

NO LONGER ESTRANGED: WOMEN, SCIENCE, SCIENCE FICTION

by

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ABSTRACT

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Feminist science fiction (SF) and feminist science studies share common concerns—the gendered perception of science and women’s place in the sciences among them—but the two fields are rarely considered together. This failure to connect the two fields may be explained in part by the ongoing divide between the sciences and the humanities; it may be further exacerbated by the ghettoization of SF within literary studies. I gather together feminist SF texts, literary theories of feminist SF, and feminist science studies in order to add to the scholarship of each individual field as well as make a case for the value of combining these fields.

Building on the historical exclusion or marginalization of women in the sciences, Chapters 2 - 4 examine three major responses to the place of women in science as represented in feminist SF: rejecting science, embracing science-as-usual, and reversing power relations associated with science. In Chapter 2, I explore a radical feminist

approach to the relationship between women and science, examining in particular anti-science feminist utopias and “utopian science” in feminist SF and the consequences of rejecting or radically redefining science. In Chapter 3, I consider a number of SF texts that take science seriously and that, through representations of women as scientists, attempt to challenge stereotypes about women doing science and provide new narratives for girls and women to either use as models or warnings. Chapter 4 considers what happens when the inclusion of women in science seen in Chapter 3 is combined with the critique of masculine science explored in Chapter 2, asking whether it is the person doing the science that makes a difference or the science being done that matters. In other words, can science done by women be better than (i.e., more equitable, feminist, or productive) than science done by men?

The final two chapters argue that a more fruitful response to the problem of women and science involves the development of a specifically feminist science. Through readings of feminist theory and science fiction by women, Chapters 5 and 6 consider feminist science as a project to revise the definitions and expand the limits of traditional science in order to include work traditionally associated with women, challenge hierarchical and dichotomous modes of thinking, and make space for more ethical, embodied scientific practices that are not limited by identity politics. For feminist science and feminist SF to be truly effective, they cannot be limited to women's writing and women doing science but must also work to incorporate men into feminist science and SF.

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CHAPTER 1

INTRODUCTION

Literature is about people. SF is about society. It amazes, whines, berates, and pleads. It's always *about* something other than its own characters which is both its weakness and its strength.
—Terry Bisson

When I was a child, I first noticed that neither history as I was taught it nor the stories I was told seemed to lead to me. I began to fix them. I have been at it ever since. To me it is an important task to situate ourselves in the time line so that we may be active in history. We require a past that leads to us. After any revolution, history is rewritten, not just out of partisan zeal, but because the past has changed. Similarly, what we imagine we are working toward does a lot to define what we will consider doable action aimed at producing the future we want and preventing the future we fear.
—Marge Piercy, “Telling Stories About Stories”

Science does not know its debt to imagination.
—Ralph Waldo Emerson

Beatrice: "Why do we always die in the stories?"
Catherine: "Because we're not the ones who write them."
—Theodora Goss

1.1 (Mad) Scientists' Daughters

In Theodora Goss's “The Mad Scientist's Daughter,” a group of women, all daughters or creations of literary mad scientists like Victor Frankenstein, Dr. Moreau, Rappaccini, and Dr. Jekyll and Mr. Hyde, have formed a club. They do not, after all, fit into the ordinary world. As Catherine Moreau, the story's narrator, remarks, “You could, I suppose, call us monsters. We are frightening, aren't we? Although we are, in our different ways, attractive. When we walk down the street, men look, and then look away.

And then perhaps look again, and away again.” Their monstrosity both appeals and repels. Victims of (mad) science, abandoned by their makers and left to fend for themselves both emotionally and financially, most of them agree that their fathers/creators “were abusive bastards, and that's all there is to it” and although Mary Jekyll owns the house where they meet and where many of them live, she is the exception, “the only one of us who has inherited any money. Science does not pay well; mad science pays even worse.”

They are not merely victims, however. Although it would be easy to read these women as no more than victims of science and masculine power or abuse, this story also reveals the extent to which such victimhood can be resisted. Not only do they create a safe space for themselves in their club, but their survival alone defies victimhood:

The reports of our deaths have been greatly exaggerated.

Justine: believed dismembered, her body parts thrown into the sea.

Beatrice: believed poisoned by a toxic antidote.

Helen: believed strangled by a hangman's rope.

Catherine: believed killed by Moreau's hand.

And yet, as you see, we survive.

Beatrice saves herself by gaining scientific knowledge about her own physiology; Justine Frankenstein and Cat Moreau could easily, it seems, engage in the same kinds of scientific practices their fathers used to create them; and Helen constantly imagines ways that they could take over the world and make it better.

The story also rejects their victimhood by presenting the women as agents with choices to make about how to live in (and affect) the world. This conversation among the women illustrates the possibilities available to them and their consequences:

Catherine: “I don't know. On one hand, it would be nice to have more of us. On the other, I don't think any of you understand my and Bea's and Justine's position. At least you were *born* rather than made. Do we really want to—manufacture beings like ourselves? To create monsters, as our fathers did? Although making beast people does sound easier, scientifically, than concocting a poison and its antidote, or animating corpses. I mean, it's just sewing the parts together. Any of us could do it.”

Justine: “But *why*? Would we make society any better?”

Helen: “We could, if we wanted to. We could put Mary in power. She's so orderly and logical. Imagine what sensible rules she would make. At least the trains would run on time.”

Justine: “I suppose we could do it for the greater good. We could clean up the East End, especially those dreadful areas around Whitechapel. We could find homes for the children in orphanages, and employment for the women who flaunt their wares on the streets . . .”

Helen: “There, you see? I'm not saying we should spend all of our time planning to take over the world. I have other commitments myself. But I do think we should start giving it some serious consideration.”

Diana: “Helen's only being practical. You know they're going to come after us eventually. They always do—scientists, other monsters, the police. So why not take control first?”

Helen: “Whether or not you agree with me now, there's going to come a day when all of you, except perhaps Mary, will want children. You'll want them to live safely in this world, and then you'll realize that it's time for us to seize power. You'll see.”

Maybe she's right. I do sometimes think about how nice it would be to have a daughter of my own, not just cats.

Ultimately, they do not seize power, but continue their quiet lives together as monsters, refusing to misuse and abuse science in the ways that their fathers have done. This refusal is itself an act of their agency, a means for them to subvert the narrative of monstrosity begun by their fathers. As Beatrice Rappaccini says, “There's nothing wrong with science. In itself, it's neither good nor evil. It's simply a way of looking at the world.” In this view, science itself is not to blame for their pain and isolation; these things are the result of the way that science has been used and the stories that are told about them. Shaping the stories, the way of looking at the world, is a way of shaping science and the world itself. However, their consideration of the benefits of seizing power also reveals the possibilities inherent in taking the power away from the usual suspects, those who use power, prestige, and scientific knowledge to damage others, and giving it to those who have different ethical and moral compasses. Perhaps monsters. Perhaps women.

As Catherine Moreau points out in the story, women are so often the victims of these stories because women do not write the stories. The women reject this victimization by telling their own stories and engaging in what Patricia Duncker calls “[t]he radical basis of feminism”: “story-telling: sitting in circles, listening to one another, valuing one another’s words, telling one another stories” (7). Goss’s story values the creation of meaning through storytelling as well as raising many questions that are common to feminist science fiction and feminist science studies: Why are women so often the victims of science instead of scientists themselves? Would scientific practice and experimentation—would the world—look different if women were in charge? Would women do things differently? Or would they fall into the same traps as men have done (as represented in Helen and Justine’s comments that they could “make the trains run on time” and “do it for the greater good”)? Feminist science fiction is one place where these questions can be addressed and where storytelling, specifically storytelling about science, can occur, helping to give women control over, if not the world, at least the stories that are told about them.

1.2 Feminist Science Fiction: Whys and Wherefores

This use of science fiction is relatively new, however. For much of its history, science fiction has been considered a genre for boys and men, not for girls and women. This sense of SF’s masculinity is driven by the idea that fandom is by and for men and that women simply are not interested in the genre. Camille Bacon-Smith, a SF writer and critic, says that she long believed that “the 1970s mark the great divide in fandom.

Before that time, the sf community belonged to men. During the 1970s and early '80s, women stormed the fortress, demanding a place in all aspects of science fiction life, and the men in place repelled the invaders with all the tools at their command" (95). This is the common narrative of SF fandom, one that reinforces the perception of SF as predominantly male. Her research into the field, though, has revealed this to be an inaccurate narrative:

many of the feminist writers of the 1970s and '80s began as readers of the pulps, science fiction magazines of the '40s and '50s. . . . That perception crumbles farther when even a cursory survey of convention attendees in the '90s turns up numbers of women who participated in the community during the '50s and '60s and who resent the way they have been written out of women's history of science fiction. These community members remind us that women did not suddenly appear with the rise of '70s feminism, and that, in fact, feminism has had many faces in the years since fandom began. (96)

Women (and even feminists) have always been there, then; they have just been made invisible by narratives of masculinity, by exclusionary practices within the publishing industry, and by the sexism inherent in many of the stories themselves.

They have been, if not absent, then invisible; if not invisible, then at least overlooked. For instance, Mary Shelley's *Frankenstein* (1818), although considered by some to be a starting point for the genre, is often excluded from a masculinized genealogy of SF by critics and readers who see it primarily as an instance of the (more feminine and non-SF) Gothic romance genre. Similarly, Charlotte Perkins Gilman's

Herland (1915), now considered to be a major feminist utopian work, was not necessarily considered as part of the genre of science fiction. It was initially published in *The Forerunner*, Gilman's own self-published magazine that focused on social reform issues that other publications were uninterested in, not by a science fiction or speculative fiction magazine or publishing company, and it fell out of print for decades before it was rediscovered in the 1970s. Even then, it was taken up more readily by feminist scholars than by science fiction scholars. *Herland* has found its way into the broader science fiction canon as part of the utopian tradition, but its late entry means that *Herland* had little impact on earlier perceptions and experiences of SF as a male domain. Furthermore, throughout the early and mid-20th century, although, "[a]s professionals in the field, C. L. Moore, Leigh Brackett, Andre Norton, and Marion Zimmer Bradley had large readerships for their commercial science fiction and fantasy in the 1940s and '50s" (Bacon-Smith 98), this success is undermined by the fact that the women who wrote science fiction often published under male or nongendered pseudonyms (e.g., C. L. Moore, Andre Norton, C. J. Cherryh, James Tiptree, Jr.¹) or published with male partners

¹ James Tiptree, Jr., (who also published under Alice Sheldon, her real name, and Raccoona Sheldon, another pseudonym) is the most notorious of these because of the response to her writing by the male editors and SF writers of the time, including Harlan Ellison and Robert Silverberg, both of whom were convinced that Tiptree must be a man. The most famous comment on Tiptree's gender is found in Robert Silverberg's introduction to Tiptree's collection *Warm Worlds and Otherwise* in 1975, in which he wrote, "It has been suggested that Tiptree is female, a theory that I find absurd, for there is to me something ineluctably masculine about Tiptree's writing. I don't think the novels of Jane Austen could have been written by a man nor the stories of Ernest Hemingway by a woman, and in the same way I believe the author of the James Tiptree stories is male" (xii). The 1977 revelation of Tiptree's gender after such comments forced at least some critics and readers to rethink their conceptions of writing as obviously and inherently gendered.

(e.g., Henry Kuttner and C. L. Moore, Poul and Karen Anderson, L. Sprague and Catherine de Camp). Publishers thought that SF audiences would not be interested in SF by women; writers feared that they would be left out or their work dismissed if they were seen to be writing domestic fiction or soft SF because of their gender.

Only in the latter part of the 20th century have women entered science fiction in a more visible way, and the subgenre of feminist SF is generally considered to have begun in the 1970s. Bacon-Smith notes that

[c]learly something happened to change attitudes in science fiction in the late 1960s and the '70s. When we investigate the period, however, we find that not just one thing but just about everything changed there. The great divide of the '70s does exist for most women in the genre, fans and professionals alike. In fact, science fiction and the fan community underwent more changes between 1966 and 1979 than at any other time in their history. (101)

It was at this point that writers like Joanna Russ, Ursula K. Le Guin, and Suzy McKee Charnas, who not only wrote under obviously female names but also explicitly addressed issues of gender in their work, began to get more attention. This attention was not always positive, however, often containing backlash against both feminism and the changes to the genre that these women's works brought with them. One instance of this negative response can be seen in this commentary from David Levinson, a scientist and science fan:

What seemed particularly blasphemous to me was the treatment of science fiction lightweights of that period, such as, say, Joanna Russ, as the peers of the great

writers from the Golden Age of science fiction. The Nebula and Hugo Awards were significantly devalued in my mind from that point on, and as far as I was concerned, science fiction qua science fiction was dead. (“Did Science Fiction Influence You?”)

Levinson’s response reflects the attitude of many long-time science fiction fans who wished that science fiction would remain (at least apparently) apolitical and would focus on the science itself rather than on social issues. Bacon-Smith writes that, although in the early 1980s “men and women were nearing parity in their numbers at science fiction conventions, and a very few women were breaking through into the major prize categories given in the community,” this was not the case for most women writers, who “found their books still relegated to the feminist ghettos that kept the advances down and the distribution of womens’ books low in the 1970s” (95). As a result of this backlash, even after the growth of feminist SF in the 1970s, however, women science fiction writers remained marginalized.

But not all feminist SF has received such a negative and dismissive response. Ursula K. Le Guin’s *The Left Hand of Darkness* (1969), for instance, is considered one of the first major feminist SF works of this period and features gender as a major issue, but it was also received incredibly well by the broader science fiction community. It won the Hugo and Nebula Awards for best novel in 1970 and has been regularly nominated for awards since then, placing highly on Locus Poll Awards for the all-time best SF novel in 1975, 1987, and 1998 and winning a retroactive James Tiptree, Jr., Award in 1995. It has also been continually in print since 1969 and is often taught in science fiction courses as a

classic text. What sets Le Guin's work apart from Russ's or Charnas's, making it more palatable to the SF audience? This is itself a question of some magnitude, but one possible answer lies in its mode of engagement with gender. Where Russ and Charnas write worlds in which men and their supremacy are challenged and in which female anger has a place, Le Guin avoids this kind of frontal assault on masculinity, instead challenging gender categories more obliquely in her creation of a world in which gender is not an essential, absolute part of an individual, but is instead flexible and secondary to other characteristics.

The contrast between these works as well as the range of responses to them provokes an even more fundamental set of questions, however: what exactly constitutes a specifically feminist science fiction? What ties together *The Female Man* and *The Left Hand of Darkness* as feminist SF? Is feminist science fiction simply science fiction by women? Or does it require a more limited definition? Frances Bonner addresses this issue, writing,

Far more vexed is the question of what makes sf feminist. There is quite an amount of sf around that is written by women (though admittedly much less than there is written by men), but this is hardly an adequate criterion. Nor, sadly, is the requirement for "strong female characters." The majority of sf is set in the future and a very easy way to indicate that the future is different has long been to place female characters in positions or roles that are usually reserved for men. This use of women as the novum (like the similar use of people of colour) but without analysis of, or alteration in the social situation that makes this a novelty can

hardly be regarded as feminist. More thorough-going role reversal may serve feminist purposes. Some evidence of a feminist political position seems rather a minimalist definition.

