STATUS

A REPORT ON WOMEN IN ASTRONOMY

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CONTENTS

Toward More Inclusive Family-Friendly Policies

Megan Reiter (Steward Observatory, U of Arizona)

We need to stop asking if women can have it all.

One recent addition to the genre of having-it-all articles, Anne-Marie Slaughter's "Why Women Still Can't Have It All," [1] offers a bleak answer in the title and a more complicated answer in the text. Slaughter describes her two years as the first female director of policy planning at the State Department and argues that it was not possible to balance the demands of high-level government work in Washington with the need and desire to be an involved parent for her two teenaged sons at home in Princeton. In many ways, the argument is familiar: women are forced to make sacrifices because they cannot simultaneously meet the demands of a high-powered career and remain truly committed to their families.

Women must choose. Women must sacrifice. The narrative is a lonely one, detailing the seeming impossibility of adding traditionally male career responsibilities on top of the expected (and perhaps desired) primary caregiving roles of mothers. To continue to focus on whether women --- and only women --- can balance these demands is limiting and needlessly gender-bound.

Asking whether women can "have it all" is detrimental, not only for mothers with careers, but also for men who wish to be actively and equally involved in family life. For example, Great Britain's Deputy Prime Minister, Nick Clegg, has been criticized for making his role as a parent to his three sons a priority, while his wife has been criticized for not sacrificing her law career for her children and for her husband's career (as made painfully clear in the comments section of a piece summarizing an interview with Nick Clegg's wife, Miriam Gonzalez Durantez).[2]

One of the benefits of moving to a more gender-neutral conversation is the creation of family-friendly policies that allow women and men to be involved with their families as they wish. However, experience has shown that extending family-friendly policies designed to improve the retention of women in academic positions (and elsewhere) to men is trickier than it may seem. By changing the language and culture surrounding family-friendly policies and encouraging greater flexibility in their design and implementation, it may be possible to reach solutions that promote equality and serve families' needs.

One example of the tension between intention and implementation is "Stop-the-Clock" policies, which allow women, and sometimes men, to temporarily stop the tenure clock following the birth of a

continued on page 2

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Toward More Inclusive Family-Friendly Policies *continued*

child. On the surface, these are progressive policies designed to minimize the impact of lost productivity on a person's career. Offering this option only to women recognizes the very real biological differences in how men and women experience pregnancy, childbirth, and recovery. In order not to penalize fathers who choose to share the exhausting and demanding work of caring for a newborn, some institutions have extended the "Stop-the-Clock" option to men.

However, this solution is imperfect at best. The physical demands of pregnancy, childbirth, and breastfeeding cannot be equally shared. Furthermore, the availability of paid paternity leave does not mean that those who take it will invest the time in egalitarian parenting. In their study of 181 heterosexual, married, tenure-track professors, Rhoads & Rhoads[4] found that the men who took paid paternity leave performed significantly less childcare than their spouses, essentially giving them more time than their female counterparts for professional activities. While there is no perfect way to ensure that parental leave will not be abused, completely eliminating paternity leave for men is the wrong solution.

Fear of being perceived as less serious about one's career is an obstacle to women and men alike stopping the clock. Therefore, the clock now stops automatically at some institutions (in some cases, for both men and women). But mandatory delay of the tenure review is not desirable or even appropriate for every situation. While nominally "on leave," one cannot halt one's research program. Graduate students and postdocs still need advising. Collaborators and competitors continue to progress unabated. In the discussion following "Female Science Professor's" posts on stop-the-clock policies,[3] anonymous commentors have advocated providing a semester of relief from teaching or service duties instead of stopping the tenure clock, because one can continue existing projects and write up results while caring for a newborn. However, because it is considerably more difficult to begin new projects in that time, a dip in productivity is likely to follow the birth of a child by a year or two. Although a direct result of the birth of the child, this possible drop in publications will fall outside the rigid confines of the year in which the clock was stopped and will likely have an adverse effect on the parent's tenure review. Flexible policies are essential to balance the financial cost to the employer with the necessity of enabling individuals to remain scientifically competitive despite the time and energy a family takes from one's career.

Inflexible stop-the-clock policies often fail to include provisions for nontraditional family arrangements. If pregnancy and childbirth are the discriminants for the right to parental leave, then there is no clear leave policy for adoptive parents, especially if the adopted child is not an infant. If the discriminant is gender, then same-sex partnerships and individuals who identify outside the gender binary are excluded. Furthermore, the birth of a child is not the only situation in which caregiving issues arise. Aging parents, terminal illness of one's siblings, and serious illness of one's child can significantly impact research productivity. Unlike having children, these situations offer no element of choice in the timing of caregiving. A more inclusive and flexible family leave policy would allow for the full spectrum of ways that people—regardless of gender—provide

Note from the Editor, Katy Garmany

A bit of introduction and updates for our contributors and editors!

STATUS welcomes our first contribution from Megan Reiter. Megan is a graduate student at Steward Observatory, University of Arizona, who likes big stars, little stars, forming stars, dying stars, accretion, outflows, feedback, and blaming things on magnetic fields.

Karly Pitman is currently based in California while contracting at the Jet Propulsion Laboratory (jpl.nasa.gov), but her company, Planetary Science Institute (PSI), is headquartered in Tucson and she works at facilities across the country - so she is on the road a lot. Her research specialties are in planetary science and astrophysics, and she is currently leading four grant projects and assisting on a fifth. Her working life is not that unusual: PSI staff are distributed across 16 US states and 6 foreign countries.

The Associate Editors of STATUS are doing very well. Joannah Hinz is now an Assistant Staff Scientist at the MMT Observatory , and we congratulate her. Pat Knezek has just been appointed Deputy Division Director at the NSF, Division of Astronomical Sciences. She will be leaving her present position as Director of the WIYN Observatory in March. And on a personal note, I was fortunate to be present at the AAS meeting last week at which Meg Urry received the Van Biesbroeck prize for her tireless efforts to enhance the participation of women in astronomy and other scientific disciplines.

Joan Schmelz and Nancy Morrison both continue to make major contributions to STATUS in seeking out—and editing—articles.

care for their families. Embracing a broader cultural view of family is also more conducive to increasing diversity in astronomy.

Policy changes are only part of the process of creating a more equitable workplace; they can only partly diminish the significant cultural barriers that remain. Women who take career breaks still struggle to make sure these are taken into account in hiring and promotion decisions; men who choose to stop the tenure clock may be penalized with lower salaries than those who do not.[5] Discussing family-leave policies proactively (rather than only in response to individual cases), in mixed-gender settings, and with a focus on flexibility is an important step towards creating a more family-friendly workplace.

