it takes—just to maintain your self, just to hold up your outer envelope, when you're in the minority, and a path-breaker to boot. Eventually, Denice's energy got used up. Like all her admirers, I wish we could roll back the clock and beam her a huge energy infusion from her thousands and thousands of fans. It's too late for that, so instead we'll have to use our energy to bring to pass Denice's agenda: excellence, diversity, equal opportunity, and ultimately, a workplace that looks more like us. ❖

boldly exhorting us to get on with the business of transforming our institutions.

Mainly, she taught us that problems can be solved. Like the engineer she was, Denice analyzed the issue, developed a solution, and



The following article is a transcript of the presentation by Denice Denton to the 2003 Women in Astronomy II conference. At the time of WIA II Denice Denton was Dean of Engineering at the University of Washington. On February 14, 2005 she became Chancellor of the University of California, Santa Cruz, the position she held until her suicide 16 months later.

Making Institutional Change

By Denice Denton

Thank you. It's a real pleasure to be here today to talk about this really important topic. I'm going to talk about two things: diversifying faculty and staff ranks and how you retain those people once you recruit them. If you work hard to get great people into an organization, you don't want a revolving door where they're gone the next year. Particularly, I want to talk about the key role of leaders, and the cultural change that is required to recruit and retain a diverse group. I would argue that unit directors, deans, chairs, laboratory directors, whatever leaders you have in your organization, have to be involved. They have to provide the leadership, they have to have the vision that diversity and excellence go hand-in-hand, and they have to really believe that. Otherwise you might as well not try to deal with it at your organization. It will be a waste of your time. A related issue is if you are involved in a search for the lab director, the department chair, the dean, the provost, the president of the university, the notion that diversity and excellence go hand-in-hand has to be a go/no go issue at the time of the hire. If you can't bring in a leader who gets this, who knows it, who's lived it, who's got a track record, forget it! So there are issues that you need to think about in populating leadership positions if you really want to make progress in this arena. If the president doesn't care about it, it isn't going to happen!

Furthermore, the leader needs to get some clarity with the team about the hiring criteria. What are we looking for in this person, in this position? What kind of attributes, what kind of track record? One of the things that I've found is that when you're trying to achieve equity and diversity, if you have a poorly defined process, you won't have uniformity. Not having uniformity is a breeding ground for inequity. You've got to have some rigidity and uniformity about how you do the process in order to get equity out the other side. The other thing that I think is important is having some infrastructure in your organization. For example, on a university campus, if you have Women in Science and Engineering, Minorities in Science and Engineering, K-12 outreach, you

will have a better chance to recruit people who care about diversity. Those are some systematic, background things that I think are important. So in terms of recruitment, the unit director has got to be on top of the process. How are we going to do this search? And how are we going to do it consistently with our other searches?

When I first got to University of Washington, there were ten departments in the College of Engineering, each doing searches a different way. In addition, many of the departments were doing multiple searches. A big department might have five different searches, for five small areas. It's not the way to go! You dilute the search. If you have a department with five parallel search

committees, two things will happen. One is you lower the bar, because you don't have all the people in the pool together. You're not looking at the quality of the whole pool. The other thing is, because there are so few women and people of color, there is little likelihood you're going to have women and/or people of color in all of those search pools. So if you're trying to do diversity and excellence, I really think you need to look at the entire pool at the same time.

I meet with every department search committee every fall. The department chair will have assembled a search committee and assigned a chair. We sit down together and we talk about the process. What are the criteria, and how am I going to work with the committee? I talk to them very explicitly about the fact that we're looking for the best people in the world. How do you go out and find the best people in the world? When I got to Seattle, I observed that the organization was not hiring as many diverse faculty as I would have liked. So my initial thought was, "Well, gee, all I have to do is tweak in a little bit of diversity information, so that they can broaden their pool and have better diversity in the pool." So I started trying to add in some little things about diversity, and I found that they didn't know how to do a faculty search! And why should they? How many of you have had a class or any kind of professional development concerning how to do a search? We don't know how to do this stuff! We got Ph.D.s in other things, not Human Resources. As much as physicists, and electrical engineers, and astronomers like to think we know how to do everything, we don't! You just need to get some



Photo of Denice Denton from the University of California, Santa Cruz, where she was Chancellor in February 2006.

help. To provide that help, we built a search tool kit. That tool kit is online at <http://www.engr.washington.edu/advance>. It goes through a good search process. It synthesized some really good documents from around the country and we added some of our own materials.

I walk the search committees through the website and give them a hard copy. I discuss some of the issues. Here are some challenges that come up when you're doing a search, and you want to increase diversity. Number one, understand and know that there are illegal questions that violate Federal law when you're doing a search. What are those questions? Are you married? Do you have kids? Are you planning to have kids? What does your husband think about your taking this job? Will your husband move? How old are you? What religion are you? What's your race? It's important to discuss these illegal questions, because who is it that gets asked that stuff? Women, and people of color! So the director has to educate your team about what those illegal questions are. On our website, we discuss what you can and can't ask in searches. While that seems like it might not be a big deal, I know people, including myself, who've not gone to a place because they were asked illegal questions. What is the best way to answer an illegal question? I think that you can say, "Why is that important?" That usually stops them in their tracks. If it doesn't, then you can say, "Well, you know, I understand that that's not an appropriate question."

Here's another thing to tell the search committee not to do. I had a conversation with a search committee looking for a department chair. They called a woman and said, "We're very interested in you. We want you to come and be the department chair. And the dean wants a woman!" So I get a call from this woman. She says, "What's going on up there?" I said, "What do you mean?" "Well, I got this call. They said you want a woman!" I said, "Oh! Sorry, sorry, sorry. I don't want a woman, you know what I mean?" So I say to my search committees "Read my lips. I'm not saying, 'I want a woman!'" I tell that story to every search committee. I say, "Think about it! If somebody called you and said, 'We're real interested in you because our dean wants a man!' How would you interpret that? It sounds like 'We don't care if you're smart, we don't care about anything except your anatomy.' And that's how it comes out when you hear it." I've heard it many times. "Oh, Denice, can you be on this committee? We need a woman." "Well, do you need a smart one, a dumb one? Idiot? Village idiot okay? I'm kind of busy, but I know a stupid woman." You have to really get into it and have the conversation. But I really urge you to do it if you're in that kind of a position.

So the next thing is, what have we all heard when we start talking about this? "Well, sure, but...There aren't any!" I take along to our meeting the latest National Research Council statistics on the post-docs and Ph.D. graduates. They have it by department, by discipline, by ethnicity—all the demographics. I pull it out if it's the Chemical Engineering Department, for example, and say "Let's see how many women got Ph.D.s in Chem-E last year. Look at that! Forty! Maybe we can find one of them." Scientists and engineers are data driven. You can get past a lot of misconceptions by showing them some numbers. It's on the web. Print it out. I talk to them about how to cast the net broadly, do very proactive recruitment, and early recruitment. We talk about the fact that every department ought to be searching all the time. You're at a meeting, a young woman gives a great talk. Go up to her and say, "I was very impressed by your talk, and I hope you will consider our university when the times comes for you to look for a faculty position. Here's my card." Be on the watch all the time for people who could be good faculty. Go up to them and tell them that. Women and people of color have never heard it and you will make an impression. So be recruiting all the time. Get to know people. All the departments should be doing that.