This definition could easily include Russ, Charnas, and Le Guin, but might exclude other writers such as Karen Traviss, Connie Willis, and Julie A. Czerneda, science fiction writers who either identify their work as non-feminist (e.g., Karen Traviss) or write more traditional science fiction that does not explicitly draw on feminist politics. Helen Merrick notes, however, that the lines between women's and feminist science fiction are difficult to draw:

Feminist sf is most commonly used to denote "sf for feminists," and (increasingly from the 1980s on) "sf by feminists," but also sf by, or for, women. The slippage between women's sf and feminist sf (also characteristic of feminist literary criticism) is a common occurrence in the narratives I trace. (*The Secret Feminist Cabal* 9)

There are certainly reasons to attempt to draw these lines between women's and feminist SF – not all women are feminists and not all feminists are women, after all, and so assuming that women's SF equals feminist SF (and vice versa) risks the very kind of essentializing that many feminists eschew – but there are also reasons to blur these definitional lines.

Defining feminist SF as women's SF provides a starting point for inquiry, one that focuses solely on women writers of SF not because only women can write feminist SF but because there is a tradition within SF criticism of discussing female SF writers

separately from male SF writers. This tradition has led to the development of critical and literary lines of influence within women's SF that must be considered, lines of influence that rarely include male SF writers. The fact that there are still fewer female SF writers than male SF writers further justifies such a conflation of women's SF with feminist SF; as long as women SF writers remain in the minority and are more likely to be overlooked, an emphasis on specifically women's SF can be justified as part of an ongoing recovery and promotion project within women's SF. Finally, as Debra Benita Shaw notes,

the appeal of sf for women has always been that it allows opportunities both to express and explore alienation as well as to offer a fictional description of the kind of world that a gender-free or differently gendered science might produce.

I do not, then, want to differentiate between "feminist" sf and sf that happens to be written by women. Although some of the works that I will be discussing nail their political colours very firmly to the mast, others do not. (5-6)

Feminism is not easily defined in just one way (including, as it does, radical feminism, liberal feminism, postmodern feminism, material feminism, etc.), and feminist ideals may sometimes be present even when gender is not a major concern of the author; in a world where women's SF is marginalized, writing SF as a woman may still be a feminist act, even if a relatively minor one. Ultimately, I believe that continuing this segregation indefinitely could be harmful or counterproductive, as it might help to further ghettoize women's or feminist SF, but it does provide a useful starting place and a tool for evaluating the health of women's or feminist SF within the genre as a whole.

If feminist SF is so readily overlooked or marginalized, however, what do women and feminists gain by reading, studying, or writing it? Despite the push to recognize the presence of women within the SF community, the fact is that many women don't read science fiction (whether feminist or not); many *people*, not just women, do not read science fiction. Karen Joy Fowler notes the discomfort many readers feel with science fiction:

I think that there are still a great many people who wouldn't seek out or pick up a book if it were in the science fiction section of the book store, but if it were shelved somewhere else, and they picked it up and read it, and nobody had told them that it was science fiction, they'd have no problem. They've read *Beloved* and *The Lovely Bones*. People have become very comfortable with fantastical literature, which seems to be shelved all over the place now. But if you ask them to read science fiction, they would balk. (qtd. in *The Secret History of Science Fiction* 88)

Similarly, Susanna J. Sturgis writes about her attempts to get people to read feminist SF when she worked at a feminist bookstore:

I encouraged feminist fiction readers to try this or that fantasy or SF writer. Astonishing! Some people stared at me bewildered, as if my English had become incomprehensible. Others gazed with a complex mixture of pity and contempt, or they murmured, "Oh, I don't read fantasy or science fiction."

"Why not?" I would ask, and hear in reply:

"It's all about spaceships and elves."

“No elves in *The Left Hand of Darkness*,” I say, “and the spaceships are strictly deep background.”

“I don’t read fantasy or SF”—a little louder this time. “It’s just about guys.”

“*The Left Hand of Darkness* has a [sic] interesting take on gender—plus it’s a mass market paperback, only \$1.95.”

“No, thanks. Besides, I was never any good at science or math.”

“Do you have to be a cop to read Agatha Christie?” I retort, unwilling to give up. “Hell, you don’t even have to be English!”

By this time the customer is looking right and left for a chance to escape. “It’s just too unbelievable,” she says, ducking past me and heading for the back of the store.

A few minutes later there she is at the cash register, plunking down three nine-dollar romances, each one about two women, one independently wealthy, the other getting a divorce from her husband, who fall in love and have simultaneous multiple orgasms on the first try. (104-5)

In bringing science fiction texts into my literature classes, I certainly find Fowler’s and Sturgis’s observations to be true. Although István Csicsery-Ronay argues for the connections between science fiction and reality, saying, “It is impossible to map the extent to which the perception of contemporary reality requires and encourages science-fictional orientation” (3), implying that anyone who is aware of the laundry list of technological advances or tragedies he provides (from the “postmodern hecatomb of the

World Trade Center” (2) and Chernobyl to cloning and computer-generated celebrities) must also be oriented to what he describes as “a mode of response that frames and tests experiences as if they were aspects of a work of science fiction” (2), many students, who are both readers and members of contemporary society, are not able to respond in this way. They are frequently, in fact, unable or unwilling to make connections between science fiction and the real world. Many students respond to SF, even explicitly political SF that comments on the world they live in, by saying that it doesn’t really apply to them; after all, it’s science fiction, which, they expect everyone to know and agree, is fantasy, even further from reality than mainstream fiction is. Students insist that science fiction is just made up and unrealistic, that it has nothing to offer them, never mind the unreality of some of their other preferred narratives or the fact that all fiction is made up to some degree. What matters is that they believe it to be more unrealistic than other types of stories; they do not know how to make sense of it and so they resist reading it, much less reading it as social commentary.

On the other hand, for those who are willing to engage with science fiction, it has the capability to dramatize real-world problems in a vivid and engaging way. As L. Timmel Duchamp writes, “in the end, the SF writer's primary task is to make ideas flesh—to elaborate their implications, to make them emotionally real” (69). Such statements regarding SF are common among SF writers and scholars, who often see themselves as embattled and wish to defend the genre from accusations of shallowness or lack of quality. Nancy McHugh provides another argument for the value of science fiction:

Science fiction uses the genre of fiction to reveal things to us about ourselves, our culture, our political system, our science and technology that usually are not revealed to us through normal avenues or are intentionally hidden from us by institutions that we consider benign, and are anything but benign. It is effective because it feels fictional and thus distant from reality, yet it reveals more about our reality and frequently holds more truth than the evening news or press releases from the EPA. Thus ignorance is excavated, and alternative knowledge is revealed, and the reader is provided with a new lens through which to understand her world. (44)

This element of SF is perhaps doubly powerful in feminist SF. Patricia Duncker argues that “[f]eminist fiction reaches a broader audience than feminist theory. Women who might not broach Mary Daly’s *Gyn/Ecology* might well read *The Wanderground*” (105). Feminist SF, therefore, has the ability to introduce not just science fictional but feminist ideas to an audience who might not otherwise encounter them. Even though feminist SF is a relatively small subset of SF overall, after all, it is far more likely to gain an audience than is either feminist theory or science studies.

1.3 Feminist SF and Feminist Science Studies

In fact, science and science fiction are already linked for many scientists and readers, as illustrated by comments collected by Sigma Xi in response to the question “did science fiction influence you?”. This selection from the comments received highlights how

widespread the influence of SF is, ranging across gender lines, across different scientific fields, and across generations:

- Carol Stephenson (SX 1990), social psychologist: “Science fiction had a great impact on my choices to pursue a career in science.”
- Jennifer Kiger, Master’s Candidate in Molecular Genetics (SX 2008): “Science fiction ABSOLUTELY had an impact on my decision to study science. . . . [Aldous Huxley’s *Brave New World*] changed the way I looked at science and inspired me to study genetics and pursue a career in research.”
- Jeffrey D. Brewster (SX 1992): “Absolutely. Asimov, Heinlein and others inspired an interest in science and a sense of the imagination and creativity that scientists can express.”
- Phil Novak (SX 1959): “I definitely favor ‘hard’ Sci-Fi over fantasy and have been able to keep surprisingly abreast of at least the jargon of current physical and astronomical theories via reading stories utilizing the cutting edge topics of the day.”
- Jack Bennett (SX 1954): “I learned a lot of various sciences incidentally along the way, some critiquing the stories. But mostly I learned that the sciences are continually evolving and today’s answers are also subject to improvement. Science fiction was one of the many influences in my life both for knowledge/attitude and entertainment. It still is.”
- Alexander B. Morgan (SX 1998), University of Dayton Research Institute: “I liked science because I found it interesting, and I knew it was the route to making

the things I saw in science fiction possible. . . . Science fiction is the perfect blend of science and language arts—it takes scientific concepts, proposes new hypotheses and experiments, and posits an outcome of those in such a way that the reader WANTS to find out what happens.”

- Andrew J. Howard (SX 2006), Associate Professor of Biology and Physics at Illinois Institute of Technology: “Science fiction did help to confirm my adolescent decision to make science my life’s work. Reading Asimov’s *Foundation* series as a high-school student helped me realize that science and technology (broadly defined) have a major impact on humankind in that they help to shape culture. So my determination to Save the World (ah, adolescent idealism!) was consistent with a life in science.”
- Patricia S. Glas (SX 1993), microbiologist: “A resounding ‘YES’! Science fiction was my favorite reading genre. I grew up in New Orleans during the time of racial unrest. Women were supposed to go to college to get a husband. One of my science teachers laughed when I said I wanted to be an oceanographer. Science fiction with its heroes and heroines, along with my father, an engineer that encouraged me to read science fiction, acted as role models. Science fiction fed my imagination and gave me the sense that thinking outside the box was not always bad.”

All of these responses to the question credit SF with influencing careers in science as well as, in some cases, women’s careers in science in particular. One of the most striking

responses, however, shows science fiction's effects not only this on the writer himself but also across multiple generations of scientists. Joe Knickmeyer (SX 1966), writes,

I suspect that the answer would be “yes” for a substantial fraction of those who grew up in the ‘50s and ‘60s, at any rate. Certainly it was for me. . . . Around 1954, I joined the Science Fiction Book Club, saving my lunch money and skipping meals to gather the resources to buy one or two cheaply printed books a month. I loved them dearly, and I still have nearly all of them in my library. Some literally disintegrated from repeated reading. Some I have already passed on to one of my two daughters (both of whom also ended up in scientific careers). . . . Before encountering science fiction, my fantasies orbited around cowboys and Indians and solder- and war-games. Once infected, I had a goal: I was going to be a scientist (since it was obvious from my frail build and glasses that I would never be a spaceman). Though I ended up a mathematician, spending most of my professional life doing operations research and systems analysis for the US Army, I have never lost the sense of wonder at the glorious sidereal universe from star-cloud to atom. Impact? I can scarcely imagine what would have become of me had I not stumbled over my mother’s SF magazines so long ago. Science fiction had much to do with my intellectual, philosophical and scientific orientation—more so by far than any single teacher or professor I ever had. (“Did Science Fiction Influence You?”)

Knickmeyer’s response is particularly interesting for my study because in this short passage he reinforces the presence of women among SF readers as well as providing a

wonderful example of the way that science fictional inspiration can be carried across both generational and gendered lines as he is introduced to SF through his mother's interest and it passes through his readership and into his daughters' scientific careers.

Despite these explicit and meaningful connections between science and science fiction, however, there remains a lack of theorization about the interconnections between the two. These testimonies reveal that “the very minimum that written sf does is to popularize the rhetoric of science, and make the language of science familiar to the reader. It valorizes and validates interest in science, and stimulates thought about the consequences of new discoveries and of new applications of science” (McLeod 174-5). It also, however, stimulates thought about the social construction of science and creates the ideal space for discussing who does science, what counts as science, and how science is represented, all of which can have a direct impact on the real-life production of science.

Feminist SF, as Theodora Goss's “The Mad Scientist's Daughter” illustrates, raises many questions that are also raised by feminist science studies. However, although, as Brian Attebery argues, “SF is uniquely positioned to mediate between the interests of the literary world and the investigations of science” (189), this mediation does not occur often enough within feminist SF and science studies writing. Susan Merrill Squier discusses this problem in her book *Liminal Lives*, describing a “kind of sterility—the failure of two potent fields, feminist literary criticism and feminist science studies, to merge in a fertile zone of inquiry and analysis” (27) and asking, “Why has feminist literary criticism been so indifferent to the question of science? Why are feminist science studies so little marked by the methodology and epistemology of literary studies?” (28).

Squier is not the only one to have noticed this scholarly gap. Helen Merrick also writes that “despite the burgeoning fields of posthuman, cyborgian and cybercultural studies which employ SF as exemplary cultural texts (eg, Hayles, 1999), feminist SF has played a surprisingly small role in ‘cross-cultural’ encounters with the sciences” (“Alien(ating) Naturecultures” para. 1).

One reason for this disciplinary gap may be the lack of a clear and unified approach to both fields. Therefore, as Squier writes, “we need to ‘find or invent’ some tools that we can use” (28) for interdisciplinary study. Merrick suggests one approach that might allow this, writing,

Many literary analyses of feminist SF imply that the genre is merely a convenient vehicle for certain devices and locales (aliens, alternate worlds or futures) that better enable an examination of gender from an estranged perspective. For some texts this is indeed the case, but for many others a feminist revisioning or critique of scientific discourses and cultures is an integral function of the text. (“Modest Witnesses?” 214)

As Merrick notes, feminist literary studies of science fiction have tended to see the science incorporated into SF (particularly feminist SF) as metaphor rather than as significant in its own right. It is certainly important to note the ways in which metaphors of power and otherness play out through representations of science in SF, but there is also much to be gained by examining what the science of feminist SF has to say about nonfictional science, addressing the gap noted by Martin Willis, who writes, “It may seem peculiar, but it is nevertheless true that extended readings of the use of science in

science fiction texts are extremely rare” (1). This consideration of the science itself might itself become one of the tools with which we may bring SF and science studies together. Squier notes that “[t]his science/literature divide has been maintained by literature and science, producing a kind of systematic ignorance, a product of the compartmentalization of experience that we can trace through the practices of science and literary criticism” (32) and that “literature has yet to be seen as instrumental in the social constructions of scientific facts” (41). Science studies, as a field that is primarily focused on examining scientific practices and ideology, would seem to have little room or need for fiction, after all, but Squier argues that including literature, specifically science fiction, in a discussion about scientific practice allows a valuable broadening of discourse and an increase in knowledge: “When we ban fiction—as a genre—from a discussion, we not only do away with that open-ended approach but are making some important choices about what counts as, and can contribute to, knowledge” (262). Similarly, Margret Grebowicz remarks upon the contributions that fiction might make to scientific understanding, noting that “the ‘public access’ we are concerned with in STS [science and technology studies] is (and always has been) happening through SF, but, in part because the discourses inhabit two such different social spheres, STS has yet to systematically analyze the most effective popularizer” (“Introduction” xvi).

Following Merrick and Squier, then, I focus my attention on the ways in which “a feminist revisioning or critique of scientific discourses and cultures” takes place within feminist SF, exploring the connections between feminist SF and feminist science studies as feminist SF illuminates the arguments and principles of feminist science studies and as

the ideas of feminist science studies scholars contribute to the significance and value of feminist SF. Accordingly, bringing together feminist SF and feminist science studies should allow a greater understanding of each field and a more solid foundation upon which to build feminist politics as well as potentially helping to unify the too-often-fragmented field of feminist studies and provide new pathways for unification between academia and activism, between the humanities and the sciences. Reading feminist SF and feminist science studies in conversation with each other – paying attention to the way that science appears in feminist SF and “situating feminist SF as a creative form of science studies” (Merrick, “Modest Witnesses?” 214) – may provide one entry point for the kind of inter- and cross-disciplinary analysis called for by Merrick, Squier, and Grebowicz and may also broaden the scope of both SF and STS discussions.