The antagonistic attitudes that have plagued "when to have children" discussions have no place in an inclusive conversation. They assume that having children is a lifestyle choice (akin to marathon running, to borrow Slaughter's analogy) to be carefully scheduled around career demands, a proposition that seems incompatible with the needs of dependent children from infancy through adolescence. For example, the attitude that the solution to childbearing dilemmas is to have kids in graduate school persists and is inherently problematic. It makes unfair presumptions about the personal and financial realities of graduate students and ignores the nearly non-existent state of family-leave policies for grad students and postdocs, a problem that needs to be included in this discussion.[6] While these arguments can be offensive in the context of childbearing, where one arguably does have some element of choice, they are completely inappropriate in a broader conversation about caregiving responsibilities.

Changing the tone of conversations around family leave is crucial to normalizing the natural career fluctuations of people with families (however each individual defines family). The decadal review provided the impetus to have a mixed gender and mixed generational conversation four years ago. But outside of workshops[7] or special sessions at AAS meetings, these conversations are often relegated to womens' groups. Encouraging men to participate will help change the perception that work-life balance concerns are gendered issues and ensure that a broad range of perspectives are represented, fostering the development of more inclusive solutions.

Despite the challenges presented here, academic careers do provide a unique level of flexibility conducive to constructing one's own work-life balance. Slaughter cites the flexibility of her academic position at Princeton as key to

continued on page 4

Toward More Inclusive Family-Friendly Policies *continued*

being able to achieve some work-life balance outside of her two-year government appointment. Without the rigidity of an 8-to-5 schedule, for example, academic parents have some power to align their workday with the school day, and adult children can attend care meetings for their aging parents during normal business hours. This advantage can be exploited by scheduling important meetings between 10am and 2pm, per the recommendations of the Women in Astronomy Workshop.[6] This step would empower the employee to decide when and where he or she works and create a more family-friendly climate.

One-size-fits-all solutions provide insufficient support for families. In order to create policies that fit, it will be necessary to consider the different ways individuals grow their families and the diversity of caregiving roles that individuals may be called upon to fill. Greater workplace flexibility will support those with caretaking roles that cannot be "scheduled" and foster excellence through greater diversity. The conversation needs to be changed from women "having it all" to supporting work-life balance for everyone, and empowering individuals to create the work-life balance they need to thrive.

[1]Slaughter, A.-M. "Why Women Still Can't Have It All," The Atlantic (2012, July/August) Retrieved November 6, 2012, from http://www.theatlantic.com/magazine/archive/2012/07/why-women-still-canthave-it-all/309020/6/

[2]Hope, C. (2011, July 11) "Nick Clegg 'killing himself' trying to balance work and family," The Telegraph, Retrieved November 6, 2012 from http://www.telegraph.co.uk/news/politics/nick-clegg/8630915/Nick-Clegg-killing-himself-trying-to-balance-work-and-family.html

[3]Female Science Professor (2009, October 22) "Stop the Clock," Retrieved from http://science-professor.blogspot.com/2009/10/stop-clock.html

(2011, January 7) "Where the Clocks Never Stop," Retrieved from http://science-professor.blogspot.com/2011/01/where-clocks-never-stop.html

(2011, January 10) "The Clock Stops Here," Retrieved from http://science-professor.blogspot.com/2011/01/clock-stops-here.html

[4]Rhoads, S.E. & Rhoads, C.H. (2012) "Gender roles and infant toddler care: male and female professors on the tenure track," Journal of Social, Evolutionary, and Cultural Psychology, 6(1), 13-31

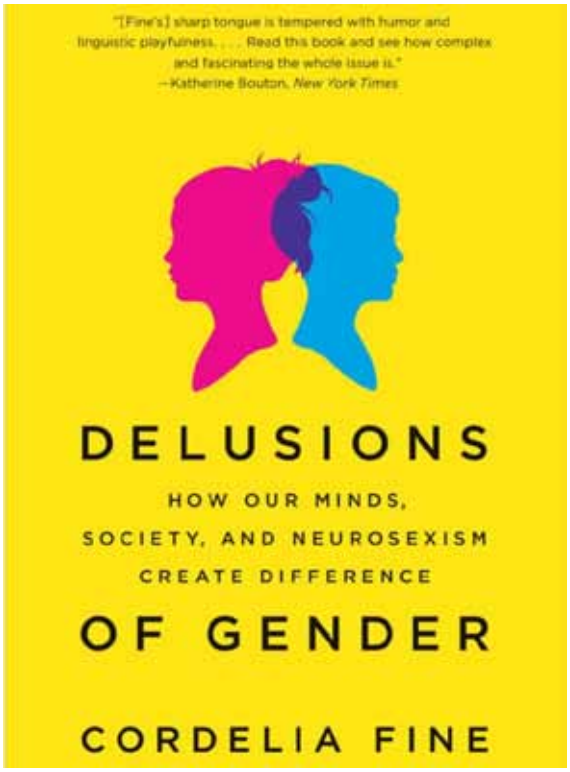
[5]Manchester, C.F., Leslie, L.M. & Kramer, A. (2010) "Stop the Clock Policies and Career Success in Academia," American Economic Review, 100(2), 219-23

[6]For information on the evolving state of family leave policies for graduate students and postdocs, see http://www.astrobetter.com/parental-leave-wiki-here-on-astrobetter/

[7]See, e.g., Brough, S. et al. (2011) "Women in Astronomy Workshop Report," Retrieved from http://arxiv.org/abs/1106.6094

CH 16: UNRAVELING HARDWIRING

A member of my family, who shall remain nameless, refers to all newborns as "blobs." There's a certain, limited truth to the description. Certainly, research continues to reveal just how sophisticated the neonate mind really is: already tuned to prefer its mother tongue, seek out facelike stimuli, time its waking up to coincide precisely with when its parents have just fallen most deeply into sleep. But it would not be an overstatement to say that newborns still have much to learn. Ideas about how this happens have been changing in important ways in neuroscience.



For decades, brain development has been thought of as an orderly adding in of new wiring that enables you to perform ever-more-sophisticated cognitive functions. According to this maturational viewpoint, gene activity at the appropriate time (and with the necessary experience and environment) brings about the maturation of new bits of neural circuitry. These are added in, enabling the child to reach new developmental milestones. Everyone, of course, acknowledges the essential role of experience on development. But when we think of brain development as a gene-directed process of adding in new circuitry, it's not difficult to see how the concept of hardwiring took off. It's been helped along by the popularity of evolutionary psychology, versions of which have promoted the idea that we are the luckless owners of seriously outdated neural circuitry that has been shaped by natural selection to match the environment of our hunter-gatherer ancestors.