Once you get to the interview you want to establish equitable treatment. What can happen is Mr. Smith is interviewing this week, and Ms. Jones is coming next week. Well, gee, somehow Smith's interview is smooth as silk. We got it all planned. Jones is coming on Tuesday. It's Tuesday! We're running around the hall going, "Who's taking her to dinner? Who's got any time to do that?" So that's why process matters. You want to make sure you're treating people equitably. One of the big issues with faculty, and I would say it's particularly big for physicists and astronomers is, "Well, we have to find out who's good enough to go through the eye of our needle. Be like us." So here are 1,000 applications, and we're filtering through to figure out who we're going to anoint and bless, who is going to join us. Well, guess what? Good people have a lot of opportunities. So we have got to recruit them. If a person is that great, she will get ten offers. This is a recruitment, not a search. The search is the easy part. The hard part is getting that best person in the country to come to your organization. So another thing that I do is I interview all the candidates myself. I think that sends a message, both to the internal people that I care a lot about this and to the candidate. You should appoint an ambassador for the candidate. Miss Jones knows that you're her ambassador.

Continued on page 14

Institutional Change *continued from page 13*

You know that you're her ambassador, and you stay in touch with her. Think about partner hire issues. Think about them as early as you can. Get involved with them. Have a policy in your organization of how you will deal with them. Be equitable about the start-up package.

Here's an important issue. We have an endowed chair. Close your eyes and imagine what the person who you recruit into that chair will look like. If we're sitting in the astronomy department, and there are 20 older guys and three or four women, what image will be conjured up? "He will be older. He's probably going to have grey hair.

Distinguished, respectable authority." Right? "World-renowned. Superstar." Make sure that you're using your endowed positions to recruit women and people of color. Endowed chairs almost always go to white guys. So it's another issue where the leadership has to be honest, or it won't happen.

How do you discuss partner hire? We have a three page list of benefits for new faculty. One of the items on that list is a dual-career program. So I walk candidates through the list and point out the different kinds of programs that we have, and say, "Would you like to hear more about any of these?" Now if you're the graduate student or the post-doctoral fellow doing an interview, when should you bring it up? I would say, if you like that place and you're getting good vibes from them on your first interview, bring it up then. If they get upset about it when you bring it up, then it's probably not a great place for you to go. They ought to be able to handle that issue. On the other hand, you could wait until they call back and say, "We want to make an offer to you." What's the difficulty with that? It's late May, faculty have left. Your partner wants an academic position. They want you there in the fall. It's really difficult at that point to arrange everything, so you've probably lost that opportunity. I would argue disclose earlier rather than later.

What do you think I hear all the time from people about diversity initiatives? Not from you, from your counterparts. "You're lowering the standards. You don't care about quality. You're taking jobs away from qualified people." The Clarence Thomas argument. "They will feel bad if they get this job." Right! How many people in this room ever felt horrible, because they got a job because of affirmative action. Anybody? A few people. So let's talk about quality. We had 22 new hires in a recent year, all in engineering. Seven were women, two were African-American. Well, we had in the year 2001, 14 career award applications, and we won nine career awards in one year. I went on the NSF website, and I couldn't find any other R-1 university that on a per capita basis in engineering had ever, ever had that many! If you

need to convince people, show them some data like this. You don't have to lower your standards. We've gotten 25 career awards in four years.

I'll make a couple of meta-comments. One meta-comment is that for those of you who are thinking about going into a leadership position, you really can have an impact. I've been at Seattle seven years, and I feel like I've really had a huge impact. They weren't emphasizing diversity before I got there. They were doing some of it—I didn't start from scratch. Now we've really moved to a whole new level, and I continue to teach. I have a small scale research program going. You don't have to give up your life to go into administration. So the comment is if you are willing to take on a leadership position, you can continue to do other things, and you can have impact. If you take on a position like this, you can do things differently from what the typical white guy would have done. So can a white guy! Anybody can make that choice to do things really differently from the way they're normally done. So I would urge you to consider that kind of a leadership position.

You have to provide support once the new faculty arrive. At UW, we have a week-long new faculty workshop for the whole campus. We have a half-day workshop for the college to orient people. We give quarterly workshops to all our assistant professors in engineering. How do you write the career award? First you have to have brilliant people, but you give them some infrastructure. We do workshops on grantsmanship and time management. How to run a group. Mentoring. We spend a lot of time trying to get that right. That's pretty hard.

In addition to that, we constantly work on improving the environment. We're very people focused, we really try to catalyze cultural change. We try to recognize and honor the contributions of staff and faculty. Faculty in the room— how many of you in the last month have had an email from your department chair saying, "Great job! Great job! Love what you're doing! Love it, love it!" Leaders need to do that: it's free, it's fast, and it has huge bang for the buck. Do it publicly. Send out to the whole department, "Ms. Jones got the Waterman! We're thrilled!" Copy the president, copy the provost. That's the kind of thing we tend not to do well. Who thinks that way? Not many, and it makes a huge, huge difference.

Finally, you have to shift the paradigm. We're not fixing the *woman*, we're fixing the *system*. Leverage the fact that Federal agencies are now mandating diversity in their request for proposals. A specific example is the NSF Advance program, which focuses on advancing women faculty in science, math and engineering into leadership positions. ❖

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Does gender matter?

By Ben A. Barres, Stanford University School of Medicine, Department of Neurobiology

When I was 14 years old, I had an unusually talented maths teacher. One day after school, I excitedly pointed him out to my mother. To my amazement, she looked at him with shock and said with disgust: “You never told me that he was black”. I looked over at my teacher and, for the first time, realized that he was an African-American. I had somehow never noticed his skin colour before, only his spectacular teaching ability. I would like to think that my parents’ sincere efforts to teach me prejudice were unsuccessful. I don’t know why this lesson takes for some and not for others. But now that I am 51, as a female-to-male transgendered person, I still wonder about it, particularly when I hear male gym teachers telling young boys “not to be like girls” in that same derogatory tone.

Hypothesis testing

Last year, Harvard University president Larry Summers suggested that differences in innate aptitude rather than discrimination were more likely to be to blame for the failure of women to advance in scientific careers¹. Harvard professor Steven Pinker then put forth a similar argument in an online debate², and an almost identical view was elaborated in a 2006 essay by Peter Lawrence entitled ‘Men, Women and Ghosts in Science’³. Whereas Summers prefaced his statements by saying he was trying to be provocative, Lawrence did not. Whereas Summers talked about “different availability of aptitude at the high end,” Lawrence talked about average aptitudes differing. Lawrence argued that, even in a utopian world free of bias, women would still be under-represented in science because they are innately different from men.