1.4 Overview

In the chapters that follow, I take up where Merrick, Squier, Grebowicz, and even Goss leave off, examining the uses of science in feminist SF and addressing some of the fundamental questions of science studies through examinations of feminist SF: Where are the women in science? How can we more effectively bring women into the sciences? Might women do science differently from men? Can there be a feminist science? And, if so, what would that feminist science look like?

Chapter Two, “Against Science: Risks of Rejection,” explores a radical feminist approach to the relationship between women and science by reading Sally Miller Gearhart’s *The Wanderground*, Dorothy Bryant’s *The Kin of Ata*, and Judy Grahn’s

Mundane's World as instances of feminist anti-science utopias that go so far in their critique of traditional science as to abandon it altogether in favor of “utopian science” or other alternative sciences. I also consider the consequences of rejecting or radically redefining science to allow it to include magic. As Squier notes, “Alliances with nonfeminist scholars in social science and science fields are more readily cemented if the feminist scholar positions herself or himself as sharing the same commitment to *facts* as opposed to *fictions*” (43); therefore, the rejection of science and embrace of magic in feminist SF potentially closes off the possibility of connection with other fields and with nonfeminists.

Chapter Three, “‘Science Genius Girl’: Bringing Women Into Science and Science Fiction,” presents science fictional texts that take science seriously and in which women are represented as scientists, including Anne McCaffrey’s *Dinosaur Planet* and *Dinosaur Planet Survivors*, Janet Kagan’s *Mirabile*, Nancy Kress’s “Computer Virus,” Marissa Lingen’s “The Grandmother-Granddaughter Conspiracy,” Kate Wilhelm’s *The Clewiston Test*, and Cathy Hinga Haustein’s “Earth and Sky Words.” This chapter places those texts in the context of the real-life challenges that discourage women from joining or remaining in the sciences. I argue that, through telling stories of women doing science, SF can challenge stereotypes about women doing science and provide new narratives for girls and women to use as either models or warnings.

Chapter Four, “Anything Men Can Do: Reversals of Scientific Power,” considers what happens when the inclusion of women in science of Chapter Three is combined with the critique of science as dangerously masculine that is explored in Chapter Two, asking

whether it is the person doing the science that makes a difference or the science being done that matters. In other words, can science done by women be better than (i.e., more equitable, feminist, or productive) than science done by men? This chapter addresses these questions while analyzing feminist separatist SF texts in which women have gained control of science and society: Joanna Russ's *The Female Man*, Pamela Sargent's *The Shore of Women*, and Sheri S. Tepper's *The Gate to Women's Country*.

Chapter Five, "Feminist Science: Discovery and Creation," argues for the possibility, revealed through feminist science fiction, of a feminist science that is not built on femaleness or femininity but that is defined by the following three major characteristics: 1) a recognition of women's scientific contributions both now and in the past, both within the realm of traditional science and also within indigenous sciences that have previously been overlooked; 2) challenges to dichotomies and hierarchies – for instance, between internal and external, self and other, nature and culture, rational and emotional, male and female – that traditional science may not readily or easily question; and 3) a consideration of the political and ethical ramifications of its choices, narratives, and definitions. Texts considered include Jean Hegland's *Into the Forest*, Molly Gloss's "Lambing Season," Nicola Griffith's *Ammonite*, Joan Slonczewski's *A Door Into Ocean*, and Marge Piercy's *Woman on the Edge of Time*.

Chapter Six, "Not Just for Women: Expanding the Range of Feminist Science and SF," argues that for feminist science and feminist SF to be truly effective it cannot be limited to women but must also work to include men. I examine Ursula K. Le Guin's *The Dispossessed* as an instance of a feminist SF novel that contributes to the vision of a

feminist science through a male protagonist and Robert Charles Wilson's *Blind Lake* as an instance of a SF novel by a male author that can also be read as contributing to the project of a feminist science. Merrick argues that

reading SF texts through the lens of feminist science theory destabilizes certain literary canons, drawing attention to texts and authors that have been previously overlooked. That is, a focus on feminist science studies can provide different criteria for appreciating the "feminist value" of a text, and modify our view of what "counts" as "feminist SF." ("Modest Witnesses?" 225).

In this chapter, I consider how what counts as feminist SF might be changed by including male characters and writers, placing this argument in the context of postmodern feminists' desire to "[reject] the innocence of identity politics as politically irresponsible" and "[claim] 'what I want for us' instead of 'who I am'" (McCaughey 80).

As a result of this reading of feminist SF and feminist science studies, I hope to "[remind] the science fiction critic that the genre is *science* fiction as well as *science fiction*" (M. Willis 3) by emphasizing the place of science in feminist SF, contest the divisions between science and science fiction as well as between feminist SF and feminist science studies, and expand the bounds of feminist inquiry. As Geoff Ryman says, "If there is an estrangement between science and science fiction, then it should be possible to do something about it. It can only be fruitful." The end of the estrangement between women, science, and science fiction should be even more fruitful, as bringing these terms and fields of knowledge and experience together can contribute to new modes of thought that are not simply literary or theoretical but that may also have practical effects.

CHAPTER 2

AGAINST SCIENCE: RISKS OF REJECTION

Some people, and I am one, also believe that art is by nature revolutionary: that a vital function of the artist is to produce and publish “virtual realities” of social change.

Certainly the inverse is true: no radical change can ever occur until a believable and seductive new vision is made public.

—Judith Merrill, *Better to Have Loved*

She had seen too many visions of heaven, too many hells, to choose among them. *I hope we make our own.*

—Joan D. Vinge, *The Snow Queen*

There is no more threatening and no more degrading doctrine than the fancy that somehow we may shelve the responsibility for making the decisions of our society by passing it to a few scientists armored with a special magic. . . . The world today is made, it is powered by science; and for any man [or woman] to abdicate an interest in science is to walk with open eyes toward slavery.

—Jacob Bronowski, *Science and Human Values*

2.1 A Numbers Game: Gender Imbalance in the Sciences

The popular conception of the scientist is male. From Dr. Frankenstein to Albert Einstein, from Richard Feynman to Dr. Horrible,² whether the scientist is fictional or nonfictional, whether mad, eccentric, or apparently ordinary, the scientist is almost always male. There are working female scientists represented in fiction, there are female science teachers, and there are real-life female scientists, but they are both statistically

² Alternatively, insert Doc Brown (from *Back to the Future*), Richard Dawkins, Carl Sagan, Mr. Fantastic/Reed Richards (from the Fantastic Four), Isaac Newton, E. O. Wilson, Mr. Wizard, Charles Darwin, Dexter, Young Frankenstein, Nikola Tesla, Douglas Hofstadter, Dean Kamen, Niels Bohr, B. F. Skinner, Erwin Schrödinger, Max Planck, Alan Turing, Dr. Venture, Dr. Jekyll, Sigmund Freud, Alexander Shulgin, John Nash, Stephen Hawking, Thomas Edison, Michael Faraday, and even, as one friend put it, “those guys in commercials with lab coats and clipboards.”

less common and less commonly thought of. What female scientist comes to mind as readily as the men named above? Jane Goodall, Dian Fossey, Marie Curie? Perhaps. But even when female scientists are identifiable to the larger public by name it can be argued that they are not perceived in the same way that the male scientists are. Jane Goodall and Dian Fossey are perhaps two of the most prominent female scientists of the 20th century, well-known not only for their work but for representations of their work on film (see *Gorillas in the Mist* (1988) starring Sigourney Weaver and numerous nature films featuring Jane Goodall), but they present a very different image of the scientist at work than do Einstein or Feynman. Where Einstein, for instance, stands for pure intellect and rationality, so pure that he could not be bothered with the mundane details of life³, Goodall and Fossey are associated with emotion and nurturance instead: Fossey's murder during the course of her research has made her a martyr to the cause as well as an emotional touchstone (rather than an intellectual one), and Jane Goodall is best known for the bond forged between herself and the chimpanzees she studies.

Marie Curie, on the other hand, is not commonly associated with emotion and feminine qualities, but she reveals another way in which women as scientists might be effaced:

Even Marie Curie—a popular role model for scientific women—conformed to the image of a lonely, introspective scientist, clothed in a simple black dress and with

³ One story told about Einstein reinforces this:

Someone once called the dean's office for directions. "How do I get to Albert Einstein's home?" the caller asked. When the man at the dean's office said he couldn't give out those directions, there was a pause on the other end. Then, a sigh, and a response: "This is Albert Einstein. I got lost walking home from the campus." (Blackwell).

severely pulled-back hair. In her youth, as a poor, driven student, she led a monastic life, becoming so lost in her studies in her cold room that she stopped bothering to light her stove or even eat. (Schiebinger, *Has Feminism Changed Science?* 75)

Curie, as many other women scientists have also described doing, shunned the parts of her that might be read as feminine in order to maintain the image of herself as a scientist, revealing, through the apparent or felt necessity of this bifurcation, how difficult it is for the two roles—scientist and woman—to coexist in most peoples’ minds. As Julie Des Jardins notes, “Most people I know think that women can be good scientists; but they also believe, consciously or not, that what makes women good scientists is the extent to which they deny their true selves to think like men” (4). The kind of self-abnegation or absent-mindedness described in the above passage seems perfectly at home in the representation of male scientists like Albert Einstein, showing how separate they are from their own materiality and from the mundane details of the rest of the world; however, when Curie engages in the same behavior, it reads less as dedication to her field and more as a representation of her failure as a woman. Furthermore, Des Jardins argues, for early twentieth century women, Curie “represented women’s untapped potential less and less and become more and more clearly a superhuman anomaly,” a woman whose life seemed unappealing, “a joyless spinster who had chosen science over sexuality” (47). As Eric Leif Davin points out, her status as woman was always central:

Even her “best friend” and husband, French scientist Pierre Curie, dismissed and discouraged her when she first contacted him seeking technical assistance on her

own research. He felt women were a distraction from scientific work. And even after winning Pierre over, she was still alone in scientific circles. At the famous 1911 Solvay Conference of outstanding scientists, for example, Marie Curie was the only female among the 24 scientists in attendance. (38)

At the time of her success, she was an anomaly, someone who not only did not fit the mold of scientist but could be “a distraction from scientific work” for others. Even now, Marie Curie, Dian Fossey, and Jane Goodall stand as anomalies in the popular perception of scientists.

This perception of the gendered scientist is widespread. Londa Schiebinger cites Jane Kahle’s “Images of Science” and Deborah Fort and Heather Varney’s “How Students See Scientists: Mostly Male, Mostly White, and Mostly Benevolent” to illustrate this. Here Schiebinger describes the results of an experiment in which children are asked to draw or talk about their ideas about scientists:

Children persisted in conceiving of scientists as men well into the 1980s. . . . Only two girls in the group drew a female scientist; none of the boys did. Even more strikingly, 82 percent of the student teachers imagined a scientist to be a man. In another study 86 percent of the girls . . . and 99 percent of the boys described scientists as male. (*Has Feminism Changed Science?* 73)

Of course, this study dates from the 1980s and so may no longer provide an accurate picture of perceptions of scientists. However, as late as 1997, a study by Barman et al showed that “the vast majority of female student images of scientists were versions of white males working alone in laboratory settings” (Jones and Bangert 38). And in 1998,

a study by Nuno showed that, “[s]urprisingly, even female scientists, for the most part, draw stereotypical Einstein-type images that are not realistic representations of themselves actively engaged in a scientific profession” (Jones and Bangert 38). In 2006, a study by Richard Jones and Arthur Bangert revealed that 51.6% of 7th grade girls, 16.9% of 9th grade girls, and 27.3% of 11th grade girls conceived of scientists as female (41). This is a striking uptick in the percentage of girls envisioning scientists as female in one class, with smaller increases in the other two classes, but, while the 51.6% of 7th grade girls who described scientists as female is heartening, the 16.9% of 9th graders and 27.3% of 11th graders reveals that this kind of change is limited yet. In those two classes, the majority of girls still see scientists as male.

Why, though, do so many—male and female, young and old—persist in imagining scientists as male? The most obvious answer is that there are simply more men than women working as scientists. Why this is the case is a far more complex question, however. One answer to the question is that inherent differences between men and women and the masculinization of the sciences prohibit women from becoming involved in the sciences. Evelyn Fox Keller has argued that “perhaps the single most powerful inhibitor [of women in science] was the widespread belief in the intrinsic masculinity of scientific thought (Keller 1974)” (“Women, Science, and Popular Mythology” 130). This belief has been held by women and men, feminists and nonfeminists. As Keller further notes,

although it may now [in the early 1980s] be muted in many circles, the mythology which has for so long divided women from science is hardly dead. It even seems

to be undergoing a kind of renaissance. While liberals attempt to escape the belief system which identifies science as male and nature as female, the very same beliefs are being re-embraced by a number of feminists. Such a resurgence suggests deeper roots to these beliefs than might otherwise have been thought. (“Women, Science, and Popular Mythology” 132)

Keller clearly believes that this mythology is harmful, writing, “Not only has that mythology helped guarantee that most scientists are men but, more important, as I will also argue, it has influenced our very definitions of science and helped to promote a particularly narrow, and perhaps even distorted conception of objectivity” (“Women, Science, and Popular Mythology” 134); however, many feminists, particularly in the 1970s and 1980s, held firm to this belief in the troubling masculinity of science, arguing that not only were women made unwelcome in scientific laboratories and classrooms, but that women’s entry into the scientific establishment would be harmful and undesirable—for women. Sandra Harding elaborates on this:

The radical feminist position holds that the epistemologies, metaphysics, ethics, and politics of the dominant forms of science are androcentric and mutually supportive; that despite the deeply ingrained Western cultural belief in science’s intrinsic progressiveness, science today serves primarily regressive social tendencies. (*The Science Question in Feminism* 9)

These regressive social tendencies are, she writes, “violent and misogynous,” as “nature and inquiry appear conceptualized in ways modeled on rape and torture” (*The Science Question in Feminism* 116) and, furthermore, “...the science we have is highly

incorporated into the projects of a bourgeois, racist, and masculine-dominant state, military, and industrial complex” (138).

If this is the case, how should feminism address the real and perceived gender imbalances in the sciences? Given the arguments outlined above, some feminists begin to answer this question by themselves asking, “What is progressive about mounting heroic campaigns to ‘add women and gender’ to the social structure and subject matters of the sciences without questioning the legitimacy of science’s social hierarchy and politically regressive agendas more generally?” (Harding, “How the Women’s Movement Benefits Science” 59). If science is indeed so oppressive, misogynist, and racist, why should women take part in it? Why should anyone?