But our brains, as we are now coming to understand, are changed by our behavior, our thinking, our social world. The new neuroconstructivist perspective of brain development emphasizes the sheer exhilarating tangle of a continuous interaction among genes, brain, and environment. Yes, gene expression gives rise to neural structures, and genetic material is itself impervious to outside influence. When it comes to genes, you get what you get. But gene *activity* is another story: genes switch on and off depending on what else is going on. Our environment, our behavior, even our thinking, can all change what genes are *expressed*.[1] And thinking, learning, sensing can all change neural structure directly. As Bruce Wexler has argued, one important implication of this neuroplasticity is that we're not locked into the obsolete hardware of our ancestors:

> In addition to having the longest period during which brain growth is shaped by the environment, human beings alter the environment that shapes their brains to a degree without precedent among animals... It is this ability to shape the environment that in turn shapes our brains that has allowed human adaptability and capability to develop at a much faster rate than is possible through alteration of the genetic code itself. This transgenerational shaping of brain function through culture also means that processes that govern the evolution of societies and cultures have a great influence on how our individual brains and minds work.[2]

It's important to point out that this is not a starry-eyed, environmentalist, we-can-all-be-anything-we-want-to-be viewpoint. Genes don't determine our brains (or our bodies), but they do constrain them. The developmental possibilities for an individual are neither infinitely malleable nor solely in the hands of the environment. But the insight that thinking, behavior, and experiences change the brain, directly, or through changes in genetic activity, seems to strip the word "hardwiring" of much useful meaning. As

continued on page 6

Unraveling Hardwiring *continued*

neurophysiologist Ruth Bleier put it over two decades ago, we should "view biology as potential, as capacity and not as static entity. Biology itself is socially influenced and defined; it changes and develops in interaction with and response to our minds and environment, as our behaviors do. Biology can be said to define possibilities but not determine them; it is never irrelevant but it is also not determinant."[3]

And so, what do popular writers, scientists, and former presidents of Harvard *mean* when they refer to gender differences as "hardwired," or "innate," or "intrinsic," or "inherent"? Some philosophers of biology, so far as I can tell, devote entire careers to the concept of innateness and what, if anything, it might mean. As cognitive neuroscientist Giordana Grossi points out, terms like *hardwired*—on loan from computer science where it refers to fixedness—translate poorly to the domain of neural circuits that change and learn throughout life, indeed, in *response* to life.[4]

Certainly, there is far more acknowledgment now of the role of experience and environment compared with a century or so ago. In the early twentieth century, "[g]enius was considered an innate quality which would naturally be manifested if it were possessed," as psychologist Stephanie Shields summarizes.[5] No one now, I should think, would agree with this. And yet there remains, in some quarters, a Victorian-style attachment to notions of innate, immutable, inevitable qualities. How else to explain why the Greater Male Variability hypothesis—the idea that men are more likely to be outliers, good or bad ("more prodigies, more idiots"[6])—appears to be no less appealing now than it was over a century ago?[7] In the early twentieth century, the Greater Male Variability hypothesis offered a neat explanation of why men so outnumbered women in eminence, despite the fact that there was little sex difference in the average scores of men and women on psychological tests. As Edward Thorndike (the sociologically unimaginative psychologist we met in the Introduction) explained it in 1910:

> In particular, if men differ in intelligence and energy by wider extremes than do women, eminence in and leadership of the world's affairs of whatever sort will inevitably belong oftener to men. They will oftener deserve it.[8]

And today, it seems, they oftener deserve high-ranking positions in mathematics and science, according to Lawrence Summers:

> It does appear that on many, many different human attributes—height, weight, propensity for criminality, overall IQ, mathematical ability, scientific ability... there is a difference in the standard deviation and variability [statistical measures of the spread of a population] of a male and a female population. And that is true with respect to attributes that are and are not plausibly, culturally determined. If one supposes, as I think is reasonable, that if one is talking about physicists at a top twenty-five research university... small differences in the standard deviation will translate into very large differences in the available pool...[9]

I'd love to know, by the way, how extreme *non*criminality manifests itself. (Number of Supreme Court judges, perhaps?) But more to the point, the assertion that males are more variable in all regards—whether you're talking weight, height, or SAT scores—certainly helps to frame variability as "a guy thing" across the board. The implication is that there is something inevitable and immutable about greater male variability in mathematical and scientific ability. Certainly, in the furor that followed, Steven Pinker defended the idea of the timeless, universal nature of greater male variability ("biologists since Darwin have noted that for many traits and many species, males are the more variable gender").[10] Susan Pinker also plays the argument that "[m]en are simply more variable" in the shadow of the Summers controversy.[11] Her book displays a graph showing the findings from a report published by psychologist Ian Deary and his colleagues—a massive IQ study of 80,000 Scottish children born in 1921. Boys' and girls' average IQs were the same, the study found, but the boys' scores were more variable. But as the educational psychologist Leta Stetter Hollingworth pointed out in 1914, and as Ian Deary and his colleagues felt compelled to reiterate nearly 100 years later, "the existence of sex differences either in means or variances in ability says nothing about the source or inevitability of such differences or their potential basis in immutable biology."[12] This should be more obvious to us now than it was a hundred years ago when capacity for eminence was regarded as something that was simply "in there." We realize that, as Grossi has pointed out, "[m]athematics and science are learned in a period of time that spans across several years; passion and application need to be constantly nurtured and encouraged."[13]

And, as it turns out, contemporary investigations of variability—both in the general population and in the

Unraveling Hardwiring *continued*

most intellectually blessed pockets—have been showing that "inevitable" and "immutable" are adjectives that need not apply when it comes to describing greater male variability in mental ability. One cross-cultural study, published several years before the Summers debacle, compared sex differences in variability in verbal, math, and spatial abilities to see if the greater male variability in the United States was invariably seen in other countries. It was not. In each cognitive domain, there were countries in which females' scores were more variable than males'.[14]