Lawrence draws from the work of Simon Baron-Cohen⁴ in arguing that males are ‘on average’ biologically predisposed to systematize, to analyse and to be more forgetful of others, whereas females are ‘on average’ innately designed to empathize, to communicate and to care for others. He further argues that men are innately better equipped to aggressively compete in the ‘vicious struggle to survive’ in science. Similarly, Harvard professor Harvey Mansfield states in his new book, *Manliness*⁵, that women don’t like to compete, are risk adverse, less abstract and too emotional. I will refer to this view—that women are not advancing because of innate inability rather than because of bias or other factors—as the Larry Summers Hypothesis. It is a view that seems to have resonated widely with male, but not female, scientists. Here, I will argue that available scientific data do

not provide credible support for the hypothesis but instead support an alternative one: that women are not advancing because of discrimination. You might call this the ‘Stephen Jay Gould Hypothesis’ (see left). I have no desire to make men into villains (as Henry Kissinger once said, “Nobody will ever win the battle of the sexes; there’s just too much fraternizing with the enemy”). As to who the practitioners of this bias are, I will be pointing my finger at women as much as men. I am certain that all the proponents of the Larry Summers Hypothesis are well-meaning and fair-minded people, who agree that treatment of individuals should be based on merit rather than on race, gender

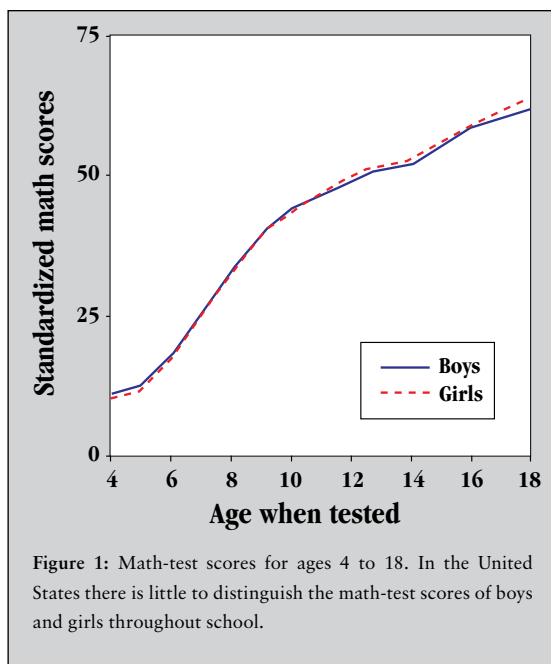
or religion stereotypes.

The sums don’t add up

Like many women and minorities, however, I am suspicious when those who are at an advantage proclaim that a disadvantaged group of people is innately less able. Historically, claims that disadvantaged groups are innately inferior have been based on junk science and intolerance⁶. Despite powerful social factors that discourage women from studying maths and science from a very young age⁷, there is little evidence that gender differences in maths

“Few tragedies can be more extensive than the stunting of life, few injustices deeper than the denial of an opportunity to strive or even to hope, by a limit imposed from without, but falsely identified as lying within.”
– Stephen Jay Gould.”

Does gender matter? continued from page 15



abilities exist, are innate or are even relevant to the lack of advancement of women in science⁸. A study of nearly 20,000 maths scores of children aged 4 to 18, for instance, found little difference between the genders (Fig. 1)⁹, and, despite all the social forces that hold women back from an early age, one-third of the winners of the elite Putnam Math Competition last year were women. Moreover, differences in maths-test results are not correlated with the gender divide between those who choose to leave science¹⁰. I will explain why I believe that the Larry Summers Hypothesis amounts to nothing more than blaming the victim, why it is so harmful to women, and what can and should be done to help women advance in science.

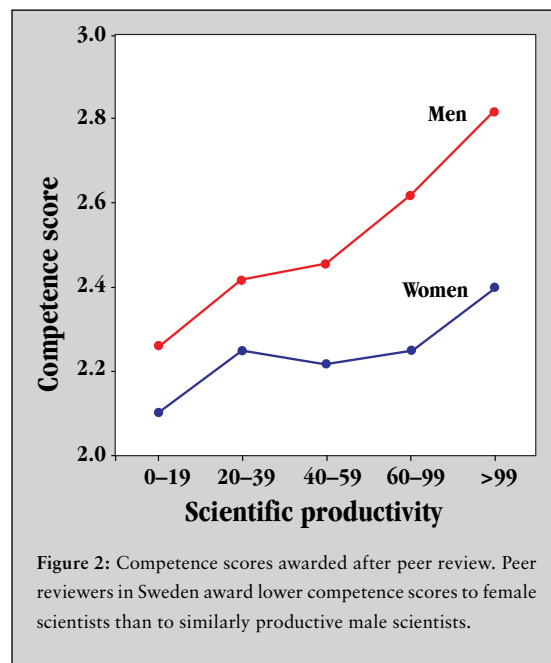
If innate intellectual abilities are not to blame for women's slow advance in science careers, then what is? The foremost factor, I believe, is the societal assumption that women are innately less able than men. Many studies, summarized in Virginia Valian's excellent book *Why So Slow?*¹¹, have demonstrated a substantial degree of bias against women—more than is sufficient to block women's advancement in many professions. Here are a few examples of bias from my own life as a young woman. As an undergrad at the Massachusetts Institute of Technology (MIT), I was the only person in a large class of nearly all men to solve a hard maths problem, only to be told by the professor that my boyfriend must have solved it for me. I was not given any credit. I am still disappointed about the prestigious fellowship competition I later lost to a male

contemporary when I was a Ph.D. student, even though the Harvard dean who had read both applications assured me that my application was much stronger (I had published six high-impact papers whereas my male competitor had published only one). Shortly after I changed sex, a faculty member was heard to say "Ben Barres gave a great seminar today, but then his work is much better than his sister's."

Anecdotes, however, are not data, which is why gender-blinding studies are so important¹¹. These studies reveal that in many selection processes, the bar is unconsciously raised so high for women and minority candidates that few emerge as winners. For instance, one study found that women applying for a research grant needed to be 2.5 times more productive than men in order to be considered equally competent (Fig. 2)¹². Even for women lucky enough to obtain an academic job, gender biases can influence the relative resources allocated to faculty, as Nancy Hopkins discovered when she and a senior faculty committee studied this problem at MIT. The data were so convincing that MIT president Charles Vest publicly admitted that discrimination was responsible. For talented women, academia is all too often not a meritocracy.

In denial

Despite these studies, very few men or women are willing to admit that discrimination is a serious problem in science. How is that possible? Valian suggests that we all have a strong desire to believe that the world is fair¹¹.



Remarkably, women are as likely as men to deny the existence of gender-based bias¹³. Accomplished women who manage to make it to the top may ‘pull up the ladder behind them’, perversely believing that if other women are less successful, then one’s own success seems even greater. Another explanation is a phenomenon known as ‘denial of personal disadvantage’, in which women compare their advancement with other women rather than with men¹¹.