This approach is in direct opposition to the liberal feminist project to bring equal rights, treatment, and opportunities to women, which may seem to be difficult to oppose. As Londa Schiebinger writes, “Who, these days, is not in favor of equal opportunity for women, or, to put a label on it, who is not a liberal feminist?” (*Has Feminism Changed Science?* 3). Liberal feminism has, after all, been the driving force behind women’s suffrage, laws supporting women’s rights to own property, and the legalization of both birth control and abortion. However, many have argued that liberal feminism does not go far enough:

While liberal feminism has served women well, it also has led into certain blind alleys. In the attempt to extend the rights of “man” to women, liberals have tended to ignore gender differences, or to deny them altogether. For all practical purposes, so the thinking goes, women think and act in ways indistinguishable

from men. (Schiebinger, *Has Feminism Changed Science?* 3)

Furthermore, Schiebinger writes,

A second problem with liberal feminism (also called “scientific feminism,” “feminist empiricism,” or “equality feminism”) is that it seeks to add women to normal science, leaving the latter unperturbed. Women are supposed to assimilate to science rather than vice versa; it is assumed that nothing in either the culture or the content of the sciences need change to accommodate them. (*Has Feminism Changed Science?* 4)

Here lies the fundamental critique of liberal feminism: it expects women to become more like men but does not require men to change at all, thereby continuing to privilege the masculine over the feminine and doing nothing to counteract the troubling masculinization of fields such as science. If this ideology prevails, argue radical feminists, more women may join the scientific ranks, but the problem remains

a) that they would remain a minority, and b) that they would tend to be self-selected by the same mechanism that . . . has in the past helped select male scientists. In that way, women in science could reproduce the two-culture split we are already so familiar with, possibly even a sharpened version of that split. (Keller, “Women, Science, and Popular Mythology” 138)

For these reasons, radical feminists have argued that science itself should be changed to accommodate women and that, because of its ideological flaws, women have no place in science-as-usual. Therefore, instead of advocating for better science education for girls and women and for laws that assure the equality of men and women working in the

sciences, these feminists either support a radical overhaul of the practice and philosophy of science in order to create an explicitly feminist (or feminine) science or champion a sweeping abandonment of science.

This more radical approach to women in science has influenced feminist SF in multiple ways, including the rejection of science in some feminist utopias and a critical turn to magic and pseudoscience as feminist successor sciences. In this chapter, I will explore these feminist approaches to science and their generic and political consequences.

2.2 Anti-Science Feminist Utopias

During the 20th century, feminist utopias were a key source of alternative visions of the relationship between the individual woman and the larger society. Charlotte Perkins Gilman's *Herland* (1915), for instance, posits a world in which women alone are capable of running an entire society, filling all roles, a world in which a liberal feminist approach, illustrated by the Herlanders' rational and scientific approach to education and knowledge, is complemented by a valorization of specifically female traits and activities—like motherhood—that is more akin to the 1970s radical feminist movement. In *Herland*, motherhood, education, gardening and farming, and even science come together to reveal ways in which women can be fulfilled members of a feminist and non-oppressive society, and in this way *Herland* constitutes a political intervention in the culture of Gilman's time and, because of the rediscovery and republication of the text in the late 1970s, in the culture of second wave feminism as well. As Frances Bartkowski has argued, Gilman's feminist utopia is simultaneously a foremother and a conceptual

sister to feminist utopias of the 1970s, highlighting the connection between the feminist movement of the early 1900s and that of the 1970s and showing that “[t]he periodization of utopian writing and thought would seem to chart certain moments or ruptures in Western social history—those times when utopian desires/projective longings are driven by both hope and fear, those times particularly marked by anticipation and anxiety” (7). The hopes and fears of 1970s feminists are performed in feminist utopias that “use imaginative and futuristic settings to test alternative relationships between women and civil society, working through dilemmas about embodiment that feminist political theory has yet to resolve” (Silbergleid 160).

These texts also test alternative relationships between women and science, and, in many of the feminist utopias of the 1970s and ‘80s, these alternative relationships amount to a rejection of science. If, as Bartkowski argues, “The feminist utopian novel is a place where theories of power can be addressed through the construction of narratives that test and stretch the boundaries of power in its operational details” (5), these feminist utopias address issues of power by addressing the place of science in the world, reassessing the power held by practitioners of science, and reclaiming that power for themselves through the elimination of science as we know it. One basic assumption in these texts is that both scientific knowledge and practice signify and produce power; a concomitant assumption is that this power is harmful (*power over*) and could be better replaced by a closer relationship with nature or a deeper understanding of oneself. Sandra Harding writes,

Now feminists often pose a different question: “Is it possible to use for emancipatory ends sciences that are apparently so intimately involved in Western,

bourgeois, and masculine projects?” (*The Science Question in Feminism* 9)

Dorothy Bryant, Sally Miller Gearhart, and Judy Grahn all seem to answer this question in the negative.

Bryant’s *The Kin of Ata Are Waiting for You* (1976; first published in 1971 as *The Comforter*), Gearhart’s *The Wanderground* (1979), and Grahn’s *Mundane’s World* (1988) envision worlds in which science is masculinized and dangerous, worlds in which, for the safety of all, science is done away with or significantly minimized. These texts belong to a particular moment in the feminist movement when “there was a governing idea, mostly untheorized, that the contaminating effects of power were tied to the work, world, and politics of men” (Bartkowski 6). Therefore, many of these texts not only eliminate science, but also eliminate men:

A number of writers began to toy with the idea that a world constructed on feminist principles, whatever its flaws, could hardly fail to improve things for most women. For many of these writers, such a world was imaginable only in terms of sexual separatism; for others, it involved reinventing female and male identities and interactions. (Attebery 107)

As an answer to the question of the place of women in science and as commentary on male/female relationships, these anti-science feminist utopias may seem hopelessly naïve to 21st century readers, but an understanding of this perspective and an examination of its representation in feminist utopian SF is essential to an understanding of later theorizations and fictionalizations of the relationship between women and science.

Dorothy Bryant’s *The Kin of Ata Are Waiting for You*, though not a separatist

utopia, is a complete revisioning of human interaction, an educational experience, and an invitation. *The Kin of Ata* begins with a common utopian technique: an outsider finds his way to the utopian community and proceeds to learn about that community and gradually become a part of it. In this case, the male narrator has accidentally killed a woman and, in the process of running away from the crime, he is in a car accident after which he wakes up in Ata. The people in this community speak a language he does not understand, but they care for him and teach him their ways. They live simply on the land, communally and without possession, they minimize the difference between the sexes, and they privilege their dreams above all else, believing that dreams have messages that must be followed. They begin each day by telling another their dreams and they do their best to live by those dreams, believing that it is “nagdeo”—good—to follow one’s dreams and that it is “donagdeo” to deny them; following one’s dreams leads to a life of peace and harmony while denying dreams leads to nightmares and pain.

One of the central tools Bryant uses to reveal Ata as a utopia is language. As the narrator discovers,

Their verbs lacked tense—literally, as they spoke, there was no sense of past or future, only of now, the present moment. . . . The language lacked all sense of the singular, the individual. But what most struck me, next to the lack of a sense of time, was its inconsistency of gender. Everything animate and inanimate was either masculine or feminine, nothing was neuter—except human beings. I’d never encountered anything like this in any other language. . . . There were words for man and woman but they were almost never used. . . . One pronoun referred to

all human beings. People called to one another by this word when not using someone's name, or they referred to one or more people by it. It was both singular and plural and it meant kinship. The way most people use the word "brother" would be the closest word in English, but because "brother" implies both gender and singularity, it is quite wrong. The closest word I can think of to approximate the meaning of this pronoun is "kin." We were all called kin. (50-1)

The language of Ata mirrors the philosophy of Ata. Gender is secondary to a broader sense of kinship; the present is paramount while past and future are unimportant. This is in stark contrast to Western conceptions of both community and language. Ata is therefore presented as an alternative to the world as we know it, utopian because each individual is free to follow his or her desires and dreams and because this freedom is for the greater good of both community and individual.

At its core, *The Kin of Ata* is a novelized self-help method presented as a solution to the problems of the world. The interaction between Ata and the outside world highlights this. The narrator appears to arrive in Ata and to eventually leave via a sort of spiritual pull. He needs what Ata can give him, so, when his car crashes, he finds himself there; when he is enlightened enough to be able to understand the outside world in a productive way and to communicate his learning to that outside world, he is called to it. His duty, as he sees it, is to write a book describing the lessons of Ata so that the world can be shown the proper way to live in harmony. He writes, directly addressing his audience,

Perhaps you picked up this book because of the sensation surrounding my trial.

Yet, you must have wanted more than sensation or you would have thrown it aside before now. If you continued to read, it was because in this hasty and incomplete account, I told you something that at some level of your being, you already know. Something you know as an echo, as a glimpse in a dream, or as a fragile hope you are ashamed to voice. (220)

He offers this echo, glimpse, or hope to his readers, inviting them to join him in Ata:

You have only to want It, to believe in It, and tonight, when you close your eyes, you can begin your journey.

The kin of Ata are waiting for you. (220)

I begin with this novel because it highlights some common elements of feminist utopias—gender-neutral language, fluid gender roles, sexual freedom, racial equality, environmentalism, alternate spirituality, and a general lack of oppression—and because of what it implicitly asserts about science.

The Kin of Ata seems to avoid the topic of science altogether, but Bryant's novel actually takes a strong anti-science stance. It repeatedly and consistently privileges personal, revealed knowledge over testable or shared knowledge. For instance, at first the narrator believes the farming techniques of the community are random and primitive and he tries to improve them through the rational application of what he knows of farming, but eventually he realizes that there is already a plan. Rather, there is a multitude of plans. Like everything else in *Ata*, planting is done according to people's dreams, and this method seems to work: "crops flourished where dreams directed they be planted," indicating to the narrator that the people of *Ata* "operated with knowledge far

deeper than I could ever reach” (158) and that they did not need science or rationality. Furthermore, *The Kin of Ata* privileges the arational in the refusal to answer the question of how people are transported to and from Ata, choosing instead to claim that “against all reason and evidence, against all common sense, against all rationality of the most intelligent or practical mind” (216) Ata was not a dream following the narrator’s head injury but a real place. Cheri Kramarae and Jana Kramer argue that in *The Kin of Ata* “there is little conflict because there is no single truth, no one reality; rules or laws become violations of the spirit behind them. People can’t *know*, they can only dream and act as their dreams suggest” (37). This is both a crucial element of the novel’s utopian drive—the idea that knowledge is personal and the minimization of conflict—and a repudiation of scientific knowledge. If, after all, knowledge is purely personal and comes not from a shared reality but from the suggestions of dreams, there is no place for the scientific method, for agreed-upon foundations of knowledge, or for the inventions and discoveries that follow from scientific exploration.

Sally Miller Gearhart’s *The Wanderground* addresses these issues even more directly. This novel shares many of the same underlying values as *The Kin of Ata* but differs from that novel in some significant ways: where Bryant’s utopia incorporates both men and women, *The Wanderground* claims its positive, harmonious lifestyle for women alone; *The Wanderground* assigns much greater power to the relationship between women and nature, including psychic connections between women, animals, and other natural elements like clouds and water; and it develops an explicit anti-science and anti-technology argument.

Sarah Lefanu writes that “Sally Miller Gearhart [rejects] all traditional science and technology as being impossibly male-tainted” (59), and Debra Benita Shaw argues that in *The Wanderground* “men are identified with technology and women with nature in a way which proposes a complete polarisation of the genders and the lifestyles appropriate to each” (131); thus, the utopia of *The Wanderground* is predicated both upon the separation of the sexes and the rejection of science. The separation of the sexes is literal, carried out through the spatial organization of the Wanderground and the City: the women live in the Wanderground, the spaces outside of the City, while the men remain in the cities. There is little to no communication between them. There is, however, some communication between men and women in other ways. Some women live in the City, subject to men’s desires, oppressed and impoverished. Occasionally, one escapes to the Wanderground and adds her knowledge to that of the hill women. These women are barely recognizable as women to the hill women, though, because they have so fully taken on the identity that men imagine for them. The men with whom the hill women communicate are called gentles. These men understand “the essential fundamental knowledge: women and men cannot yet, may not ever, love one another without violence; they are no longer of the same species” (115). The gentles, therefore, are no threat to the hill women for they do not try to dominate or rape them.

Communication—among the hill women as well as between the hill women and the natural world—is another central issue in *The Wanderground*, one that ultimately supports the anti-science ideology of the novel. The Wanderground consists of multiple small communities that stay in contact with each other through psychic communication,

called mindstretch or enfoldment. For instance, the women have built a protective psychic net between themselves and the men of the City. The women's defensive power is, however, dependent upon the presence of women from the Wanderground in the City; when fewer women are on rotation there, more violence occurs. As one character explains, "there is a relationship between the number of hill women working in the City and the incidence of rape, of machine and firearm functioning outside the City" (173-4). Another example of nontraditional communication in the novel is the communication and understanding implied by the relationship between the hill women and the earth itself. This is even more central to their safety, because it led to "the Revolt of the Mother," which occurred "once upon a time" when "there was one rape too many." At this point, "The earth finally said 'no.' There was no storm, no earthquake, no tidal wave or volcanic eruption, no specific moment to mark its happening. It only became apparent that it had happened, and that it had happened everywhere" (158). From this point on, men's weapons and technology do not work outside the City. Neither do their penises, making literal the critique of technology as phallic representations of power. Men who leave the City and try to rape the hill women simply fail. In this enforced impotence, the earth and the women ally themselves against technology and against men.

The women's alliance with nature extends beyond "the Revolt of the Mother," too. The hill women, in addition to being able to mindstretch and communicate psychically with one another, can also communicate with animals and specific elements of nature. One early scene describes the death of a pony. While the pony lies dying, Krueva, the character responsible for it, senses the approach of a bobcat and quickly

moves to protect the pony:

Even as she knelt by the pony she was weaving about the two of them a wall of protection. . . . she began to match her breathing with that of the stricken body beside her. In and out. And out. Up and hold. Down. Hold. Up. Hold. Down. Again she drew the curtain of protective shades about them both. . . . Even in its faintness and deep sleep the pony seemed to respond to Krueva's urgings. Together they built the dome against the cat. Together they bonded for protection against the approaching fear. (55)

This protective bond is built upon Krueva's ability to communicate with the pony. She also protects the pony by communicating directly with the cat and asking it to not eat the pony. Momentarily, however, the pony says, "I am ready. I've done all that was important for me to do. And I don't want to wear out my welcome. . . . I commend my body to my sister, the cat. May she feed well" (57). Later, the hill women also connect with trees and water. One scene illustrates both of these. One of the hill women wishes to swim through an underground portion of river. Before diving in, she pauses and asks permission, saying, "Earthsister . . . I want to join you." The water replies, "Join" (12). As she swims, she begins to run out of air. A school of fish advises her about which direction and how far she must go and she makes it through. As she leaves the water, she is assisted by a tree root and she promptly thanks the tree:

"Thank you," she said in mindstretch to the tree.

"Again if you need me," responded the tree.

"Stay well," she chanted inside.

“Go well,” said the tree. (13)

Susan Stratton, in her article on ecofeminism in this novel and others, addresses Gearhart’s approach to nature, saying,

Although Gearhart effectively demonstrates that a change in dominance relationships between men and women could fundamentally change the dominance relationship between humans and the rest of the natural world, her depiction of the interactions between women and animals produces something of a Disney world. She does characterize her animals by attributes appropriate to the species, but they are rather excessively attentive to human wishes and surprisingly considerate of each other. (37)

There is a great deal of critical work in existence that explores the theoretical association between women and nature and the ways in which this association can be used to improve the lot of both women and the natural world; however, romanticizing this relationship does little practical good. In fact, romanticizing the relationship between women and nature may actively cause harm, either by reinforcing old sexist ideologies or by providing a false understanding of the reality of nature.

The relationship in *The Wanderground* between men and technology and between women and nature directly addresses the issue of science. Most obviously, Gearhart uses these associations to underscore her critique of masculine technology. As one character says, “we can do anything that the old machines could do. And with a good deal less effort” (145). She elaborates, saying,

That’s the mistake the men made, sisterlove, and made over and over again. Just

because it was possible they thought it had to be done. They came near to destroying the earth—and may yet—with that notion. Most of us like to think that even long ago women could have built what’s been called “western civilization”; we knew how to do all of it but rejected most such ideas as unnecessary or destructive. (145)

According to the hill women, science and technology have done nothing but harm and the world is better off without them. Instead, the hill women rely upon pseudoscience and magic: “Women who scanned the heavens and those who read raindrops or the bottoms of tea cups—any who on any occasion had discovered some danger sign—listed and described the omens” (127). In the face of one of the most serious threats to their free existence, they turn to psychic powers and omens.