More recently, several very large-scale studies have collected data that offer tests of the Greater Male Variability hypothesis by investigating whether males are inevitably more variable in math performance, and always outnumber females at the high end of ability. The answer, in children at least, is no. In a *Science* study of over 7 million United States schoolchildren, Janet Hyde and her team found that across grade levels and states, boys were modestly more variable than girls. Yet when they looked at the data from Minnesota state assessments of eleventh graders to see how many boys and girls scored above the 95th and 99th percentile (that is, scored better than 95 percent, or 99 percent, of their peers) an interesting pattern emerged. Among white children there were, respectively, about one-and-a-half and two boys for every girl. But among Asian American kids, the pattern was different. At the 95th percentile boys' advantage was less, and at the 99th percentile there were more girls than boys.[15] Start to look in other countries and you find further evidence that sex differences in variability are, well, variable. Luigi Guiso's cross-cultural *Science* study also found that, like the gender gap in mean scores, the ratio of males to females at the high end of performance is something that changes from country to country. While in the majority of the forty countries studied there were indeed more boys than girls at the 95th and 99th percentiles, in four countries the ratios were equal or even reversed. (These were Indonesia, the UK, Iceland, and Thailand.)[16] Two other large cross-cultural studies of math scores in teenagers have also found that although males are usually more variable, and outnumber girls at the top 5 percent of ability, this is not inevitably so: in some countries females are equally or more variable, or are as likely as boys to make it into the 95th -percentile.[17]

Of course, scoring better than 95 or 99 percent of your school peers in mathematical ability is probably a baseline condition for eventually becoming a tenured Harvard professor of mathematics: like having hands, if you want to be a hairdresser. Top scorers on standardized math tests may be what one group of researchers, rather stingily, refers to as "the merely gifted."[18] But also changeable is the proportion of girls identified in what's called the Study of Mathematically Precocious Youth (SMPY), which gives the quantitative section of the Scholastic Aptitude Test (the SAT) to kids who, theoretically, are way too young to take it. Children who score at least 700 (on a 200 to 800 scale) are defined as "highly gifted." In the early 1980s, highly gifted boys identified by the SMPY outnumbered girls 13 to 1. By 2005, this ratio had plummeted to 2.8 to 1.[19] That's a big change.

Being highly gifted is, I imagine, rather nice, but at the risk of swelling the head of any research mathematicians in top-ranked institutions who happen to be reading this book, they need to have made it onto the next rung of the giftedness ladder, and be "profoundly gifted." And here again—in this literally one-in-a-million category—there can be striking differences in female representation, depending on time, place, and cultural background. The International Mathematical Olympiad (IMO) is a nine-hour exam, taken by six-person teams sent from up to ninety-five countries. The length of the exam is off-putting enough, but the six problems within it are also so difficult that every year just a few students (or sometimes even none) get a perfect score. We tend not to hear that much about math competitions (perhaps in part because, let's be honest, live televised coverage of a nine-hour math exam would not make for compelling viewing). So it's probably worth pointing out that these competitions are not female-free zones. Girls are among those who achieve perfect scores. Girls, like US team member Sherry Gong, win medals for outstanding performance. Gong won a silver medal in the 2005 IMO and a gold medal in 2007. The girl can do math—and she's not alone. As the researchers point out, "numerous girls exist who possess truly profound ability in mathematical problem solving."[20]

But an equally important insight from their analysis is what a difference where you come from makes for your chances of being identified and nurtured as a math whiz. Between 1998 and 2008 *no* girls competed for Japan. But next door, seven girls competed for South Korea (which, by the way, ranks higher than Japan). A profoundly gifted young female mathematician in Slovakia has a five times greater chance of being included on the IMO team than her counterpart in the neighboring Czech Republic. (Again, Slovakia outperforms the Czech Republic. I say this not to be competitive, but merely to show that teams

continued on page 8

with more girls have not been scraping the bottom of the barrel.) The ratio of female members on IMO teams among the top 34 participating countries ranges from none at all, to 1 in 4 (in Serbia and Montenegro). This is not random fluctuation, but evidence of "socio-cultural, educational, or other environmental factors" at work.[21]

In fact, we can see this very clearly even within North America. Being underrepresented on the IMO team, or the Mathematical Olympiad Summer Program (MOSP), is not, as you might assume, a *girl* problem. It's more subtle and interesting than that. First of all, if you're Hispanic, African American, or Native American, it matters not whether you have two X chromosomes or one—you might as well give up now on any dreams of sweating for nine hours over some proofs. Then within girls, interesting patterns emerge. Asian American girls are *not* underrepresented, relative to their numbers in the population. But that doesn't mean that it's even simply a *white girl* problem. Non-Hispanic white girls born in North America are sorely underrepresented: there are about twenty times fewer of them on IMO teams than you'd expect based on their numbers in the population, and they virtually never attend the highly selective MOSP. But this isn't the case for non-Hispanic white girls who were born in Europe, immigrants from countries like Romania, Russia, and the Ukraine, who manage on the whole to keep their end up when it comes to participating in these prestigious competitions and programs. The success of this group of women continues into their careers. These women are *a hundred times more likely* to make it into the math faculty of Harvard, MIT, Princeton, Stanford, or University of California–Berkeley than their native-born white counterparts. They do every bit as well as white males, relative to their numbers in the population. As the researchers conclude:

> Taken together, these data indicate that the scarcity of USA and Canadian girl IMO participants is probably due, in significant part, to socio-cultural and other environmental factors, not race or gender *per se*. These factors likely inhibit native-born white and historically underrepresented minority girls with exceptional mathematical talent from being identified and nurtured to excel in mathematics. Assuming environmental factors inhibit most mathematically gifted girls being raised in most cultures in most countries at most times from pursuing mathematics to the best of their ability, we estimate the *lower* bound on the percentage of children with IMO medal-level mathematical talent who are girls to be in the 12%–24% range [i.e., the levels seen in countries like Serbia and Montenegro]. . . . In a gender-neutral society, the real percentage could be significantly higher; however, we currently lack ways to measure it.[22]

That's a lot of squandered talent, and among boys, too. As the researchers acknowledge, the data they collected can't answer the question of whether females—in a perfectly gender-equal environment—could match (or, why not be bold, perhaps even surpass) males in math. But the gender gap is narrowing all the time, and shows that mathematical eminence is not fixed, or hardwired or intrinsic, but is instead responsive to cultural factors that affect the extent to which mathematical talent is identified and nurtured, or passed over, stifled, or suppressed in males and females.

And so this is all good news for Lawrence Summers, who said that he "would far prefer to believe something else" than the "unfortunate truth" that, in part, "differing variances" lie behind women's underrepresentation in science.[23] And for Pinker, too, who warned Summers' detractors that "[h]istory tells us that how much we want to believe a proposition is not a reliable guide as to whether it is true."[24] Evidence for the malleability of the gender gap in ability and achievement is there. And this is important because, as we learned in the first part of the book, it makes a difference what we believe about difference. Stanford University's psychologist Carol Dweck and her colleagues have discovered that what you believe about intellectual ability—whether you think it's a fixed gift, or an earned quality that can be developed—makes a difference to your behavior, persistence, and performance. Students who see ability as fixed—a gift—are more vulnerable to setbacks and difficulties. And stereotypes, as Dweck rightly points out, "are stories about gifts—about who has them and who doesn't."[25] Dweck and her colleagues have shown that when students are encouraged to see math ability as something that grows with effort—pointing out, for example, that the brain forges new connections and develops better ability every time they practice a task—grades improve and gender gaps diminish (relative to groups given control interventions).[26] The Greater Male Variability hypothesis, of course, endorses the view that very great intellectual ability is indeed a fixed trait, a gift bestowed almost exclusively on men. Add a little talk of women's insufficient white matter volumes, or their plump corpora callosa, and the ingredients for a self-fulfilling prophecy are all in place.