My own denial of the situation persisted until last year, when, at the age of 50, several events opened my eyes to the barriers that women and minorities still face in academia. In addition to the Summers speech, the National Institutes of Health (NIH) began the most prestigious competition they have ever run, the Pioneer Award, but with a nomination process that favoured male applicants¹⁴. To their credit, in response to concerns that 60 of 64 judges and all 9 winners were men, the NIH has revamped their Pioneer Award selection process to make it fairer. I hope that the Howard Hughes Medical Institute (HHMI) will address similar problems with their investigator competitions. When it comes to bias, it seems that the desire to believe in a meritocracy is so powerful that until a person has experienced sufficient career-harming bias themselves they simply do not believe it exists.

My main purpose in writing this commentary is that I would like female students to feel that they will have equal opportunity in their scientific careers. Until intolerance is addressed, women will continue to advance only slowly. Of course, this feeling is also deeply personal to me (see ‘Personal experiences’). The comments of Summers, Mansfield, Pinker and Lawrence about women’s lesser innate abilities are all wrongful and personal attacks on my character and capabilities, as well as on my colleagues’ and students’ abilities and self esteem. I will certainly not sit around silently and endure them.

Mansfield and others claim that women are more emotional than men. There is absolutely no science to support this contention. On the contrary, it is men that commit the most violent crimes in anger—for example, 25 times more murders than women. The only hysteria that exceeded MIT professor Nancy Hopkins’ (well-founded) outrage after Larry Summers’ comments was the shockingly vicious news coverage by male reporters and commentators. Hopkins also received hundreds of hateful and even pornographic messages, nearly all from men, that were all highly emotional.

Taboo or untrue?

There is no scientific support, either, for the contention that women are innately less competitive (although I believe powerful curiosity and the drive to create sustain most scientists far more than the love of competition). However, many girls are discouraged from sports for fear of being labelled tomboys. A 2002 study did find a gender gap in competitiveness in financial tournaments, but the authors suggested that this was due to differences in self confidence

“I am suspicious when those who are at an advantage proclaim that a disadvantaged group of people is innately less able.”

As a transgendered person, no one understands more deeply than I do that there are innate differences between men and women. I suspect that my transgendered identity was caused by fetal exposure to high doses of a testosterone-like drug. But there is no evidence that sexually dimorphic brain wiring is at all relevant to the abilities needed to be successful in a chosen academic career. I underwent intensive cognitive testing before and after starting testosterone treatment about 10 years ago. This showed that my spatial abilities have increased as a consequence of taking testosterone. Alas, it has been to no avail; I still get lost all the time when driving (although I am no longer willing to ask for directions). There was one innate difference that I was surprised to learn is apparently under direct control of testosterone in adults—the ability to cry easily, which I largely lost upon starting hormone treatment. Likewise, male-to-female transgendered individuals gain the ability to cry more readily. By far, the main difference that I have noticed is that people who don’t know I am transgendered treat me with much more respect: I can even complete a whole sentence without being interrupted by a man.



rather than ability¹⁵. Indeed, again and again, self confidence has been pointed to as a factor

Does gender matter? *continued from page 17*

influencing why women ‘choose’ to leave science and engineering programmes. When women are repeatedly told they are less good, their self confidence falls and their ambitions dim¹⁶. This is why Valian has concluded that simply raising expectations for women in science may be the single most important factor in helping them make it to the top¹¹.

Steven Pinker has responded to critics of the Larry Summers Hypothesis by suggesting that they are angry because they feel the idea that women are innately inferior is so dangerous that it is sinful even to think about it¹⁷. Harvard Law School professor Alan Dershowitz sympathizes so strongly with this view that he plans to teach a course next year called ‘Taboo’. At Harvard we must have veritas; all ideas are fair game. I completely agree. I welcome any future studies that will provide a better understanding of why women and minorities are not advancing at the expected rate in science and so many other professions.

But it is not the idea alone that has sparked anger. Disadvantaged people are wondering why privileged people are brushing the truth under the carpet. If a famous scientist or a president of a prestigious university is going to pronounce in public that women are likely to be innately inferior, would it be too much to ask that they be aware of the relevant data? It would seem that just as the bar goes way up for women applicants in academic selection processes, it goes way down when men are evaluating the evidence for why women are not advancing in science. That is why women are angry. It is incumbent upon those proclaiming gender differences in abilities to rigorously address whether suspected differences are real before suggesting that a whole group of people is innately wired to fail.

What happens at Harvard and other universities serves as a model for many other institutions, so it would be good to get it right. To anyone who is upset at the thought that free speech is not fully protected on university campuses, I would like to ask, as did third-year Harvard Law student Tammy Pettinato: what is the difference between a faculty member calling their African-American students lazy and one pronouncing that women are innately inferior? Some have suggested that those who are angry at Larry Summers’ comments should simply fight words with more words (hence this essay). In my view, when faculty tell their students that they are innately inferior based on race, religion, gender or sexual orientation, they are crossing a line that should not be crossed—the line that divides free speech from verbal violence—and it should not be tolerated at Harvard or anywhere else. In a culture where women’s abilities are not respected,

women cannot effectively learn, advance, lead or participate in society in a fulfilling way.

Take action

Although I have argued that the Larry Summers Hypothesis is incorrect and harmful, the academic community is one of the most tolerant around. But, as tolerant as academics are, we are still human beings influenced by our culture. Comments by Summers and others have made it clear that discrimination remains an under-recognized problem that is far from solved. The progress of science increasingly depends on the global community, but only 10% of the world’s population is male and caucasian. To paraphrase Martin Luther King, a first-class scientific enterprise cannot be built upon a foundation of second-class citizens. If women and minorities are to achieve their full potential, all of us need to be far more proactive. So what can be done?

First, enhance leadership diversity in academic and scientific institutions. Diversity provides a substantially broader point of view, with more sensitivity and respect for different perspectives, which is invaluable to any organization. More female leadership is vital in lessening the hostile working environment that young women scientists often encounter. In addition to women and under-represented minority groups, we must not forget Asians and lesbian, gay, bisexual and transgendered folks. There are enough outstanding scientific leaders in these racial and gender groups that anyone with a will to achieve a diverse leadership in their organization could easily attain it.

Speak out

Second, the importance of diverse faculty role models cannot be overstated. There is much talk about equal opportunity, but, in practice, serious attention still needs to be directed at how to run fair job searches. Open searches often seem to be bypassed entirely for top leadership positions, just when it matters most—search committees should not always be chaired by men and the committee itself should be highly diverse^{14,18}. Implementation of special hiring strategies and strong deans willing to push department chairs to recruit top women scientists are especially effective. It is crucial in the promotion process that merit be decided by the quality, not quantity, of papers published.

Women faculty, in particular, need help from their institutions in balancing career and family responsibilities. In an increasingly competitive environment, women with children must be able to compete for funding and thrive. Why can’t young faculty have the option of using their tuition benefits, in which some universities pay part of the college tuition fees for the children of faculty, for day care instead? Tuition benefits will be of no help if female scientists don’t make

tenure. And institutions that have the financial capability, such as HHMI, could help by making more career transition fellowships available for talented women scientists.