In addition, gender and science are linked in the representation of women’s special relationship to nature and the body; invoked here to empower women, this relationship means that women’s power does not come from external sources (like scientific knowledge or technological advances), but instead comes from within. One important internal source of power is the lonth, which provides the hill women with the ability to transcend the limits of the body and of physics. One of the uses of the lonth is to allow them to fly (they call it windriding):

Evona drew in and held a deep breath. Then exhaled. Another. Held. Exhaled. The breaths came more quickly, released more suddenly. Evona’s arms spread to her sides. Again the intake. The hold. The release. Then as she sensed a readiness, a long long breath, a hold, and a bend at the waist. At the same

moment her knees moved and her feet lifted from the dirt; she clasped her arms about her legs and ducked her head, a slow-motion folding into a foetal position. She closed her eyes tighter, concentrated upon the air which bore her—caressing it inside her lungs, rolling against it outside her body. She knew herself to be suspended now, just a few centimeters above the ground, a ball barely hovering in space. (103-4)

From this hovering, she begins to float in a more directed fashion, and then to fly: “With careful intent, she bent her consciousness to her lower abdomen and transferred to her loath there her suspension and her breathing. Satisfied that her loath would indeed take over these functions, she returned to her full body” (105). She uses visualization techniques to guide her body’s progress, gradually giving over more and more control to her loath until “[s]he was using no conscious physical movement whatsoever. Her loath moved her immobile body, made it sweep and slide, coast and skim. She was fully loathing now, letting that lower part of herself control both her suspension and the guidance of her upright body fully four meters above the earth” (106). The loath is a fascinating representation of the ways in which our bodies have more agency than we imagine them having, and it complicates the boundary between voluntary and involuntary human actions, raising questions about the limits of conscious thought and “the ongoing, mutual co-constitution of mind and matter” (Alaimo and Hekman 5); however, this exploration is difficult to take seriously when it leads to flying women and a complete abandonment of the laws of physics.

All of this makes of the women’s power something magical rather than something

rational, scientific, or practical, making it rather difficult to envision actually getting to the Wanderground from the world in which we live. Contemporary utopias are written not to provide a blueprint for society—as many earlier utopias were intended to do—but to comment on the present society; Gearhart’s *Wanderground* is certainly able to do that, but if that commentary does not provide any concrete ideas about what real women can do to improve their lives, it is less than helpful. After all, women cannot actually communicate psychically with animals or water, nor can they, by virtue of being oppressed alongside the earth, convince Mother Earth to turn off men’s technologies and penises when they try to invade. As Marleen Barr notes,

Reality is more sobering than the texts, however. Real women cannot leave earth permanently. Whileaway does not exist for them. Real women have but one alternative: they must remain and fight to widen their particular chink in the male world-machine. They must remain and struggle to be seen. 65-6)

Therefore, while it may be invigorating for some women to fantasize about a world outside the realm of masculine technology, without a recognition of the battles that real women continue to fight, such fantasies risk further entrenching women in the status quo by shortcircuiting the desire for resistance.

In the context of this critique, it is useful to examine Gearhart’s essay “An End to Technology” as a nonfictional extension of the ideas presented in *The Wanderground*. Gearhart’s view of technology is decidedly pessimistic. She argues that technology is the defining characteristic of human beings, that technology “is the enterprise produced by human animals, and human animals are those which produce technology,” but she also

argues that technology is inherently dangerous: “We must see technology as a continuum: the mentality that creates the digging stick or the short-handled hoe also creates computers and rockets” (171). In fact, she says, “the entire scientific/technological enterprise indicts itself in two important ways: in its epistemology—incomplete and ego-centered; and in its value system which presumes the planet’s unlimited resources and the human species’ unlimited population” (173). A good deal of Gearhart’s argument can be defended; even non-feminist scientists might agree with some of these ideas. No one can deny that sometimes the road of science leads to dangerous places. However, recognizing the risks of scientific exploration by saying that “we cultivate a dangerous dependency on technology” or acknowledging the abuses of nature that have accompanied the scientific enterprise by claiming that “Western science would have us all stand in an adversarial relationship to our environment” (179) is very different from saying that “by picking up a tool, any tool, we commit ourselves to the precepts of Western science or some painfully like them; complete with the dependency and alienation that accrue to them” (180). It’s very different from saying that “[t]he consequences of such a limited and self-serving epistemology weave themselves into the fabric of our lives until we accept without question the prescription of the reasoned scientist above that of the counterculture healer,” that “[w]e accept for ourselves the status of lesser beings, those mere consumers of the benefits of scientific exploration who keep alive the presuppositions of both science and technology” (175), or that “[u]ntil we accept such avenues of knowing as equal to reason and scientific method, we cannot hope to enjoy the full possibilities of human knowledge; until we forsake justification and

affirm discovery, we miss the point of learning” (175). These statements paint scientists as either charlatans or bullies and leave absolutely no room for the development of a feminist science. Instead, Gearhart concludes her essay by advocating the end of humanity:

I find in this solution of our species suicide an integrity of the calibre that humanists have long claimed is possible for the human race, though such a solution may not seem at first glance to be expressive of such integrity. If some still ask “Why?” I suggest that the burden of proof has shifted, that in terms of our biosphere the question is, “Why not?” (181)

Given that the subtitle of her essay is “A Modest Proposal,” one might be tempted to think that she is not serious. But the resonance that this presentation of the problem and its solution shares with *The Wanderground* indicates otherwise.

In its final chapter, *The Wanderground* addresses the issue of the death of transformation and rebirth of the natural world, presenting a series of chants that the hill women participate in to reinforce their ideology and gather their collective strength. They portray men as “the slayer” and women as “the slain” and ask, “if the slayer will not change, will not yield the crown?” The answer to this question is a refrain of “Death”:

We do not slay him

But aid him in his dying,

Show him how to bear himself

Into his own stilldeath.

Show him how to pull on the knotted sheet,

Show him how to breathe

How to push, how to cry,

Show him how to count between

The pains. How to die.

Bathe him in the blood

And the water of his dying,

Show him the way to give death to himself,

Cut the species human

From the cord of life,

That the species human

May at last let go.

With water and blood we can wash away the slayer.

With water and blood we can wash away the race. (194-5)

This chant mixes images of birth and death, implying that the death of the human race, the death of men, would be a rebirth for life and nature. The women's task, the final part of the chant reveals, is

To work as if the earth, the mother, can be saved.

To work as if our healing care were not too late.

Work to stay the slayer's hand,

Helping him to change

Or helping him to die.

Work as if the earth, the mother, can be saved. (195)

Once again, the tradeoff is that the earth can be saved at the expense of humanity. The fact that the women show no indication that they plan to commit suicide at this point only underlines the dichotomy that the book draws between nature and science, women and men. Women are so thoroughly imbricated in the natural world that they are not even considered part of the human species. And the act that defines men as slayers is rape: rape of women's bodies, rape of Mother Earth through the use of technology.

As Patrocínio Schweickart notes, "Gearhart makes the association between science and technology and misogynistic violence quite explicit" (203), so explicit in fact that

Ata and the Wanderground are marked by the absence of anything resembling science and technology as we know them today, and this absence amounts to a repudiation—quite explicit in *The Wanderground*--of the link between utopia and technological progress. Both novels imply that science and technology are part of the problem. We must not pin our hopes on them; instead, we must recover powers and faculties which have atrophied as a result of the hegemony of scientific reason. (201)

It seems, then, that Gearhart puts forth the possibility of psychic communication and the lonth not as metaphors about the relationships between women and nature but as legitimate alternatives to "the hegemony of scientific reason." She does, after all,

advocate that we do not “accept without question the prescription of the reasoned scientist above that of the counterculture healer” and that we affirm countercultural “avenues of knowing as equal to reason and scientific method” (“An End to Technology” 175).

This repudiation of technology and valorization of countercultural and women’s ways of knowing comes with its own set of problems and, ironically, Gearhart points to one of them in her critique of technology. She writes,

To be sure, some groups of human beings have related well to the earth, have developed a consciousness worthy of our intellectual gifts. But, precisely because they refused technology, they became vulnerable to those who didn't. Technology leads to power, domination, control. . . . Until the worst of us is reformed, the whole species seems doomed; our nature seems to be to destroy whole portions of our self. (“An End to Technology” 180)

Gearhart clearly intends this to reassert the danger and oppressive nature of technology. But in her assertion of technology’s power she also inadvertently reveals its feminist possibilities. She assumes that power is the same thing as domination or control, but this is a narrow reading of power, one that focuses on “power over” at the expense of the much more liberatory “power to” that many feminists emphasize. Technology used to dominate others is, yes, bad and destructive; technology used to free the self (e.g., reproductive technologies that free women from the cycle of pregnancy and childrearing) may, however, provide a way out of the false dichotomy she presents, a way to avoid either the total vulnerability of those who reject technology or the corruption that

accompanies using technology to dominate.

Judy Grahn's *Mundane's World* treads much of the same ground covered in *The Kin of Ata Are Waiting for You* and *The Wanderground*. As in *The Kin of Ata Are Waiting for You*, knowledge is personal; as in *The Wanderground*, communication flows freely between humans and the natural world. This utopia is, as Grahn says, "an ecotopia, and as much future as past." Therefore, the time frame for this story is unclear; the city itself has no recognizable twentieth century technology, instead emphasizing technologies associated with women and with a more agricultural society (e.g., weaving, cooking, plant medicine). The city is inhabited by women, but there are men in this world, some of whom occasionally stay in the city. *Mundane's World* is not, like *The Wanderground*, an explicit repudiation of science and of men; instead, it is a straightforward valorization of women's practical and mystical powers—but at the expense of science—and a marginalization of men. Grahn points out that "Mundane means, at root, 'world' and this novel is one of my first attempts to sacralize the everyday" ("Judy Grahn in Cyberspace"). In this attempt "to sacralize the everyday," Grahn relies on mysticism and magic. In fact, she says about the writing of this book, "I had been educated in science and practical medicine (I was a laboratory technician) and had lost connection with the life of the earth, and the earth as a being. Writing this novel—*ecopsychology*—restored that sensibility for me" ("Judy Grahn in Cyberspace"). This indicates that instead of being an expansion of science, this novel is a denial of science. For Grahn, immersion in scientific practice as a laboratory technician was a harmful separation from the earth, while nature—for this is a novel intimately concerned

with the natural world—is vital but cannot be understood scientifically, only through personal and spiritual means.

Grahn’s metaformic theory is also worth discussing as an extension of the ideas put forth in *Mundane’s World*. Grahn is involved with *Metaformia: A Journal of Menstruation and Culture*. The editors there explain why this theory is important by stating, in part:

Metaformic Theory returns women to a crucial place in cultural origin stories, in our histories, in our rituals, in our religions, and in the ordinary and extraordinary everyday things that billions of women do all over the planet—so women can again identify themselves as being part of culture creation in major, leading, and centralizing ways. (“What Is Metaformia?”)

Furthermore, they state, metaformic theory does not alienate or blame men, it posits a braided, balanced, dialectical form of evolution in which menstruation plays a much larger role than earlier thought, and it emphasizes the solidarity of women in their ability to synchronize menstrual cycles:

This encourages and enables women to, for example, intelligently struggle to gain a full measure of control within institutions that affect them related to health and our bodies, motherhood, sexuality, the economy, marriage, education and children’s welfare, religion, government, science, the military, the welfare of the planet, and so on.

This is not only antithetical to scientific reasoning in its use of evolution and evidence, but it is also, in its reduction of women to one physical attribute (one that not all women

experience regularly, in the same way, or even throughout their entire lives), a return to the very essentialist ideas about gender that long kept women out of fields like science and math. As the editors of *Metaformia* explain,

Grahn's theory holds that evolution is constantly braiding; beginning in the shape of horizontal strands consisting of the "parallel" rituals of each gender, which are categorically different from the rituals of the other gender. That is to say, women and men bleed differently, much of the time. As the strands of ritual elaborate into cultural forms, the sexes lose track of what each other is doing.

This is precisely what seems to be happening in *Mundane's World*. Men are part of the world, but their lives are so distant from those of the women that the men and women seem to "lose track of what each other is doing."

However, as Diana Fuss notes, "The question we should be asking is not 'is this text essentialist (and therefore "bad")?' but rather, 'if this text is essentialist, *what motivates its deployment?*'" (xi). There is no question that all three of these texts rely, to varying degrees, on essentialisms, and, coming from the historical moment that they do, that is no surprise, but what do their authors hope to gain by using this strategy? And is this strategy successful?

One thing that Bryant, Gearhart, and Grahn hope to gain is freedom from the dangers and oppression perceived in the realm of masculine science. To gain this freedom they align themselves ever more closely with nature and with magic:

In the novels of Bryant and Gearhart, scientific reason is rejected . . . because it is seen to be in complicity with misogynistic violence and with the domination of

women in patriarchy. The relationship between the self and the Other implicit in science and technology is seen to be homologous to that between man and woman in the tragedy of the bedroom. Both are informed by the dialectic of love and rape. Thus, the domination of nature is of a piece with the domination of woman, the liberation of nature with the liberation of woman. (Schweickart 204)

Ynestra King notes that the kind of ecofeminist connection between women and nature seen here can be used

as a vantage point for creating a different kind of culture and politics that would integrate intuitive/spiritual and rational forms of knowledge, embracing both science and magic insofar as they enable us to transform the nature/culture distinction itself and to envision and create a free, ecological society. (122-3)

Following from this connection, a more positive reading of *Mundane's World* emphasizes its utility as a vision of healing:

In *Mundane's World*, Grahn sketches just such a “woman-identified” story that unfolds outside the structures of patriarchal oppression; *Mundane's World* is the deliberate construction of a utopian world not yet contaminated by postindustrial twentieth-century patriarchal violence. By depicting a safe enclave, *Mundane's World* visualizes the desire for wholeness—a (however utopian and seemingly “unreal”) “beyond.” (Dehler 36)

A similar argument could be made in defense of *The Wanderground* and *The Kin of Ata Are Waiting for You* as well; however, these visions come at the expense of real-world scientific knowledge. *Mundane's World* may be a world “not yet contaminated by

postindustrial twentieth-century patriarchal violence,” but this world is also not yet “contaminated” by scientific knowledges and technologies. In fact, the utopian element and safety of the world seem to be dependent upon this very lack. Given the place of women in the sciences, this is problematic.

Therefore, this turn to essentialism and to magic does not in fact rescue women but disempowers them. As Jennifer Burwell writes, “a feminist utopian impulse founded on Woman's difference continues to draw on a logic of exclusion and threatens to consolidate women's position on the margins of the social space without challenging the social structures and logics that place them there” (xiv). And Jean Pfaelzer expands upon this:

Feminist utopias extend the borders of Thomas More's pun: *eutopia*—the good place; *outopia*—nowhere. Unlike the imagined space of the discourse theorists, the literary utopia reinscribes women in history, language, and narrative activity, articulated in the utopia. Hence, articulated nowhere: the utopia, the “nowhere,” the non-place, resides outside of history to extrapolate from it and comment upon it. The feminist utopia, the feminist “nowhere” or non-place, resides outside of patriarchal history. But in some sense women already are conceived of and hence conceive themselves as outside of history, as marginal to history. Thus, feminist utopias such as *Whileaway*, *Herland*, or *Mizora* reproduce women's marginality, which already exists in society.