The sensitivity of the mind to neuroscientific claims about difference raises ethical concerns.[27] A recent study by University of Exeter psychologist Thomas Morton and his colleagues asked one group of participants to read the kind of passage that is the bread-and-butter of a certain type of popular gender science book. It presented essentialist theories—that gender difference in thinking and behavior are biological, stable, and immutable—as scientifically established facts. A second group read a similar article, but one in which the claims were presented as being under debate in the scientific community. The "fact" article led people to more strongly endorse biological theories of gender difference, to be more confident that society treats women fairly, and to feel less certain that the gender status quo is likely to change. It also left men rather more cavalier about discriminatory practices: compared with men who read the "debate" article, they agreed more with statements like, "If I would work in a company where my manager preferred hiring men to women, I would privately support him," and "If I were a manager in a company myself, I would believe that more often than not, promoting men is a better investment in the future of the company than promoting women." They also felt better about themselves—a small consolation indeed to women, I think you'll agree.

Interestingly, for men who tend to the view that sex discrimination is a thing of the past, the appeal of essentialist research is enhanced by evidence that the gender gap is closing, Morton and his colleagues also found. Participants were asked to rate research that investigated the genetic basis of sex differences in mouse brains, as well as claiming that similar factors may underlie psychological gender differences in humans. Beforehand they read an article, supposedly from a national newspaper, arguing either that gender inequality was stable, or closing. After reading about women's gains these men more readily agreed that "this type of research should continue, deserved more funding, was good for society, represented the facts about gender differences, and made a major contribution to understanding human nature."[28]

Taken together, Morton's findings suggest that women's gains will, in certain quarters, increase demand for essentialist research. As this research trickles back into society, people will turn away from social and structural explanations of gender difference. They will give up on the idea of further social change. And, to help the belief in the inevitability of inequality come true, workplace discrimination against women will -increase.

It is, I think, time to raise the bar when it comes to the interpretation and communication of sex differences in the brain. How long, exactly, do we need to learn from the mistakes of the past?

As we've seen in this part of the book, speculating about sex differences from the frontiers of science is not a job for the faint-hearted who hate to get it wrong. So far, the items on that list of brain differences that are thought to explain the gender status quo have always, in the end, been crossed off.[29] But before this happens, speculation becomes elevated to the status of fact, especially in the hands of some popular writers. Once in the public domain these supposed facts about male and female brains become part of the culture, often lingering on well past their best-by dates. Here, they reinforce and legitimate the gender stereotypes that interact with our minds, helping to create the very gender inequalities that the neuroscientific claims seek to explain.[30]

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[1]For details, and contrast with maturational viewpoint, see (Westermann et al., 2007), in particular figure 4, p. 80. Also (Lickliter & Honeycutt, 2003; Mareschal et al., 2007).
[2](Wexler, 2006), pp. 3 and 4.
[3](Bleier, 1984), p. 52, footnote removed.
[4](Grossi, 2008).
[5](Shields, 1982), pp. 778 and 779. See also (Shields, 1975).
[6]As Steven Pinker put it (Edge, 2005b).
[7]For a history of the Greater Male Variability hypothesis see (Shields, 1982).
[8]E. L. Thorndike, *Educational Psychology* (1910), p. 35. Quoted in (Holling-worth, 1914), p. 510.
[9](Summers, 2005), para. 4.
[10]Quoted in (Edge, 2005b).
[11](Pinker, 2008), p. 13.
[12](Hollingworth, 1914). Wendy Johnson, Andrew Carothers, and Ian Deary published a reanalysis of these data in 2008. They concluded that males were *especially* variable at lower levels of IQ. They also noted that, with a ratio of about 2 boys to 1 girl at the very highest levels of intelligence, this did not go very far in explaining the much steeper ratios for high-level academic physical science, math, and engineering positions (Johnson, Carothers, & Deary, 2008), p. 520.
[13](Grossi, 2008), p. 98.

continued on page 10

Unraveling Hardwiring *continued*

[14](Feingold, 1994).
[15](Hyde et al., 2008).
[16](Guiso et al., 2008).
[17](Penner 2008; Machin & Pekkarinen 2008). These latter authors stress the strong pattern of greater male variability, but the boy/girl ratio (shown in parentheses) at the top 5 percent of math ability was more-or-less equal in Indonesia (0.91), Thailand (0.92), Iceland (1.04), and the UK (1.08). Penner found greater female variability in the Netherlands, Germany, and Lithuania. For useful discussion of these data, see (Hyde & Mertz, 2009).
[18](Andreescu et al., 2008), p. 1248.
[19]See (Andreescu et al., 2008), p. 1248.
[20](Andreescu et al., 2008), p. 1251.
[21](Andreescu et al., 2008), p. 1252.
[22](Andreescu et al., 2008), pp. 1253 and 1254. See table 7, p. 1253.
[23](Summers, 2005), para. 4.
[24](Pinker, 2005), para. 3.
[25](Dweck, 2007), p. 49.
[26]See (Blackwell, Trzesniewski, & Dweck, 2007; Dweck, 2007; Good, Aronson, & Inzlicht, 2003).
[27]This has been surprisingly little discussed in the academic literature, but see (Chalfin, Murphy, & Karkazis, 2008; Fine, 2008).
[28](Morton et al., 2009), pp. 661 and 656 (reference removed), respectively.
[29]This is thanks, in no small part, to books aimed at a general audience that have critiqued popular myths of gender. Recent examples of such efforts include (Barnett & Rivers, 2004; Cameron, 2007; Fausto-Sterling, 1985, 2000; Rogers, 1999; Tavris, 1992).
[30]This is a point made in a general way by the instigators of the Critical Neuroscience project, which "holds that while neuroscience potentially discloses facts about behaviour and its instantiation in the brain, the cultural context of science interacts with these knowledge claims, adds new meaning to them and influences the experience of the people to whom they pertain" (Choudhury, Nagel, & Slaby, 2009), p. 66, references removed.