Third, there should be less silence in the face of discrimination. Academic leadership has a particular responsibility to speak out, but we all share this responsibility. It takes minimal effort to send a brief message to the relevant authority when you note a lack of diversity in an organization or an act of discrimination. I don't know why more women don't speak out about sexism at their institutions, but I do know that they are often reluctant, even when they have the security of a tenured faculty position. Nancy Hopkins is an admirable role model, and it is time that others share the burden. It doesn't only have to be women that support women. I was deeply touched by the eloquent words of Greg Petsko¹⁹ following Summers' comments. And it has been 30 years since I was a medical student, but I still recall with gratitude the young male student who immediately complained to a professor who had shown a slide of a nude pin-up in his anatomy lecture.

Fourth, enhance fairness in competitive selection processes. Because of evaluation bias, women and minorities are at a profound disadvantage in such competitive selection unless the processes are properly designed^{11,12,14,18}. As the revamped NIH Pioneer Award demonstrates, a few small changes can make a significant difference in outcome. By simply changing the procedure so that anyone can self-nominate and by ensuring a highly diverse selection committee, the number of women and minority winners went up to more than 50% from zero. This lesson can and should now be applied to other similar processes for scientific awards, grants and faculty positions. Alas, too many selection committees still show a striking lack of diversity—with typically greater than 90% white males. When selection processes are run fairly, reverse discrimination is not needed to attain a fair outcome.

Confidence booster

Finally, we can teach young scientists how to survive in a prejudiced world. Self-confidence is crucial in advancing and enjoying a research career. From an early age, girls receive messages that they are not good enough to do science subjects or will be less liked if they are good at them. The messages come from many sources, including parents, friends, fellow students and, alas, teachers. When teachers have lower expectations of them, students do less well. But we are all at fault for sending these messages and for remaining silent when we encounter them. Teachers need to provide much more

encouragement to young people, regardless of sex, at all stages of training. Occasional words of encouragement can have enormous effects.

All students, male and female, would benefit from training in how to be more skillful presenters, to exert a presence at meetings by asking questions, to make connections with faculty members who may help them to obtain grants and a job, and to have the leadership skills necessary to survive and advance in academia. Because women and minorities tend to be less confident in these areas, their mentors in particular need to encourage them to be more proactive. I vividly recall my Ph.D. supervisor coming with me to the talks of famous scientists and forcing me to introduce myself and to ask them questions. There is a great deal of hallway mentoring that goes on for young men that I am not sure many women and minorities receive (I wish that someone had mentioned to me when I was younger that life, even in science, is a popularity contest—a message that Larry Summers might have found helpful as well). It is incumbent on all of us who are senior faculty to keep a look out for highly talented young people, including women and minority students, and help them in whatever way possible with their careers. ♦

“Simply raising expectations for women in science may be the single most important factor in helping them make it to the top.”
— Virginia Valian

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Nancy Forbes is a scientist based in Washington and author of "Imitation of Life: How Biology is Inspiring Computing". This article appeared in the Baltimore Sun on August 6, 2006.

White men, white coats, little change

By Nancy Forbes

The recent, alarming report by the National Academies of Science on the health of our innovation economy, "Rising Above the Gathering Storm, Energizing and Employing America for a Brighter Economic Future," did the nation a major service by decrying the dismal state of science and math education in the U.S. and the gradual erosion of our world primacy in science and technology.

But the report fell short in one crucial area: It failed to address the persistent shortage of women and minorities in science and engineering.

The report, whose authors included university presidents, company executives and Nobel Prize winners, presented convincing evidence that the foundation for a healthy economy, national security and quality of life is "derived in large part from the productivity of well-trained people and the steady stream of scientific and technical innovations they produce." It repeatedly drove home the fact that our role as world leader is linked to our standing in science and technology more than we know, and that we can't afford to be as complacent about it as we have been.

To address the problem, the authors proposed a series of actions centered around four main focus areas: improving K-12 education in math and science; encouraging the best and brightest students to enter undergraduate and graduate study in science and engineering; strengthening basic and applied research and development; and revitalizing high-tech innovation and entrepreneurship. The Bush administration appears to have taken their recommendations to heart, with its \$136 billion, 10-year American Competitiveness Initiative.

Yet, as a scientist and longtime advocate of women and minorities in the field, I was surprised - and dismayed - to find diversity issues missing from the four key challenge areas. Women and minorities are still not full participants in science and engineering, especially in the upper echelons, and renewed efforts to further this goal could make a substantial difference in our technological future.

The under-representation of women and minorities in science, technology, engineering

and math has been researched and re-researched for decades now, so there is a plethora of data on the topic. Did the authors of "The Gathering Storm" feel diversity was old hat? Or did they think the situation had so improved that there wasn't much of a problem anymore?

Yes, there have been gains. Women now hold more than a quarter of all science and engineering jobs, compared with 13 percent in 1980. They now earn roughly half the doctorates in biology and degrees in medicine. Numbers are also up in physics, computer science and engineering, traditionally male domains.

In 1983, women held less than 6 percent of all engineering jobs. Today, that has doubled. Almost half of all high school physics students are female, yet they are still only 18 percent of all physics doctorates. Black and Hispanic physicists are rarities. From 1983-2003, only 115—less than 1 percent-of doctorates in physics went to U.S. African-Americans, and only a few more to Hispanics. Meanwhile, the vast majority of the almost 15,000 of these academic degree awarded went to white males. Our racial minorities still make up less than 1 percent of the physics job market; the numbers in engineering are equally low.

Even with these upward trends, women and minority scientists and engineers do not always realize their full potential or reach their maximum intellectual heights. Attrition remains a serious problem, beginning in elementary school. Many girls and non-Caucasians with a natural curiosity about science lose interest for lack of encouragement, mentoring or proper instruction. Or they may lack role models and simply give up.

Loss of talent occurs at all stages of the educational and career pipeline. For example, many women and minorities claim they still feel "diminished by discrimination we barely see," as Meg Urry, a friend and one of the few female tenured physics professors, once put it. Women and minority scientists and engineers, on the whole, still earn less money than their male colleagues. They obtain fewer of the top jobs, and feel marginalized, undervalued, and less respected. Many find their careers derailed by subtle discrimination or the difficulty of balancing family and work. Success is often less a question of ability than how well one handles the cumulative effects of bias and an unfriendly school or job climate.

A few years ago, I attended a symposium at an annual meeting of the National Academy of Sciences. Though I didn't expect to see many women or minorities, I was still bowled over by the sheer number of Caucasian, gray-haired males in the auditorium. The feeling of being so completely outnumbered was visceral, similar to what I had experienced in physics classrooms or later on, at meetings in the Washington defense engineering community. Situations like this can impede "full participation," as those in the minority become too inhibited or intimidated to speak up. Parity in the field seemed cons away.