The question is, in literalizing women's marginality, do they perpetuate it or subvert it? Is the “nowhere”, the non-place, a necessary space for women to be in?

To what degree does the separateness of the feminist utopia reinscribe women's "otherness" in its attempt to subvert and criticize it? (284)

Pfaelzer concludes her essay by arguing that, in Gilman's *Herland* and Piercy's *Woman on the Edge of Time* in particular, "the representation of women's separate space perpetuates the paradoxical image of women's original space: the home—*eutopia*, the good place; and *outopia*, the unreal place. Hence, irrelevant and invisible" (291-2). Thus, Pfaelzer provides a compelling argument for the value of feminist utopias while simultaneously acknowledging their limitations. These feminist SF texts present new visions of a world in which women are not oppressed by masculinist science, in which "the act of fantasizing a feminist future shatters the determinism of patriarchy and stimulates a rebellious subjectivity" (Pfaelzer 292); however, "thinking, in and of itself, does not create material change" (Pfaelzer 291), and so these visions may not translate well to the real world. Furthermore,

More than eroding possibilities for agency and resistance, this approach tends to result in a situation where groups consolidate their position outside of dominant practices by creating a "utopia of reversal" that renaturalizes divisions between groups at the same time that it revalues as positive the group's position outside of power structures. These reverse utopias abstract the subject away from its historical and cultural context, encourage exclusionary paradigms, and result in severely eroded options for effective agency and resistance. (Burwell 18)

This certainly applies to feminist separatist utopias in terms of the relationship between male and female; it also applies to anti-science utopias in terms of the relationship

between women and science.

Most feminist SF and literary critics who address the essentialism of these texts concern themselves with their rejection of science primarily insofar as it helps to reiterate the problematic relationship between women and nature. I argue, on the other hand, that the rejection of science is worth examining for its own sake, not just in terms of what it reinforces about essentialized gender roles. Debra Benita Shaw writes, “In *The Wanderground*, the rupture created by the Revolt of the Mother, through which the Hill Women pass out of history (and thus out of language), also effectively negates the gains of feminism in challenging stereotypes which have perpetuated women's oppression” (144-5). The Hill Women (as well as the Atans and the women of *Mundane's World*) not only reinforce stereotypes and pass out of history and language, but they—by the author's intention—pass out of science as well, giving up any sort of gains to be had from participating in the production of scientific knowledge and undoing the work that has been done by generations of women to show that they, too, are *capable* of participating.

2.3 Utopian Science: Successor Science or Rejection of Science?

Another way in which feminist SF has dealt with the question of science is in the invention or discovery of utopian and alternative sciences. Jane Donawerth begins her book *Frankenstein's Daughters: Women Writing Science Fiction* by defining and establishing the necessity of utopian science, writing that “[b]ecause almost no feminist science exists, many women science fiction writers and feminist science theorists have imagined an idealized system of science, creating it as a dialogue with and critique of

contemporary scientific ideologies and practices” (3). This utopian science, this “idealized system of science,” emphasizes

women’s participation in science as subjects not objects, revised definitions and discourse of science, inclusion in science of women’s issues, treatment of science as an origin story that has been feminized, a conception of humans’ relation to nature as partnership not domination, and an ideal of science as subjective, relational, holistic, and complex. (2)

Robin Roberts, in *A New Species: Gender and Science in Science Fiction*, joins Donawerth in reading an alternative science as a positive feminist SF response to contemporary science:

Women cannot control scientific narratives because, although they are frequently its subject, they are largely excluded from the practice of science. Through feminist science fiction, however, women can write narratives about science. With its imaginative possibilities, science fiction provides women opportunities denied them in the real world. (6)

Donawerth and Roberts thereby uncover a set of feminist SF responses to science that they read as empowering for women.

However, the turn to utopian and alternative science rests on shaky ground. Utopian or alternative science, though seeming to claim a place as a successor science, is actually another rejection of science, this rejection perhaps even more dangerous because of its pretense to scientific invention. Donawerth indicates as much herself by saying that the reason feminist SF writers imagine these liberatory utopian sciences is their inability

to find a place in science as it currently exists. She writes,

The issue of women as objects not subjects of science is resolved by the greater portion of women writing science fiction in twentieth century United States and Great Britain through the imaginative creation of utopian science. Were these women writers to rely on the science of their (male) contemporaries, their careers as science fiction writers, their female heroes' careers as scientists, and even the kinds of worlds they inhabit—all would remain implausible. (1)

The fact that women have been and continue to be “objects not subjects of science” and therefore disadvantaged in scientific fields is crucial, but this argument for the necessity of a utopian science addresses the disadvantage by ignoring women’s long involvement in science (and science fiction) and implying that the only way women can gain authority or plausibility in science is to abandon science as we know it. Donawerth continues,

Rather than extrapolating from contemporary science, a strategy male writers can adopt, women writers must thus imagine a major rupture with science as it exists in the twentieth century in order to present themselves as scientific authorities and their female heroes as scientists, and in order to build a technology conformable to women's experience. (1-2)

Instead of a transformative imagining of a feminist society in which women are treated as equals, then, Donawerth presents a radical science fictional rethinking of science itself in which women are identified as fundamentally different from men and unsuited to men’s science. Helen Longino, on the other hand, argues,

Our sciences are being harnessed to the making of money and the waging of war.

The possibility of alternate understandings of the natural world is irrelevant to a culture driven by those interests. To do feminist science we must change the social and political context in which science is done.

So: can there be a feminist science? If this means: is it in principle possible to do science as a feminist?, the answer must be: yes. If this means: can we in practice do science as feminists?, the answer must be: not until we change present conditions. (222)

She emphasizes the relationship between society and science, claiming that to change science, to make it a friendly or at least tolerant space for women, requires remaking society. Donawerth avoids dealing with this element, however. This conception of utopian science is one in which women not only desire but require a new science and one that, as Helen Merrick writes, “may well necessarily be utopian,” but that misses the point that “an essential part of feminist projects to change the sciences is the process of intervening in and revealing the narratives, myths, and truth claims of science” (“Modest Witnesses?” 220). That intervention is more difficult to carry out if women’s science has been separated from that of men or if men and women simply engage in different sciences.

Donawerth maintains an emphasis on practices that are recognizable as science, focusing in particular on the ways in which these practices are expanded or modified to accommodate women or more closely match feminist ideals. For instance, she discusses the ways in which Marge Piercy’s *He, She, and It* and Joan Slonczewski’s *A Door Into Ocean* “[construct] a utopian vision of nature and science in partnership,” with humans

recognizing their place as part of “the web of nature” (8). In another example, she reads Judith Moffett’s *The Ragged World* as a text that, “[r]ather than presenting an abstract discourse about science, . . . stresses embodiment and connection to life” and furthermore relies upon “what [Hilary] Rose would call the ‘language of love’ that current science lacks and a utopian science would discover” (10). Donawerth’s utopian science rests largely upon a reimagining of science that “would express the culturally different qualities assigned to women” whose “conditions, values, and goals do not describe contemporary science” (*Frankenstein’s Daughters* 26). Despite Donawerth’s statement that these are “culturally different qualities assigned to women,” however, her analysis does not attempt to deconstruct this idea, instead relying upon it as a marker of women’s difference just as certainly as Sally Miller Gearhart relies upon the assumption of the inherent goodness of women in *The Wanderground*.

Robin Roberts’ reading of feminist SF uses of science creates and promotes an even greater distance between traditional and feminist science. She begins by emphasizing the importance of science for women and feminism, writing that “[b]ecause science wields power as a source of legitimacy for ideology, women need to pay attention to the discourse of science. . . . Using the tropes of science fiction, feminist writers reconstruct science to provide a critique of and an imaginative alternative to real-life science, a field still inhospitable to women” (4). And she argues not only for a reconstruction of science but a deconstruction of science and its relationship to gender. She writes that feminist science fiction “looks at the dualities of masculine and feminine, traditional science and feminist science, and shifts the terms of the pairing to privilege the

marginal over what is usually central. And in the process it deconstructs the binarisms of patriarchy” (90). Furthermore, she argues,

Feminist science fiction also calls into question the legitimization of patriarchy through conventional science and focuses on—and tries to change—the gendered categories and myths that shape the world of science. Unlike traditional science fiction, which perpetuates the gendered cultural myths of science, feminist science fiction works to deconstruct these myths and to refashion them into myths that authorize the experience of women. Thanks to feminist writers, women in science fiction do have a science, or even sciences, of their own. (6-7)

Feminist science studies has often asked what a feminist science might look like. Roberts presents one possible answer to this, arguing that “[u]nlike real-life science, alternative science is open to both sexes in feminist science fiction” (95). However, upon closer examination, since much of the alternative science she describes is tied directly to gender her alternative is less open and equitable than this description would imply.

Roberts’ reification of gender distinctions appears in, for instance, her discussion of physics in Doris Lessing’s *Marriages Between Zones Three, Four, and Five*. Lessing’s interest in “the new physics,” she says, is significant because the new physics’ “emphasis on the volatility and capriciousness of submolecular particles strongly connects it to postmodernism. Its deconstruction of traditional hard science methodology makes new physics feminine *by contrast* because it is decentered, playful, and uncontrolled” (121). Roberts writes that “the playful patterns of modern physics . . . shape her science fiction and in it become an alternative science that is identified as

feminine” (121). However, it is worth reiterating what precisely makes this “new physics” feminine. She argues that its affinity to postmodernism makes it feminine—and thereby feminist. But it is this same physics that is enshrined in the most prestigious and, statistically most masculine, levels of science. This desire to read this subfield of physics as feminine (and feminist) does little to change the place of women in the sciences and does not address the reality of the enactment of the new physics; instead, Roberts reinforces the message that women do not belong in the traditional sciences and defines the feminine in strict opposition (“feminine *by contrast*”) to the masculine and to hard science. In this example, Roberts does not reject science out of hand. She simply redefines it according to her needs, ignoring the reality of the scientific world. This ignorance represents yet another way for women to write themselves out of science.

In other portions of her analysis, the alternative sciences she discusses are far less recognizable as science than are the new physics:

In feminist science fiction, the figure of the witch and many other overtly sexist tropes are recovered for feminist purposes. While male science fiction writers characterize witches as magical and evil, female writers depict magic as valorizing for women and as a legitimate science. Nineteenth-century science fiction novelists from Shelley onward redefine female magic as science, making women doubly powerful as they claim science for themselves and resist the narrow definition of science offered by patriarchal society. (8)

One text she discusses in particular is Joan Vinge’s *The Snow Queen*, which, she argues, “follows the paradigm of feminine magic versus male-dominated science” (96) and

represents “the triumph of feminine psionics over mechanical science and of soft science over hard science” (97). Suzanne Damarin adds to the concept of alternative science, too:

although language is of great importance to feminist science fiction, the genre also makes use of those means of knowing and communicating [e.g., time travel and mind-speaking] which have often been maligned as “women's intuition” or tools of magic associated with witches Feminist sci-fi serves to magnify the effects of these senses just as material technologies and “macho” science fictions magnify the reach and effect of the traditionally accepted “five senses.” (64)

Thus, alternative science in feminist science fiction draws on “women’s intuition,” magic, and nature; as Roberts notes, “[i]n feminist science fiction, female closeness to Nature becomes a powerful science” (94).

Both Donawerth and Roberts build their analyses of women’s relationship to science on the assumption that women SF writers have had no other realistic ways to envision themselves engaging in science, but Lisa Yaszek’s analysis of the place of science in mid-century women’s SF challenges this assumption. Yaszek writes, “later writers [than Merrill] imagine that women might seize control of science and technology to actively create new and distinctly nonsuburban, nonpatriarchal societies. As such, they grant their protagonists a kind of critical and creative agency that postwar authors could only gesture toward” (203). She writes that feminist SF writers imagine “that women might not need to leave the home to escape patriarchal culture, but instead might use science and technology to eliminate the problem of patriarchy itself” (205-6). Both of these statements indicate that feminist SF leaves plenty of room for imagining women in

control of science and technology. Yaszek thus calls into question the idea that the most liberating option available to women is a separate science, one that, in Roberts' analysis might consist of "magic and art as alternative sciences" (92) and that, despite Roberts' claims regarding the deconstruction of such categories, relies heavily on traditional assumptions about gendered roles and abilities.

In some ways, Sally Miller Gearhart's *The Wanderground* resembles the kind of alternative sciences described by Roberts and Donawerth, particularly in its emphasis on connectedness, a deeper relationship between humans and nature, and psionics and embodied ways of knowing, but *The Wanderground's* significant investment in the outright rejection of science and technology separates it from texts that actually posit an alternative science, such as Donna J. Young's *Retreat: As It Was!* (1979). Young's *Retreat: As It Was!* engages in the construction of an alternative, imaginary science and presents a vision of what a world without men might look like. On this world, women live in environmentally friendly communities and have developed an unusual form of reproductive science. The women living there procreate through parthenogenetic reproduction of themselves (adding no new genetic material) or through sharing genes, which is "painful, dangerous, and requires that the two involved be totally committed to the race" (31). This text, like *The Wanderground*, emphasizes connectedness and a closer relationship with nature. Young describes the central community as a "collection of buildings that seemed to blend into the landscape instead of rising from it" (2), characters can "perceive the inner feelings of other creatures" (4), and they "don't have too many surface transports . . . because [they] don't want too many machines cluttering up a

beautiful world such as this one” (9). However, unlike *The Wanderground*, the alternative science presented in *Retreat: As It Was!* is framed as science within the novels themselves and treated as a legitimate avenue of inquiry and action.

Gene sharing, dangerous as it is, is presented in the book as the height of their culture’s connectedness and the height of their scientific development. It is also something that can only be done by women and that makes it possible to maintain an all-female world. In many feminist texts featuring parthenogenesis or other utopian or alternative reproductive sciences, the science itself is glossed over or turned into fantasy. In *Mundane’s World*, for instance, Grahn describes the conception of children as the result of dreams: “Of all the dreamers in the city Ernesta’s mother Donna was the most unusual. While other women dreamed their children from stars, domesticated plants or people, she had dreamed hers from a strange wild bush growing deep in some rocky hills east of the city” (11). But Young provides a scientific narrative to support gene sharing. In the process of gene sharing, the two women involved fast until they are extremely weak and their “bodies have been deprived enough to activate [their] Patterners” (59). As it is explained to Ria, a character who is preparing to go through this process, the Patterner is

a small appendage to your intestinal tract. It doesn’t do anything your whole life until it’s signaled by the deprivation of your body. Then it snatches the next available foreign substance that passes through the intestines, analyzes it, and prints the gene pattern, if it’s from another of our race, on your cells. After that, it goes dormant again, never to be aroused, even by deprivation. (59)

So after this deprivation triggers the Patterner, the two women engage in oral sex and hopefully swallow enough cells from the other person to allow gene printing to take place. The science is entirely imaginary, but it is embraced as real science, part of a full and naturalistic understanding of the human body, which sets it apart from anti-science utopias like *The Wanderground*.