The following is a reprint of two blog posts by Joan Schmelz:

http://womeninastronomy.blogspot.com/2012/07/women-versus-women-i-why-all-senior.html and
http://womeninastronomy.blogspot.com/2012/07/women-versus-women-ii-why-junior-women.html

Women versus Women: I. Why ALL Senior Women Should Be Role Models

I confess that I cringe when I hear women in astronomy put other women down. We all too often divide ourselves into "us" versus "them": senior women who are/are not effective role models for girls in STEM; women who do/do not return to work immediately after having a baby; women who do/do not stand up for themselves against bullies; women who do/do not make waves when confronted with sexual harassment. Women of astronomy, we have common foes – discrimination, harassment, bullying, to name but a few. Let us unite and spend our energy fighting *these* enemies. At the same time, let us not waste our valuable time on artificially generated women-versus-women battles like the Anne-Marie Slaughter-Sheryl Sandberg "debate" (http://www.newyorker.com/reporting/2011/07/11/110711fa_fact_auletta) that has resulted in such media frenzy. Slaughter and Sandberg each made choices that were right for them. We should not second-guess them, and their choices should not have any negative influence on us. Let us all support each other and be a bit more understanding of the choices others make.

Since becoming chair of CSWA three years ago, I have (occasionally) been asked why the AAS needs a committee on the status of *women* in astronomy. The questioner has almost always been a young woman, a graduate student, who may have felt that the existence of our committee somehow diminished her individual accomplishments.

You might think that such questions would be depressing. After all, I spend a lot of my time, energy, and creativity on women-in-astronomy issues. Actually, my reaction is quite the opposite. Hurrah! I think to myself. Here is a young woman who has never (noticeably) experienced discrimination, sexual harassment, or bullying, and perhaps more importantly, there is no one in her peer group who has had to deal with these issues. I am chair of a committee whose number one goal is to put itself out of business. Although she does not realize it, this young woman has just made my day. We (and by "we" I mean women in astronomy and the men who support us) have created an environment where some women at the graduate-student level think that our profession has reached the stage where CSWA is no longer necessary. I know better, unfortunately, but I take her question as a sign of progress.

I have also heard comments about how senior women are not good role models because they never (1) got married; (2) had children; (3) made waves; (4) backed down; (5) had a life outside astronomy; etc. There is a long list; just pick your favorite. I would counter that ALL senior women should be considered role models. They "made it" in an environment that was a lot tougher on women than the one we face today. In the process, they made it easier for the rest of us to succeed. We no longer have to walk solely in their footsteps; many individuals have trampled enough earth to create a wide-open space that allows the rest of us to navigate our own path. There is no single "right way" to astronomical success. Thanks to the women who went before us, a life in astronomy can include marriage (or not), babies (or not), daycare (or not). You can work halftime, fulltime, or double time. You can succeed with a shy or a brazen personality. You have the power to make the choice that is right for you as an individual, as half of a couple, or as part of a family. Not all success stories are the same. The right choice is the one that is right for you.

Did your advisor ever accuse you of enrolling in college to earn your MRS degree? Did university nepotism rules ever keep you out of a paid research position? Did you ever have to hide a pregnancy because you would be fired if anyone found out? When you married your college boyfriend, did anyone expect you to work as an unpaid research assistant to support his career? If these things sound outrageous, then you should read Chapter 2 of Vivian Gornick's book entitled, *Women in Science: Then and Now*. The interviews for the book were conducted in 1980, and the 25th anniversary edition has recently been released. 1980 was not that long ago. You might be surprised at the obstacles faced by these women.

This particular post is aimed at junior women—to encourage them to appreciate the contributions of senior

Women versus Women *continued*

women. Just because you are not following exactly in their footsteps does not mean that they did not contribute to your success. They created the environment where you could succeed. My advice—appreciate them; they are our role models!

Senior women, don't think that you are off the hook! Part II of Women versus Women is aimed at you. Be sure to check in next week.

Women versus Women: II. Why Junior Women Can Navigate Their Own Path to Success

In part I of this two-part series, I confessed that I cringe when I hear women in astronomy put other women down. Last week's post was aimed at junior women, but at the risk of alienating everyone, it is now time for senior women to sit up and take notice. I pay close attention when women talk about what it is like to be a woman in astronomy. One unfortunate theme that seems to repeat itself goes like this: a junior woman reluctantly complains about the senior woman in her department/group/organization who does not support her. Here are some generic examples:

A junior faculty member is having a baby. She is negotiating for release time with her department chair. The senior woman in her department argues that the rest of the department members should not have to do more work to cover for their junior colleague.

A grad student is dealing with sexual harassment. A senior woman advises her to keep her head down, not complain, and just finish her thesis.

A shy postdoc with an introverted personality is the victim of bullying. A senior woman advises her to get a backbone and stand up for herself.

A young astronomer wants to take a year off after her first child is born. A senior woman challenges the young mother to get back to work as soon as possible.

The common problem in all these examples is that the senior woman is expecting her junior colleague to follow in her footsteps. The first senior woman succeeded because she decided not to have children. The second snuck through because no one paid attention to her. The third used her strong personality to plow her way through trouble. The fourth attributed her ability to "have it all" to great daycare. These incidents support the idea that there should be more than one senior woman in every department/group/organization. No one should have to represent all women.

I remember a series of AASWOMEN Newsletter contributions from years ago where a junior woman confessed that she could not think effectively when she was pregnant, and as a result, had a difficult time doing science. A senior woman pounced on her, bragging that she was able to work successfully right up until the day she delivered. An e-mail frenzy ensued, with each subsequent contribution describing the "right" pregnancy experience.

I remember thinking at the time that all these descriptions represented a spectrum (there's a nice astronomical word) of experiences. No pregnancy was more right than another. They were all valid. Why then did we spend so much time and energy putting each other down? I can only speculate because I myself don't understand it; does putting other women down somehow make us feel better about our own situation, predicament, and/or accomplishments? Or is it more about thoughtlessness than malice? We need to be supportive of paths, choices, and experiences that are different than our own. We should all walk a mile in each other's shoes.

Younger women are getting tenured and federal positions, chairing review panels, and becoming PIs of new instruments. Sometimes, it is easy to get negative about these things. Why them and not you? It is so easy to get into that "us" versus "them" frame of mind! Don't let yourself fester in this negative space. Rather, remind yourself that as a group, junior women *should* be able to go further than their senior counterparts, simply because they have less opposition. Incidents of overt discrimination and sexual harassment are not completely gone, but they are seriously waning. CSWA is working to make the astronomy community aware of unconscious bias and

bullying. We hope that these incidents will begin to wane as well. Senior women, if you ever feel envious of the accomplishments or opportunities of a junior colleague, remember that you *helped* create the environment where those accomplishments and opportunities were possible. Be proud of them, and in the process, don't forget to be proud of yourself.