So for those who sincerely care about the future of U.S. science and technology and want to help stem the tide of its decline, I would like to add a fifth recommendation to the four already put forth in the academies' report: that all members of our science and engineering community, particularly those nonfemale and nonminority members, make a personal effort to increase diversity in science, technology, engineering and math. Suggestions include:

- ◆ Mentoring female or minority students through encouragement, guidance or emotional support. Studies show that those with mentors have higher salaries, more advanced positions and greater confidence in their ability to succeed.

- ◆ Helping qualified women or minorities along their career paths by giving them referrals, recommendations or outright recruitment.
- ◆ Nominating them for leadership positions.
- ◆ Showing support for junior female or minority colleagues in the workplace. This could involve salary parity, an important committee membership, and most importantly, friendship.
- ◆ Giving credit to a woman, black, Hispanic or other minority scientist or engineer when credit is due.

In the Association for Women In Science (AWIS), a 35-year-old national organization I belong to, we use the expression, "to give a hand up" to describe efforts to help women become full participants in the field. It's my gut feeling that if we all "gave a hand up" to women and minority scientists and engineers, it would make a measurable difference in the future of our science and engineering enterprise. There's a huge talent pool out there. Trust me. ❖



“That’s an excellent suggestion, Miss Tiggs. Perhaps one of the men here would like to make it.”

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SPOTLIGHT

A SECTION OF STATUS

STATUS is beginning a new column to honor the women and men who promote women in science issues and particularly those who have a unique and active role in the astronomy community. If you have a candidate for the Spotlight column, please contact Joanna Hinz at jhinz@as.arizona.edu.



LISA FRATTARE received her undergraduate education in physics and astronomy at Arizona State University and went on to receive a master's in astronomy from Wesleyan University. She is now an Astronomical Image Processor at the Space Telescope Science

Institute in Baltimore, where she has worked for the past 10 years. She is a member of the Hubble Heritage Team and the STScI News Team and juggles this high-profile work with taking care of her two children.

She has long served the community of women in astronomy as a member of the CSWA board and has held the positions of co-editor of the STATUS and AAS Women newsletters. She is a co-founder of the Women in Astronomy Database, and co-author and co-editor of Equity Now: The Pasadena Recommendations for Gender Equality in Astronomy. Colleague Pat Knezek says of her, "She has put a tremendous effort into promoting women in science issues, in a very quiet, persistent mode".

Lisa became attuned to women's issues early in her career and can remember being "easily set-off" by inequities in her college environment. One incident specific to astronomy stays with her: as an undergraduate attending an AAS meeting, she read an article in STATUS that horrified her. It was a personal testimonial from a student who was being sexually harassed by a professor and who was likely leaving astronomy because of it. Lisa felt moved by this article, enough that she attempted to talk to others at the conference about this terrible account. Lisa was sorely disappointed: "Most had not read it. Most

did not care. It was my first time being exposed to such a tragedy, but for them, the effect was not the same."

Turning her disappointment into a positive force, Lisa became more aware of women's issues, listening to the experiences of more senior female astronomers and mentors and held to the belief that, with some attention to detail, people could be taught not to act in a discriminatory manner. She began emailing authors of documents with male-dominant language, both in her professional and private life, eventually joining with the more formal AAS infrastructure to continue her activity in women's issues.

Lisa says of her experiences, "I am grateful for all those who have gone before me and to all my comrades in arms that encouraged me to continue the fight. A special thanks goes out to my early mentors: Meg Urry, Anne Cowley, and Bill Keel. Their enthusiastic push for gender equality in astronomy was contagious and empowering. What I have taken away from this battle is to stand up for what I feel is right, and to call someone on an injustice. Small changes are still progress, even though across disciplines many groups are endlessly reinventing the wheel when it comes to improving the atmosphere for women in science. At times, the going gets tough. Eventually, enough change will be made that I will feel we have made a difference in the world. For now, I will slowly keep fighting, one 'he/his' at a time." ♦



Rebecca M. Young is at the Women's Studies Department, Barnard College, Columbia University. Evan Balaban is in the Behavioral Neurosciences Program, McGill University.

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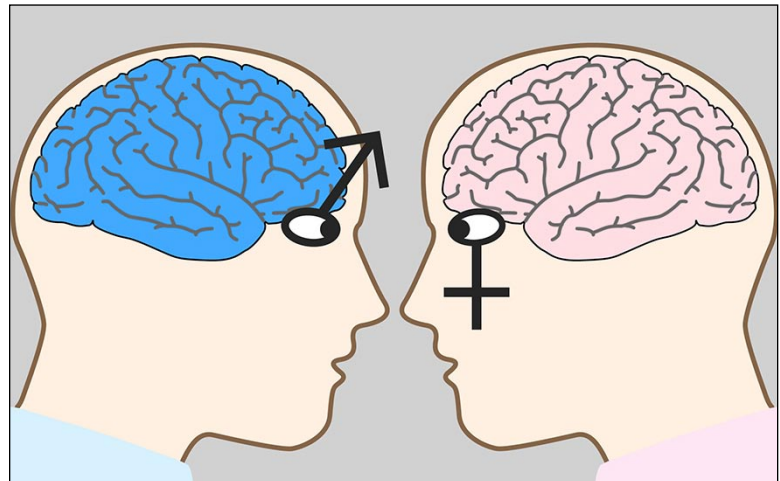
The Female Brain, Louann Brizendine (Morgan Road: 2006. 279 pp. \$24.95)

Reviewed by Rebecca M. Young & Evan Balaban

In an age when one in three American adults firmly rejects evolution as false, it is a daunting challenge to write a popular and accessible account of the endocrinology, pharmacology, neurobiology, development and evolution of human sex differences. As a result, we are inclined to give authors who take up the challenge a certain amount of freedom to spruce up the facts in order to attract lay readers, who may not have the patience for the usual cautious, scientific approach.

In her book *The Female Brain*, Louann Brizendine adopts a mix of self-help, sex-specific medicine and populist neuroscience. The book advances a particularly stark version of the theory that exposure to prenatal hormones 'hard-wire' male and female brains for sex-differentiated patterns of emotion and cognition throughout life. Brizendine—director of the Women's Mood and Hormone Clinic at the University of California, San Francisco, with diplomas in neurobiology from the University of California, Berkeley, medicine from Yale University, and psychiatric training at Harvard Medical School—uses personal stories from her patients, her friends and her own life to anchor the discussion of sex differences in behaviour, hormones and the brain. The stories are the best part of the book, and it is through these that Brizendine emerges as a dedicated and sympathetic clinician. Readers whose eyes glaze over when they encounter scientific concepts will surely be drawn in.

Yet, despite the author's extensive academic credentials, *The Female Brain* disappointingly fails to meet even the most basic standards of scientific accuracy and balance. The book is riddled with scientific errors and is misleading



Credit: Steve Bartlett

about the processes of brain development, the neuroendocrine system, and the nature of sex differences in general. At the 'big picture' level, three errors stand out. First, human sex differences are elevated almost to the point of creating different species, yet virtually all differences in brain structure, and most differences in behaviour, are characterized by small average differences and a great deal of male–female overlap at the individual level. Second, data on structural and functional differences in the brain are routinely framed as if they must precede all sex differences in behaviour. Finally, the focus on hormone levels to the virtual exclusion of the systems that interpret them (and the mutual regulatory interactions between receptor and secretion systems) is especially lamentable, given the book's clinical emphasis on hormone therapies.