Significantly, *Retreat* also posits a utopian all-female world that exists *before* the introduction of men. Here, men are the result of genetic mutations caused by radiation. The child born of the gene sharing described earlier is affected by one mother's proximity to an incident during space travel and is born different, mutated. This mutation leads to the development of a second sex. The incident that causes this mutation also leads to an interstellar war that cuts *Retreat* off from the rest of the nearby worlds and destroys the technology they have developed. One reading of this narrative is that Young is reversing the typical relationship between female utopias and the world as we know it. In *Herland*, for instance, the female utopia is created when the women are cut off from the rest of the world; in Merrill Mushroom's *Daughters of Khaton*, a stranded group of male and female travelers becomes a utopian all-female community after all the men are killed by spores native to the planet but none of the women are affected; in *The Wanderground*, a female utopia is only possible through the rejection of the male world. Here, however, the female utopia comes first and the world of both men and women grows out of the destruction of that lost Eden. This reversal allows for a feminist utopia that is not built on the rejection of a specifically masculine science; therefore, *Retreat* is able to both valorize women's closeness to nature and incorporate highly technological developments

into their culture.

Young's *Retreat* shows that there is a subset of feminist SF that turns to alternative or utopian science as a meaningful response to the position of women in the sciences and as a way to place women in positions of scientific power without endorsing the abuses of power they associate with masculine science, thereby illustrating an approach to science in feminist science fiction that is less drastic than simple abandonment (as in the anti-science feminist utopias discussed earlier). However, there still remain multiple troubling elements in this critical approach and in the texts containing representations of utopian or alternative sciences, including 1) the insistence upon assigning a gendered value to various scientific fields or practices; 2) the misrepresentation of traditional science as being completely void of all values seen as feminine or feminist (e.g., empathy, intuition); and 3) the valorization of magic or imaginary science over (traditional) science in feminist SF. I have discussed already the trouble with insisting that physics, for instance, is either masculine or feminine itself, and I will return to the misrepresentation of science in a later chapter, so I turn now to the question of genre as a way of responding to the place of magic in a discussion of feminist science and feminist SF.

2.4 Fantasy Versus Science Fiction: The Importance of Generic Boundaries

A crucial element of the approach to SF represented here is the breakdown of generic boundaries. As Patricia Duncker writes, "Feminist writing does not respect the boundaries, categories, and genres which men have made" (16). Instead, as Robin

Roberts points out, “Male and female science fiction writers alike use and question the historical distinction between magic and science, but while hard science fiction writers usually reveal that what seemed to be magic was really science, feminist writers radically undermine the distinction between magic and science” (7). This is a radical approach to reading SF precisely because SF is usually defined by its relationship to science. It is generally accepted that science fiction extrapolates from what is known to what is possible while fantasy requires no such connection to contemporary scientific knowledge or possibilities. This is one source of science fiction’s power. It is not just a way to fantasize about a better world; it is a way to show what better worlds might actually, literally be possible.

Fredric Jameson highlights the way this common distinction between SF and fantasy is inextricable from the treatment of science:

Surely the issue of science in SF is strategically crucial in the first of these generic distinctions at the very least: whatever “fantasy” is, some far more constitutive repudiation of science is at work within it than in anything here termed “soft” SF.

But oddly, this topic is never raised (nor is the related one of feminist SF and fantasy).

Jameson also raises the specter of another boundary challenged by Roberts and other feminist writers: that between soft science versus hard science. Soft sciences include psychology, anthropology, and other more socially-oriented sciences; hard sciences include physics, chemistry, and other sciences oriented toward physical processes. Soft science and SF have typically been associated with women and femininity while hard

science and SF have typically been considered masculine and dominated by men. This gender division within the genre is widespread enough to warrant feminist examination.

Raffaella Baccolini makes a strong argument for this kind of analysis:

Underlying this feminist transformation of science is a recognition of the socially constructed category of gender. By exposing the rigid binarism of gender divisions and proposing alternatives to parceling science and feminism into two neat piles, feminist science fiction deconstructs science and traditional science fiction, which both contain a gender split between “hard” and “soft” science. This distinction is used, often unself-consciously, by scientists, writers, and readers of science fiction. The natural sciences are categorized as hard because they are ostensibly more objective and rigorous, while the social sciences are depicted as soft because, in this construction, they are supposedly more subjective and easier to master. These categories are coded through gender, as Sandra Harding points out in *The Science Question in Feminism*.

Rather, as feminist scholars, we might want to question the very notion of genre, boundaries, and exclusionary politics and to investigate instead the intersection of gender and generic fiction and the ways in which gender enters into and is constructed by the form of the genre and, in turn, helps to create new texts. (14)

The hard/soft science (fiction) divide appears to be merely descriptive, but, as Baccolini and Harding have pointed out, this divide carries the weight of value judgment as well (soft sciences are easier, less rigorous, than hard sciences). In a 1995 study published in

Journal of Research in Science Teaching, Dale Baker and Rosemary Leary's interviews with primary and secondary school girls reveal this divide in action: "Some of the girls made an intriguing distinction between a 'scientist' who studies biology or zoology and a 'scientist scientist' who uses chemicals or works with rockets" (Clark Blickenstaff 375). Because the two sides of this hard/soft binary are gendered, this value judgment leads to the devaluing of the feminine side of the binary and therefore the ordinary consideration of these fields as "soft" demands deconstruction and challenge.

Robin Roberts also deals with this issue in her analysis of feminist SF. However, where Baccolini calls into question the gendered nature of this divide, Roberts reinforces it:

In science fiction, "hard" refers to fiction that focuses on technology where the fiction's hardware is scrupulously accurate: nothing in a piece of hard science fiction contradicts known scientific facts, at least the facts known at the time of the work's creation. . . . Soft science fiction, on the other hand, tends to focus on the social sciences: psychology, sociology, even parapsychology. Many soft science fiction writers expand the social sciences by creating and embracing an imaginary science known as psionics, which includes telekinesis, telepathy, and teleportation (Lefanu 88-89). Although there are male soft science fiction writers, most hard science fiction is written by men, while women write soft science fiction almost exclusively. Feminist utopias frequently reject hard technology altogether (Schweickart). The distinction itself carries overt valuation: many science fiction writers, critics, and readers stress scientific accuracy and

plausibility and see soft science fiction writers as weakening the field by diluting its true purpose of hard scientific extrapolation. (5)

In response to this, Merrick notes that

Roberts reaffirms the notion that men write hard sf and women write soft sf, effectively leaving this gendered binarism intact (1993: 5). She instead reverses the traditional hierarchy to privilege the social sciences, imaginary sciences such as telekinesis and telepathy, and magic, arguing that writers who “depict magic as valorizing for women and as a legitimate science” may “overcome the dichotomy between valid hard science and invalid soft science” (8). However, exactly how this dichotomy could be overcome and the implications for science if successful remains unclear. (*The Secret Feminist Cabal* 240)

The implications for science are unclear not just because Roberts’ deconstruction of the binary fails but because she elides the difference between hard and soft sciences and science and nonscience. She assumes that because soft science and magic are both devalued and feminized that they can be treated equivalently in SF. As she says,

Psionics has been appropriated by women writers, just as they have appropriated the idea of witches, for feminist ends. Yet the adaptation occurs in the context of science fiction rather than fantasy. Feminist science fiction writers provide plausible explanations for magical powers. For example, in her Hugo Award-winning *Dreamsnake*, Vonda McIntyre’s female protagonist, Snake, has the witchlike ability to communicate with animals. As Snake carefully explains, however, her ability results from a program of advanced psychological training,

making the skill potentially available to any of the characters in the novel. By emphasizing the scientific qualities of soft science and the magical qualities of hard science, writers like [Vonda] McIntyre overcome the dichotomy between valid hard science and invalid soft science. (8)

Multiple problems arise in this process. The first of these is simply that of definition: soft science simply does not equal either pseudoscience or magic. Roberts frames this redefinition as a challenge to the centrality of masculine science, saying, “The idea of hard and soft science fiction also applies to science—the hard science of the male protagonist is challenged by the soft science of the Sphinx, the Medusa, and the witch” (26-7). Considering “the Sphinx, the Medusa, and the witch” as scientists engaged in the soft sciences makes the categories of scientist and science meaningless, however. Blurring these terms in this way is not a revaluation of women’s science or soft sciences; instead, this presents yet another way in which Roberts devalues (and rejects) science.

The other problems with this breakdown of categories have to do with the consequences of such redefinitions. Historically, feminist SF has had difficulty finding a place within literary criticism and within the broader field of SF. Some critics, notably Marleen Barr, wish to remove feminist SF from the field of SF altogether. Instead of reading feminist SF as part of the tradition of SF, Barr argues for a new category called “feminist fabulation,” a “feminist metafiction” that “critiques patriarchal master narratives” (10-11). Barr’s creation of this new category is built on her perception that “good” works might be “unfairly demeaned by [their] association with science fiction” (11) and her concern that “[t]he designation *science fiction* causes a group of important

feminist writers who address familiar feminist concerns to be made unfamiliar” (98). For instance, she notes,

Tiptree is almost never mentioned in discussions about major contemporary feminist fiction writers; Butler has not received the recognition accorded to contemporary black women authors. Associating writers such as Butler and Tiptree with science fiction devalues them. Hence, I argue that feminist science fiction should be incorporated within feminist fabulation. (98)

Finally, she argues, “it is not in the best interest of a cadre of feminist writers to have their work defined as different from respected work, [and] I want to bridge the separation of feminist science fiction from canonical postmodern literature” (102). Barr’s feminist fabulation, however, not only unnecessarily reinforces the perception that SF itself is not valuable and assumes (incorrectly, I would argue) that all feminist SF is by definition postmodern, but also, most significantly in terms of feminist interventions in the sciences, removes feminist SF from ongoing conversations about science itself that occur within the field of SF. Helen Merrick writes,

When critics from outside the field *do* examine feminist sf, it is usually re-situated as part of a different tradition (such as feminist, lesbian, or utopian fiction) as a way of making sf, in Roberts’ words, “palatable to the academy” (1995: 186-7). Such readings detach the texts from the very community within which their feminist interventions generated specific political and aesthetic consequences, and thus obscure the political and historical import of writing within, against, or beyond the sf tradition. (*The Secret Feminist Cabal* 16)

Feminist SF does not exist in a vacuum, nor does it exist only in relation to other feminist texts; much of its power comes from its connections with non-feminist texts and its ability, within that field of texts, to provide alternatives to the place of science in society.

The further consequences of removing feminist SF from SF, then, include the further separation of women from actual science as they are simultaneously separated from SF. As Merrick writes,

the bulk of feminist sf criticism has approached the genre purely as literature, part of the humanities or “soft sciences” rather than the supposed “hard science” of masculinist sf. Amidst the confusion over exactly how science functions in sf, there seems to be an assumption that, if nothing else, the “science” in sf was what kept it a masculine field for so long and excluded women from its realm, whether it functioned as subject, object, or method (see for example, Donawerth 1997).

(The Secret Feminist Cabal 223)

Here Merrick points to the difficulties inherent in approaching feminist SF as “literature” rather than as part of the genre of SF, including seeing SF’s use of science as a problem instead of a crucial element of the genre. Feminist theory and criticism has often looked for ways to break down binaries and muddy the waters between categories in order to change real world approaches to problems of gender. However, in this case, dissolving the boundaries between SF and fantasy, hard and soft science, and valid and invalid science, may be more dangerous than liberating. Valorizing pseudoscience, invalid science, or magic is not a useful response to the real world, after all, and does not provide any practical ways to address the problems inherent in contemporary science. In fact,

regularly incorporating these elements as significant parts of feminist science fiction invites questions about whether or not feminist analyses of contemporary science have a useful role to play in remaking science.

As noted earlier in this chapter, girls and women have enough trouble gaining admittance to the sciences without being taught to think in terms of magic and pseudoscience instead. An article titled “Clarke’s Law for Girls’ Toys” highlights the ways in which the same gendered division that Roberts employs between magic and science is utilized to teach children. The article describes the way toys are packaged differently for boys and girls:

If it’s for boys, then the technology in the toy will be prominent in the advertising. The design of the toy and its description in commercials will suggest bleeding-edge technology.

If it’s for girls, then it’s time to break out the fairy dust. Even the need for batteries is hidden in fine print. Everything the toy does is attributed to magic or other mysterious powers. The girls in the commercials will act overawed and amazed as dolls move, dance and talk in response to voice commands... even though they probably see TV remote controls and personal computers on a daily basis.

This might add difficulty to recruiting girls and young women into pursuing technical fields of study.

Approaching feminist SF in this same way—by treating the science or technology within it as magical rather than realistic and thereby shutting down the need or desire to

investigate the way it may work—might also increase the difficulty of bringing girls and young women into studies and practices of science.

Therefore, although I support challenges to the gendered dichotomy between hard and soft science and SF, agreeing with Baccolini's eloquent argument that genre and gender are intertwined categories and that an investigation of their interconnections would go far to establish a better understanding the ways in which gender is mobilized to support various ideologies within the genres of SF and fantasy, I also maintain that the generic categories of fantasy and SF are valuable terms that lead to very different ways of approaching science within speculative fiction. After all, paying attention to and analyzing such historical and generic assumptions is not the same as throwing out genre distinctions altogether. A careful investigation is warranted; unfortunately, Roberts' conflation of the dichotomies of fantasy/SF, hard/soft, valid/invalid science is not careful enough.

Ultimately, the distinction between fantasy and SF matters because the two genres demand different behaviors of their readers and interact with reality in different ways. James Gunn states that "fantasy creates its own world and its own laws; science fiction accepts the real world and its laws" (9). Similarly, Samuel Delany argues that not only does science fiction build upon the laws of reality but it insists upon a "literalization of the language" (105) that literary fiction or fantasy do not insist upon.⁴ Therefore, to read

⁴ Delany provides specific examples of this literalization, including the following:

Then her world exploded.

If such a string of words appeared in a mundane fiction text, more than likely we would respond to it as an emotionally muzzy metaphor about the inner aspects of some incident in a female character's life. In an SF text, however, we

The Wanderground as fantasy is to allow for the possibility of reading the psychic communication it contains as a metaphor and to unhinge that world from our own in significant ways. To read *The Wanderground* as science fiction, on the other hand, is to read those same things very literally and to draw a clear line from our world to the world of the novel. Removing that clear line weakens the important critiques the book presents of contemporary life, science, and gender roles, but maintaining that line means that Gearhart is literally advocating imaginary sciences either as part of the solution to our current problems with masculine science and technology or as a reward for leaving that masculine science and technology behind. Karen Cadora's argument that "taking the science out of feminist sf strips the genre of its power to critique and re-imagine the intersections of technology and gender" (qtd. in Merrick, *The Secret Feminist Cabal* 226) is an extension of this difference in generic reading protocols.

Although I argue for the maintenance of genre distinctions, therefore, I do acknowledge the value in questioning them as well. Andrew Pavelich writes,

By painting a vivid image of a billion corpses, post-apocalypse fiction can help us think about the consequences of pulling the trigger. As warnings about the short-sightedness of nationalistic politics and economic rivalries, such stories are valuable, but because they share uncritical assumptions about the way that science develops, they are incapable of genuinely raising the issue of the value of science as we know it. They are a warning against pulling the trigger, but they are not asking whether we should be holding the gun in the first place. (198)

must retain the margin to read these words as meaning that a planet, belonging to a woman, blew up. (103)

Regardless of its other potential problems, the feminist SF discussed in this chapter has at least this going for it: it asks this question. The answers may not always be productive, and the problem may not be easily solved, but the question remains worth asking.