Senior women, stop charging ahead and take a moment to turn around – figuratively speaking, of course. Younger women do not have to walk solely in your footsteps to succeed. Your individual efforts have blended with those of all the other women who have made it. You have helped create an environment where junior women have more freedom to make their own choices. They are individuals, not your clones. Support them in their troubled and challenging times and celebrate with them as they triumph!

Thanks to Nancy Morrison and Caroline Simpson of CSWA for sharing their insights on these issues.

Practical Strategies for Soft Money Researchers Who Work Remotely

Karly M. Pitman (Planetary Science Institute)

Formal guidance on best practices and survival strategies for soft money researchers, especially those who telecommute, has not been fully covered in the existing CSWA online resources and advice columns. Based on collective experience in this arena, this article presents a list of practical recommendations for people starting out in the soft money career track, with input from both onsite and offsite astronomers on how we've set up office space, dealt with work-life balance, and other issues.

Home Office & Technology Needs:

Remote researchers structure their offices by dedicating a separate room or stand-alone building on their home property as "the office," setting up a partitioned cube or desk in a multipurpose room, renting commercial or coworking office space, or working out of a host facility. In terms of science productivity, it doesn't matter where you set up shop. For tax purposes and sanity, however, it's best to use a separate room for your office, preferably a door with a lock.

Upgrade three major peripherals to business grade:

1. A top-of-the-line internet router with firewall. Check traffic logs on your internet connection weekly, and save them in case your internet provider asks for them. If using wireless, encrypt, patch, and block everything. If collaborators need to log onto your machines, bracket the dynamic range of DHCP addresses within the router software to create a faux static IP.

2. A business phone line, with a good polycom setup (headset, mute, speakerphone, and caller ID functions). Approach your company about getting a VoIP line or at least make your outgoing home phone answering machine message sound professional.

3. A reliable printer. Household printers wear out quickly with the daily abuse inflicted on institutional copiers, so remote researchers tend to favor low-end business class combination printer/FAX/scanner or laser printers. Before purchasing, look into whether the largest sized ink cartridges can be easily refilled or the replacement price of toner and drum. To conserve on ink, for example, print rarely or on the fast draft black & white settings, or buy/top off printer ink from a printer or stationery shop.

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Practical Strategies for Soft Money Researchers Who Work Remotely *continued*

Have a doomsday protocol for your office. For example, get an heir and a spare for your technology: two computers so that you won't be offline in case one fails. For cataclysmic data backups, use a cloud computing service, e.g., Backblaze, Carbonite, Crashplan, which will allow you to back up content for individual machines. For local backups, invest in a dedicated external disk and an automatic backup system like Time Capsule for Macs. A cheaper option for protecting your data is to have two external hard drives to mirror your system and storing one drive in a place other than your home. Take into consideration whether your backup software will restore your backups from boot.

Utility outages are frequent for residential customers, and service is not often restored quickly during regular workday hours. To stay up and running, get a UPS to protect your devices, an external battery for your laptop, and an alternate source for your internet (e.g., remote wireless plug-in card that attaches to your computer; tether to your smartphone). The latter is important for those who work in remote locations. With metropolitan ISP coverage, there are few bandwidth issues; however, sharing your entire bandwidth with family can adversely affect file transfer.

Support Personnel:

If you're not already an expert in these areas, find a trustworthy computer repair shop (retailers will try to take advantage) and a friend who's a good sys admin.

Get a certified accountant to figure your ability to take off home office expenses on your taxes. In some states, claiming a home office at all opens up your tax records to audits.

Financial Considerations:

Budget for "home office overhead" (office supplies, communications costs, computing equipment) in all of your grants. Consult your company's financial officers when attempting to recoup power consumption and networking costs or insure your capital equipment. Insuring your equipment, including computers, peripherals, and furniture, is advisable regardless and is even required of offsite PIs at some soft money companies. Electronics riders on homeowners' or renters' insurance policies are easily maxed out with the computing demands of astronomers. Small business insurance plans can be purchased for around $700 per year to cover $5K worth of equipment.

Ordering supplies can be tricky, as some companies will not ship technical supplies to a residential address or will charge extra for orders from a small company. Three helpful procurement strategies are:

1. For experimentalists, don't purchase chemicals or anything that could be conceivably used to build a bomb on your portion of the grant; budget these costs for your co-I's institution and go through their protocols for bringing these items onto campus or lab. Even if your co-I's institution has higher overhead, the costs may break even because the larger companies purchase in bulk; for example, you'll pay 4 times more for supplies like Kimwipes at a small company than a NASA center does.

2. Non-profits do not necessarily qualify for discounts. Try for academic discounts for big-ticket items like computers by presenting business cards with an .edu e-mail address at the counter; order hardware and software through your company's designated representative. Sign up for a rewards card at your local business products shop.

3. Shipping and handling fees are stiffer for small companies; complain loudly. Make sure that vendors ship little items in one box and do not automatically expedite shipping at added cost. Ask if deliveries can be hand-carried to your co-Is at large institutions.

Diversify your funding sources to minimize salary risk. For grants, soft money researchers advocate proposing to not just NASA and NSF but also other government agencies (e.g., DOD, DOE) and serving frequently on review panels for pay. Most soft money researchers rely on a mixture of grants and contract work, consulting and teaching gigs, and small business ventures to support themselves.

Workplace Safety:

Be aware that your home address and phone number will be emblazoned on business cards, e-mail signatures, and company websites, and be careful to whom you give this information.

Add more physical activity to your day. Get up from your desk every 90 minutes and establish a regular workout routine. If you don't add more cardio to substitute for hikes to a parking lot, you will be at the plus sigma end of your weight curve.

Practical Strategies for Soft Money Researchers Who Work Remotely *continued*

Assess and address the safety of your workstation, as this is likely to be very poor by OSHA standards. Consider natural disasters (e.g., bolt your equipment and furniture down if you're in an earthquake zone) as well as ergonomics (e.g., substitute an exercise ball for a chair or turn your palms upward while sitting to improve posture).

Work-Life Balance:

Working from a home office eliminates that big firewall that compartmentalizes Science World and the Real World. Ways to manage this:

1. Set "on duty" and "off duty" hours, and stick to them. Work a regular M-F schedule if you can and dress for work just like it's a normal day at the office. During working hours, do not answer the home phone or the door unless you are expecting a work-related call, package, or visitor. Make your instant messenger status express how busy you actually are. Flex time is great when you actually need to be flexible, but indulging in an irregular schedule will throw off the schedules of the people around you, invite frequent visitors (whether you want them or not), and end up reducing your overall work time. Structuring your working hours is critical when working in semi-isolated conditions, e.g., office area in a multipurpose room.