Misrepresentations of scientific details are legion. Readers who studied biology in high school may puzzle over the invocations of the male brain with its single "dose of X chromosome (there are two Xs in a girl)": is the author suggesting that X-chromosome dosage compensation is absent from female brains? Is it an improvement to dispel the myth that testosterone is a "male hormone" only to call it the "sex and aggression hormone"? (If each hormone needs a sound bite, "confidence and sense of well-being hormone" might better fit the data.) Ironically, at the intracellular level, much of the differentiation of the "testosterone formed male brain" is accomplished by oestrogens.

Continued on page 24

Female Brain continued from page 23

Fostering such misleading metaphors may prevent broader understanding.

The text is rife with ‘facts’ that do not exist in the supporting references. A typical example is the claim that young boys “physically cannot hear” the cues in the intonation of adult human female voices that girls can, “just as bats can hear sounds that even cats and dogs cannot”. The references provided (including a paper on songbird brains) require major misunderstanding or misrepresentation to be twisted into such a statement, a state of affairs that is repeated throughout the book.

Like other popular books on the biology of human nature, *The Female Brain* has a rigid plot line: the foil of ‘political correctness’ against which the author wages a struggle for truth. We are told that the media, feminists, pointy-headed intellectuals and a vaguely specified ‘culture’ dogmatically insist that gender or racial differences in personality and behaviour are entirely cultural, an observation that is hard to reconcile with the volume and tone of media attention to the biology of gender and sexuality.

Such assertions require empirical support. This genre loves to dwell on childhood toy preferences: little girls cradle inanimate, ‘boy-coded’ objects as if they were baby dolls (here,

as is often the case, it’s a fire engine); and little boys turn harmless objects into weapons (our favourite is the boy who bites his toast into a gun in Deborah Blum’s *Sex on the Brain* (Allen Lane, 1997)). The emphasis on myth-busting turns into a vehicle for dressing the myth up in new clothes—such as Simon Baron-Cohen’s recent hypothesis that the ‘male brain’ is hard-wired for ‘systematizing’, and the ‘female brain’ is hard-wired for ‘empathizing’—there is no shortage of pseudo-scientific ways of saying ‘thinkers’ and ‘feelers’. The problem with such explanations of sex differences is not that they are overly biological, but that they are fundamentally non-biological and explain nothing.

Ultimately, this book, like others in its genre, is a melodrama. Common beliefs are recast as imperilled and then saved. Stark, predictable protagonists (an initial “cast of neuro-hormone characters” that reads like a guide to astrological signs) interact linearly with foreseeable results. The melodrama obscures how biology matters; neither hormones nor brains are pink or blue. Our attempts to understand the biology of human behaviour cannot move forward until we try to explain things as they are, not as we would like them to be. ❖

SNIPPETS

NEWS BRIEFS AND HIGHLIGHTS

Women Aren’t Good in Math...or Are They?

The following piece by Richard Morin appeared in the Washington post on Thursday, August 31, 2006.

Strange but true: Women score much lower on math tests if they are first asked unrelated questions about gender issues. The phenomenon is called “stereotype threat”—a kind of performance anxiety discovered in 1995 when psychologists found that black students at Stanford University did significantly worse on intelligence tests if they were first asked to identify their race on the test form. Since then,

dozens of other experiments have confirmed that subtly cuing women or minorities to think subconsciously about their sex or race causes them to do poorly in areas where the stereotype suggests they are weak. University of Texas psychologist Matthew S. McGlone wondered if there wasn’t another side of the story. What if you prompted people to think about their strengths rather than their stereotypical weaknesses—would that be enough to improve performance in areas where they weren’t supposed to do well? In a novel set of experiments, McGlone, working with Joshua Aronson of New York University, found that the answer is yes. “The idea that something is immutable due to some biological factor can be trumped,” McGlone said. Their ingenious

study involved 90 students, half men and half women, at Lafayette College in Easton, Pa. The students filled out a questionnaire that first asked them general questions about campus life. In a second section, researchers varied the questions to get these students thinking in slightly different ways. One group of students were asked whether they lived in a single-sex or coed dorm. Previous studies found even this benign question unconsciously activated male and female stereotypes, McGlone said. Another group answered questions about why they chose to attend a private liberal arts college. The goal was to nudge these young women and men into thinking how smart and accomplished they were. “We were activating their snob schema,” McGlone said with a chuckle. The remaining students, the control group, were asked to write about their experience living in the northeastern United States. The students then took the Vandenberg Mental Rotation Test, a standard test of visual—spatial abilities linked to math performance in which objects are shown at different angles and the test-taker has to pick the identical pair. Previous studies found that men are three times as likely as women to do well on this test, McGlone and Aronson wrote in a forthcoming issue of the *Journal of Applied Developmental Psychology*. When they analyzed the data, they found that men in the control group did, indeed, perform 15 to 20 percent better than the women on the Vandenberg test, in line with previous studies. Among those who had been subtly cued to think about their gender, the gap was even wider—guys did “25 percent to 30 percent better than the women,” again consistent with previous research, McGlone said. The surprise came among those who were primed to think about their status as students at an exclusive private college. The gender gap closed dramatically, as women’s scores improved while men’s stayed the same. “There was no significant difference between men and women,” McGlone said. “With a pretty simple manipulation, we could significantly reduce this gap,” which suggests that “there might be things that make all of these biological factors go away.”

Beyond Bias & Barriers

The Committee on Maximizing the Potential of Women Academic Science and Engineering of the National Research Council have issued a report “Beyond Bias and Barriers: Fulfilling the Women in Academic Science and Engineering”. At the very beginning of the report there is a statement “The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members

are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the committee responsible for the report were chosen for their special competences and with regard for appropriate balance.” One wonders if such a statement is regarded as necessary for other reports—related to topics other than women in science - coming from the nation’s highest academic body. The Committee was chaired by Donna Shalala and the report is dedicated to Denice Denton (who was on the committee). The fact that the New York Times OpEd columnist John Tierney issued a blistering attack of the report obsessing about there only being one man on the committee is a good sign that the report may have hit the mark. The PDF is available from the National Academies <http://www.nap.edu/catalog/11741.html>

Physics and Astronomy Senior Report: Class of 2003

The American Institute of Physics (of which AAS is an affiliate) has statistics division that issues reports regularly on the demographics of our field. The above report covers the backgrounds, experiences, and future plans of physics and astronomy majors at the point of graduation. It includes data on reasons for choosing an undergraduate institution, participation in undergraduate research, as well as the number of years required to receive their degree. It also covers student’s satisfaction with their major and their immediate and long term career goals. The report can be found at: <http://www.aip.org/statistics/trends/undergradtrends.html>