2. When you are "on duty," only multitask on work-related activities and ask yourself: Does it take a Ph.D. to do this? If not, delegate or defer. Strategies to eliminate household distractions: hire a cleaning service; shut the doors to rooms that aren't your office; turn off the lights in every room but the one you're working in; record TV programs; get a Bose headset to drown out outside noise; work at a coffee shop or with a colleague.

3. For pacing work, think in terms of what you will accomplish in 1 week's productivity instead of by the day. Set kitchen timers, use productivity software tools, or set up telecons to stay on schedule. When you have all day to work on one task, that task takes all day, so consciously binning your time is essential.

4. Translate scientist lexicon and meaning to the non-scientists around you. Never say "working from home," as this means "lightly checking work e-mail" to non-scientists. You're "telecommuting." You're not "on a telecon"—actually say "Busy with work—come back in an hour." Establish a code phrase for the times you cannot be disturbed.

5. Use your office space as a strictly "work only" zone. Paying household bills at your desk will invite others to use your office area as communal space. In fact, because you will have business equipment at home, people will be tempted to treat your home as an alternative to FedEx/Kinko's by demanding to use your FAX machine, or even routing packages to your home because you'll be around to sign for them in the daytime.

Professionally and socially, it can be very isolating to work offsite. To maintain visibility and connections to the scientific community, soft money researchers strongly recommend attending a lot of conferences and workshops (with or without presenting) as a way to keep inspired and motivated. Developing a local network of other offsite workers and having regular lunches to share tips and tricks or just talk to another person outside your family, is also strongly recommended. Be sure to cultivate a life outside of work.

Professional Conduct: [adapted from Meghan Casserly, 05/24/2012, forbes.com]

When telecommuting, body language and people skills are still important. Speak up often in meetings or send frequent communications to be visible at your company. For video conferencing, emote on camera and keep your backdrops clean, uncluttered, or as another scientist would expect. Smile and make small talk when you're on the phone with someone just as you would in person. Mute and minimize household noise. Say "yes" in e-mail communication; if you have to say "no" to a project, do it over the phone. Write medium-sized e-mails that are neither too terse nor too longwinded. Use a combination of phone calls and separate e-mails with different subject lines for different requests to keep things straight for all parties.

Thanks to Marc Fries, Heidi Hammel, Nalin Samarasinha, Mark Sykes, Becky Williams, Mike Wolff, Terrill Yuhas, and researchers at the Planetary Science Institute (http://www.psi.edu/) and Space Science Institute (http://www.spacescience.org) for their helpful suggestions on content for this article.

Women in War and Peace

Gerrit Verschuur

I have read hundreds of books about World War II and have almost never come across stories about the crucial roles played by women, either those who served in the home front or those who were launched into the thick of battle in occupied lands in the midst of terrible danger. Two stunningly contrasting accounts of the roles played by women during World War II provide a unique perspective on the age-old issue of a woman's role in society. When nations found themselves in a fight for survival everyone was inevitably dragged into the conflict, men and women alike. Yet even then it wasn't that simple, especially in the USA where, during WWII, conservatives in Congress fought hard to protect what they saw as the traditional role of women. That, of course, meant women should stay at home and raise families while the men went overseas to fight.

The tale of women in World War II is told in great detail in a scholarly work entitled *American Women and World War II* by Doris Weatherford (Castle Books, 2008). She outlines the heroic exploits of military nurses in battle, in particular in the Philippines where they suffered as much as the men during the horrendous episode known as the Bataan Death March. Back home a different battle loomed as Congress began to move toward creating a female corps. That met stiff opposition, such as the congressman who opined if women were to be taken into the armed forces in appreciable numbers, "who then will manage the home fires; who will do the cooking, the washing, the mending, the humble, homey tasks to which every woman has devoted herself."

In contrast, women who volunteered or were recruited as secret agents in Britain launched themselves wholeheartedly into battle by parachuting behind enemy lines in Europe. The story of some of those brave individuals is outlined in *The Women Who Lived for Danger: Behind Enemy Lines During WW II* by Marcus Binney (Hodder & Stoughton, 2002). Countless other women in occupied countries also performed heroic tasks in the underground fighting to rid their nations of oppression, their heroic actions unhampered by politicians.

During WWII the USA inevitably had to turn to women to carry out jobs formerly the exclusive role of men and the image of Rosie the Riveter became the famous icon that marked the acceptance, albeit temporarily, of women's liberation from their traditional roles as homemakers. Rosie and her sisters plunged wholeheartedly into countless professions, from welding to ferrying planes from factories to bases in the US or England, flying solo across country or the Atlantic. At the same time women were actively involved in the battles of the underground resistance in German occupied France, Holland, Italy, and Poland. Organized by the Special Operation Executive (SOE) these women were trained on a par with men to organize the resistance, carry out sabotage, send and receive coded messages, fight with real guns and bullets, and learn how to survive while hiding out or when captured. Not all their stories ended happily. Many were caught and tortured to obtain the secrets they carried about networks of resistance fighters. Many were put to death but virtually none were broken. Those women were incredibly brave, tenacious and creative. In due course many were recommended for decorations but even then they were discriminated against when their superiors awarded them lower-level decorations than those earned by the men who carried equally dangerous missions.

So what is the moral of these two very different perspectives on women in war? One is that, given a chance, women are every bit as brave, resourceful and skillful as men. The other reminds us that the barriers to women fulfilling a valuable role in war still lie with men wielding political power. But of course many women in the home front were also opposed to allowing a full role for their sisters in time of national need. That again boils down to equal opportunity. The brave secret agents who parachuted behind enemy lines did so because they wanted to play a role in winning the war and no one was there to prevent them from doing so. But back home in the USA the nation never really came to terms with the new-found freedom granted women in a time of need. After the war was over, women went back to the old way, earning less than men for the same work (if they could even get equal work) and ceding their newfound liberty to tradition. It would be many decades before women pilots, for example, would be allowed to do more than simply ferry planes from the factories to the theaters of war.

One cannot help but wonder whether the more things change the more they stay the same. Looking back at WWII and the role of women in that well defined context, we see the same patterns. Less money for equal jobs. Some jobs not for women. Yet those who had the opportunity to defy the stereotypes with which they were saddled at birth proved they were equal to men, even in times of great personal danger. It is sad that it took a world war to demonstrate this point and peace to forget those lessons.