Two Paths to Heaven’s Gate

NRAO and the NRAO Archives are pleased to announce the publication of a memoir by Nan Dieter Conklin. Dr. Conklin was a prominent figure in what was 50 years ago an entirely new science, radio astronomy. She was the first American woman whose Ph.D. dissertation used radio astronomy data and, in 1952, the first American woman to formally publish original research in the field. Over the course of her impressive career at Harvard and Berkeley, she pioneered studies of neutral hydrogen in nearby galaxies that are members of the local group and of the structure of the interstellar medium in the Milky Way and other galaxies. She also played a key role in early discoveries and investigations of interstellar masers. In her candid memoir, Dr. Conklin discusses the evolution of her scientific work and her interactions with the other senior

Continued on page 26

Snippets continued from page 25

scientists of her day, writing with continuing fascination of discoveries both accidental and painstakingly accomplished. The book is also clear view of her personal life, from the considerable adversities she experienced—the demands of single parenthood in the days before childcare, the multiple sclerosis with which she was diagnosed in 1960, just two years after receiving her doctorate—to a celebration of her immensely happy third marriage to Garret Conklin and subsequent exuberant adventures in lifestyle and travel. Dr. Conklin tells of her personal and professional life with a clarity that is accessible to both scientists and non-scientists.

Copies cost \$10.00 each prepaid, with an additional per copy shipping and handling charge of \$3.00 for U.S., \$14.00 for Canada/Mexico, and \$20 to other non-U.S. addresses. Checks payable to NRAO should be sent to: NRAO Archives, 520 Edgemont Rd., Charlottesville VA 22903,

USA. Please include a full shipping address, or a print copy of the order form found at <http://www.nrao.edu/archives/Conklin/bookorder.pdf>.

MentorNet

MentorNet is an award-winning nonprofit e-mentoring network that addresses the retention and success of those in engineering, science and mathematics, particularly but not exclusively women and other underrepresented groups. Founded in 1997, MentorNet provides highly motivated protégés from many of the world's top colleges and universities with positive, one-on-one, email-based mentoring relationships with mentors from industry and academia. In addition, the MentorNet Community provides opportunities to connect with others from around the world who are interested in diversifying engineering and science. Sign up and mentor a young woman scientist or engineer! Or just get their newsletter <http://www.mentornet.net/> ❖



*“Ginger Rogers did everything Fred Astair did.
She just did it backwards and in high heels.”*

*Illustrated by:
Ann Feild*

Ann Richards, Governor of Texas
RIP 2006

Notes From a Life are vignettes describing quotidian life of a woman in science. They are usually—but not always—anonymous. This contribution is from Kate Becker who provides support for outreach programs at the University of Colorado's Laboratory for Atmospheric and Space Physics and is a freelance science writer (www.spacecrafty.com).

Notes From a Life

Contributions from our readers

♀ Lately I have been feeling a bit like Dr. Science. You might know him: Radio personality, he has been doing 3-minute segments on National Public Radio stations since 1985. He answers real science questions in outrageously fictitious ways that were lost on me when I listened to him as a kid: I wonder now that my parents weren't worried his segments would irreparably skew my understanding of the natural world toward the whimsical and the terminally phony.

But my recent kinship is with Dr. Science's tag line (or disclaimer; take it as you will). It goes like this: "Remember, I'm not a real doctor. I have a master's degree. In...science!"

That is another joke I didn't quite get until I started down the long road to a Ph.D. myself, first as an undergraduate in physics and then as a graduate student in astronomy.

But when, after a long, unhappy first year of graduate school I decided to aim for a master's degree instead of a Ph.D., I suddenly found myself in Dr. Science's shoes. I received my degree in 2005, and my diploma tells the tale: I have a master's degree. In...science!

Back when I had my sights set on a Ph.D., people would ask the usual question: "What are you going to do with that?" Well, probably a couple of post-docs, and then, with luck, settle down with a nice tenure-track position somewhere. It was an answer that I didn't much have to think about, the auto-reply of the Standard Academic Track.

The question is harder to answer as an M.S. It is not that fewer options are available—though some, like faculty positions, are off the table—but that the path is unmarked, the destination unknown. Since leaving Cornell, I have worked on Capitol Hill for the House Science Committee, where I wrote words which were spoken on the House floor (I have the Congressional Record to prove it, and though my words make up only a fraction of the 600-some pages spoken on the floor *that day*, I am proud

that they should have enjoyed the company of so much oak and marble).

I have also worked in public outreach for the University of Colorado's Laboratory for Atmospheric and Space Physics, where the Congressional staffers were replaced by scientists, engineers, teachers and school children, and where I dressed middle-schoolers in clean room "bunny suits," built a model planet out of a cantaloupe, and got glitter stuck in my hair more often than seemed proper for a Working Woman.

When I first announced my decision to leave the Ph.D. path, many of my fellow students mourned the end of my academic career like a death. Others—mostly men—told me I was a defector from the greater cause of women in science, that I had failed to grasp the personal as political. Only one described the decision as brave, which is how it felt: leaving a familiar, if mis-fit career, for an unknown one, in an undecided-upon city? I was alternately invigorated and terrified, set free and dangerously untethered.

A few months ago, I dreamed that I was an astronaut, on my way to the moon. I was scared beyond words, just on the edge of turn-this-ship-around-and-take-me-home at every stage of the journey—as I arrived at the launch pad, as the engines ignited, as we ascended through the atmosphere. But once I arrived, I found that the Moon felt a lot like the Earth. There were trees and green grass. There was a comfortable bedroom and an office to work in, a conference table and a potted plant. Only the sight of the Earth, distant on the horizon, reminded me how far I had traveled.

To my graduate-student self, the non-academic world might just as well have been the Moon: a exotic country in which I imaged everything, not least myself, would look and feel unfamiliar. I pictured a world of business suits and briefcases, happy hours and high heels. I think, somehow, I imagined myself taller. But now that I am here, I see that it is not so different. Work does not occupy my entire being as it did when I was a student, but I am still committed to a career that challenges me and a job that means something.

Send your
"Notes" to
bagenal@colorado.edu

Notes from a Life *continued from page 27*

Lately, I find myself acting as the public face (or, more often, pen) of scientists. I suppose it is ironic, as I decided not to become one, but my excitement about astronomy and my respect for the people who make it their career are the same as they always were. I do some science writing in addition to my education and public outreach work; you can see my mug in Boulder, Colorado's local paper, where I write an astronomy column. I even hosted a local science radio program in Boulder—watch out, Dr. Science.

My education has helped my in each of these settings, though I have sometimes wished for the cachet that comes with a Ph.D., or at least

for some label identifies me as a person who can crunch numbers, point a telescope, and write a thesis; a person who has books on quantum mechanics, electrodynamics, and cosmology on her shelf. "Ms," of course, I qualified for before I ever entered any Institution of Higher Learning, and "Master Becker"—well, that is no way to make friends.

I know that I will never be Professor Becker, that I may never have control of a telescope again, and sometimes I miss it. But there is so much to explore here, outside the world of Ph.D.s and post-docs and tenure, and I don't mind traveling without a map. After all, I have a master's degree in science. ❖



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