2.5 Conclusion: Caught in the Crossfire

These discussions of genre echo the “science wars” of the 1990s that emphasized disciplinary divisions between the sciences and the humanities. During these debates, the humanities, feminism, and environmentalism were all considered opponents of science and truth. Mario Bunge provides one expression of this opposition:

The radical feminist philosophers are interested in power, not in truth. They want to undermine science, not to advance it. In this way they do a double disservice to the cause of feminine emancipation: they discredit feminism by making it appear to be barbaric, and they deprive it of a strong lever—namely the scientific research of the spurious causes and the pernicious effects of gender discrimination. Moreover, their attack on science alienates women from scientific studies and thus reinforces their subordinate position in modern society. (101)

His underlying assumptions about radical feminist philosophers may be flawed, but in the end he makes a valuable point: an antiscience approach to knowledge at the very least *risks* alienating women from a source of power and of justification. Others make the same argument. Rene Denfeld, for instance, in a critique of ecofeminism in particular, writes,

Outside of their title, ecofeminists have little to do with the original aims of

modern feminism. In my mind, the feminist rejection of rationality and science is actually a rejection of equality, gussied up in fancy academic discourse and New Age trappings. What ecofeminists are truly rejecting is [sic] the public realms of economics, the workplace, politics, and the sciences: the very realms that can deliver full equality to women. (250)

Her analysis can be applied just as well to the utopian science of some feminist SF. Sally Miller Gearhart's *The Wanderground*, for instance, rejects rationality and science in favor of New Age magic and, in so doing, also rejects possibilities for true equality between men and women.

Janet Radcliffe Richards, in an essay titled "Why Feminist Epistemology Isn't," may put the case most strongly, however. She constructs her argument against feminist epistemology in terms of what would be required to sway a traditional feminist to take that step from feminist political philosophy to feminist epistemology, determining finally that

the still-traditional feminist must also conclude that it is the advocates of feminist epistemology who are treating women wrongly. Her feminist principles combine with her present epistemological views to suggest that the proper way to treat any women who make these misguided knowledge claims is to give them a proper education and bring them out of their ignorance. To offer them instead an epistemology that passes their ignorance off as knowledge is only to cheat them into collusion with their own deprivation, and this is obviously something she must regard as a scandalous perpetuation of the traditional wrongs of women, to

be fought with all the feminist energy she can muster. (397)

Furthermore, she writes,

It is hard to imagine anything better calculated to delight the soul of patriarchal man than the sight of women's most vociferous leaders taking an approach to feminism that continues so much of his own work: luring women off into a special area of their own where they will remain screened from the detailed study of philosophy and science to which he always said they were unsuited, teaching them indignation instead of argument, fantasy and metaphor instead of science, and doing all this by continuing his very own technique of persuading women that their true interests lie elsewhere than in the areas colonized by men. And, furthermore, outdoing even his own contrivances, in equipping them with a sophisticated, oppression-loaded, all-purpose rhetoric that actually obstructs any serious attempt at analysis. (407)

Radcliffe Richards' critique of feminist epistemology is problematic, as she defines feminist epistemology here as an approach to knowledge that "disdain[s] as patriarchal" core scientific and philosophical ideas or that "demands recognition as special ways of knowing for the contrived ignorance" that scientists "struggle to remedy" (406), dismissing these ideas without ever quite dealing with their substance. She argues that "conclusions about what should be done by feminists for women . . . are *at all stages* essentially derivative, and dependent on more fundamental ideas. No beliefs about matters of fact, and no theories of epistemology or science, can be required by feminism, because feminist conclusions depend on them" (399). This approach to feminist

epistemology reveals that Radcliffe Richards may be inadequately addressing the field, but her fundamental argument, that feminists do not help themselves by ghettoizing feminist science or rejecting science altogether remains worth considering.

Radcliffe Richards is not the only critic of this element of feminist thought. Alan Sokal, of the infamous Sokal Hoax, writes in further defense of science:

nothing is gained by denying the existence of objective scientific knowledge; it does exist, whether we like it or not. Political progressives should seek to have that knowledge distributed more democratically and to have it employed for socially useful ends. Indeed, the radical epistemological critique fatally undermines the needed political critique, by removing its factual basis. After all, the only reason why nuclear weapons are a danger to anyone is that the theories of nuclear physics on which their design is based are, at least to a very high degree of approximation, objectively true. (25)

Even though this is intended as a critique of political progressives like feminists, Sokal's analysis is not so far from the goals of many feminist science studies scholars. Both Sokal and Londa Schiebinger, for instance, emphasize democratic distribution of knowledge, socially useful ends, and a concern with possible dangers developed by science as well as with the ignorance promoted by rejections of scientific knowledge and processes:

The value of difference feminism has been to refute the claim that science is gender neutral, revealing that values generally attributed to women have been excluded from science and that gender inequalities have been built into the

production and structure of knowledge. But difference feminism, especially when vulgarized, can be harmful to both women and science. (*Has Feminism Changed Science?* 5)

There are, as some of the above indicates, significant differences between those on the side of science in those “science wars” and those on the side of feminism or even feminist science studies, but the connections are well worth noting. Both defenders of objective science (the kind of science called out by feminists as particularly oppressive) and feminist science studies scholars acknowledge that deepening the divide between science and women and the outright abandonment of science do women no favors. Noretta Koertge, for instance, claims that “science—even white, upperclass, male-dominated science—is one of the most important allies of oppressed people” (413), and Meera Nanda reiterates this by saying that “[t]he problem with letting go of reason even as an ideal is that then there is nothing left in whose name arbitrary authority of patriarchal institutions and practices can be challenged” (431). If this is the case, then, in direct contradiction to the approaches taken by the feminist SF texts discussed here, science must be taken seriously even as it is critiqued.

Perhaps feminist scholars are willing to forgive feminist utopias their anti-science arguments because they promote other useful or positive ideas about women’s place in society. Perhaps they simply do not read these utopian texts as science fiction, reading them instead as fantasy, allowing them to more easily dismiss these statements about gender and science. Perhaps these anti-science feminist utopias are given more leeway because of the historical context of the radical feminist movement within which they

were written. Regardless of the reason, ignoring these texts' anti-science ideology and their reinforcement of the historical gulf between women and science is dangerous.

Drawing on the critical work of Donna Haraway, Helen Merrick argues that “feminist sf’s re-workings of such myths [about science and technology] can be seen as central to feminist reconstructions of the sciences.” However, she continues, “Haraway has argued that feminist contests for scientific meaning do not work by replacing one paradigm with another” (*The Secret Feminist Cabal* 257). The rejection of science and attempt to replace it with an imaginary science or with magic discussed in these texts do not constitute the kind of reconstruction described by Haraway and Merrick. In the next chapters, I will turn to texts that do attempt to engage in this kind of work, texts showing that instead of reinventing the scientific wheel, feminist SF and SF criticism that takes science seriously can begin to make space for women and feminist values in the existing scientific body of knowledge while still advocating an ethical, embodied approach.

CHAPTER 3

“SCIENCE GENIUS GIRL”:

BRINGING WOMEN INTO SCIENCE AND SCIENCE FICTION

I'm a science genius girl
I won the science fair
I wear a white lab coat
DNA strands in my hair
—Freezepop, “Science Genius Girl”

I was nine when I realized I wanted to be a white-coated scientist who saved the world. I was nine when I read my first science fiction novel. I don't think this is a coincidence, though it took me a long time to understand that.
—Nicola Griffith, “Identity and SF: Story as Science and Fiction”

What can a heroine do?
What myths, what plots, what actions are available to a female protagonist?
Very few.
—Joanna Russ, “What Can a Heroine Do? Or Why Women Can't Write”

3.1 The Obstacle Course to the Sciences

If one response to women's exclusion from science is to reject science in return, another perhaps more productive response is to attempt to bring women and science together. Rejecting science only reinforces the perception—and reality—that science is for men, not women, thereby further disempowering women by closing off an avenue for knowledge, self-determination, and empowerment; embracing science might, on the other hand, lead to more inclusion of women as well as a more democratic and feminist science. In response to the question of how we should approach the entanglement of scientific knowledge with commerce and the state, Marcelo Gleiser writes that we need,

“[a]t the very least, to raise the level of scientific awareness of the general public. Only a population well-versed in the basic tenets of science and modern scientific research can take control of its own future.” It is also true that only if women are “well-versed in the basic tenets of science and modern scientific research”—by becoming scientists, writing about science in fiction and nonfiction, and maintaining an interest in ongoing research rather than retreating to a stance that is merely critical and dismissive of science—can they “take control of [their] own future” and defend against potential abuses, oversights, and inequalities. This is one reason why the solution to the masculinization of science and disenfranchisement of women from scientific work cannot be to give up and abandon scientific thought and practice to those who do not have women’s interests at heart.

Science and technology are now and will continue to be a part of human cultures and thus cannot be ignored or merely rejected. As Frances Bartkowski observes of feminist utopias in the first half of the twentieth century, “The nightmare fears of technology which often led to regressive, pastoral, anti-industrial images in the late nineteenth and early twentieth centuries are confirmed by a realization that the machine will not be banished from the garden” (7). This shift, this “realization that the machine will not be banished from the garden,” is not limited to feminist utopias or to the first half of the twentieth century; we can outline the same kind of shift happening between the radical feminist separatist utopias of the 1970s⁵ and later feminist works of speculative fiction:

⁵ This kind of utopian fiction is, of course, not limited to the 1970s, but it was during the 1970s that this formulation was most popular. Later radical feminist utopias (1980s to the present) are both less common and arguably less directly connected to major strands of contemporary feminist thought and politics.

While feminist sf of the 1970s and early 1980s tended to identify woman with an hypothesized and idealized pre-technological world, seeing much technology as in the service of the masculine, by the end of the twentieth century a properly pre- or post-technological age is increasingly hard to imagine. There is a grudging awareness that technology, whatever its troubling patriarchal origins, motivations, and connotations, offers women certain freedoms and opportunities. Furthermore, the assumption that these origins are definitively male has been decisively challenged by Sadie Plant and others who have sought to rewrite the history of technological progress as a “herstory” of female networks, metaphors, and agency. (Mitchell 116-7)

In this way, more recent feminist science fiction challenges the conception of science and technology as “definitively male” but also acknowledges the difficulty of imagining a nontechnological world. This shift away from the pastoral anti-technological utopia and toward involving women in science is vital to the project of building a future that is utopian in new ways—or that is at least an improvement on the present.

Margaret Brenston reveals the significance of this shift, writing that technology (and, more broadly, science) is inescapable precisely because it is inextricably connected to power:

first, technology itself can be seen as a “language.” Second, men's control over technology and their adherence to a technological world view have consequences for language and verbal communication and create a situation where women are “silenced.”

In a world where women do not know the language of technology, they remain (relatively) powerless and speechless. It is difficult to object meaningfully if the stakes and the language are unfamiliar. It is difficult, too, to be taken seriously if ignorant of the subject of critique. Therefore, a feminist future must be one in which individuals of both genders have access to science and technology as sources of power (but not necessarily domination) and must be one in which both women and science are taken seriously.

Currently, girls and women are socialized to be consumers of products, not creators of technology or explorers of science. Brenston acknowledges that of course women do already use technology and that in fact much technology is designed with women in mind, but, despite her own comfort with math and theoretical science, she notes, “I have never felt ‘at home’ around machines and technology. I am not alone in this—it is typical for women.” Joan Rothschild argues that this discomfort is tied to the way technology is marketed to women:

Products carry minute, step-by-step instructions, leaving little room for initiative or ingenuity, and programming women to be docile consumers and workers (Baxandall et al. 1976). Housewives become dependent on company experts to fix malfunctioning machinery that women are to operate but not understand. A consumer-oriented economy encourages dependency on these tools, products, and machinery, including the seemingly indispensable automobile. (83)

Women are often not “at home” around technology because they are alienated from it, made dependent upon it. These tools designed to help housewives be more efficient are also tools of the economy, of institutionalized technology, of patriarchy—designed to

find new ways to keep women in their place. Therefore, although technology has liberatory potential, as long as women are consumers and not producers of technology, its liberatory power is limited by what is made available to women.

However, as Rothschild writes, although “analyses can be developed that demonstrate how technology can be a manipulative means to oppress and control women,” this does not necessarily mean that the answer is rejection of technologies “that, for example, can make the difference between the single mother’s being able to cope effectively with job, housework, and children, or not. Rather, the emphasis can be on developing ways to use such technology—selectively, collectively—that put women in greater control” (89). This recognition of the variable uses of technology illustrates Donna Haraway’s claim that “[t]he boundary is permeable between tool and myth, instrument and concept, historical systems of social relations and historical anatomies of possible bodies, including objects of knowledge. Indeed, myth and tool mutually constitute each other” (“Manifesto” 23). Technology is not in and of itself oppressive or liberatory; the value of technology is born alongside the narratives about it and those narratives help birth the tools we have available.

These myths and tools are co-constituted through the ongoing and pervasive gendered socialization from childhood that (through marketing, TV shows, toys, clothing, etc.) teaches girls that science and technology are for boys and that discourages them from exploring these fields of knowledge. For instance, a 2009 examination of the gift search engine for the Toys R Us website revealed that the company “confirms that girls may *like* technology, but boys build it.” Lisa Wade, a blogger for *Sociological Images*,

describes her informal test of the site:

For both boys and girls ages 12-14, I checked “techie” and “building” to see what I would get.

What I got was rather fascinating. I can’t remember where I originally heard it, but someone somewhere observed that when it came to technology, there was a stereotype that men were the engineers and designers and women were the consumers and users. That is, both men and women might like technology, but men were active in producing technology and women just got to benefit from men’s hard, brainy work.

Well, that’s essentially what Toys R Us told me.

The top gift suggestions for boys included “13 building/engineering games (like Lego and KNEX), 3 iPod accessories, 4 portable DVD players, 2 MP3 players, and a few other things”; the top gift suggestions for girls included “seven iPod accessories, 5 portable DVD players, 4 MP3 players, 3 laptop computers, 3 cameras, and one building/engineering game” (Wade). This is a significant reinforcement of the idea that women are consumers and men creators. This active/passive gender division with regard to science says much about the expectations of adults and has the power to shape children’s ideas of their relationship with science and technology into the limited and limiting consumer-oriented approach to technology held by many adult women. Corlann Gee Bush writes, “It is difficult to invent a better mousetrap if you’re taught to be afraid of mice; it is impossible to dream of becoming an engineer if you’re never allowed to get dirty” (158). This gendered division is harmful, then, not just because it limits the range

of choices for young girls (and boys) but also because it forecloses entire types of activity and modes of being in the world. Girls who are taught that it isn't gender-appropriate to build things, get dirty, or play boisterously are far less likely to do these things, instead choosing—or feeling as if they are choosing—to nurture things, organize or clean things, or play quietly. Care, organization, and quiet can certainly belong in the sciences, but it is unlikely that this is the vision of science provided by children's toys, games, and entertainment.

This socialization takes place within formal education as well. Good, Woodzicka, and Wingfield write that “[t]extbook images may depict a ‘hidden curriculum’ of what is considered a perfect society” and that, “[i]ronically, although textbooks are considered vehicles for learning, they may actually hinder success in half of the student population” (133). They also report the following inequities in textbooks:

texts contained minimal information regarding the accomplishments of women in science or about scientific topics of interest to women such as menstruation, childbirth, and menopause (Potter & Rosser, 1992). . . . In an analysis of 80 science textbooks from both elementary and secondary schools, men were pictured more often than women, and over 85% of the occupations pictured were embodied by men (Powell & Garcia, 1985). Most recently, in a review of seven high school chemistry textbooks, researchers found that only one book achieved gender parity in image representation; the other books overwhelmingly pictured more men than women (Bazler & Simonis, 2006). . . . Hogben and Waterman (1997) found that men were more often portrayed as dominant or having higher

status than women in textbook images. For instance, when a doctor and nurse are pictured together, the doctor is typically shown as a man, while the secondary role of the nurse is typically shown as a woman. Women are also more likely to be shown as passive actors merely reacting to their environment, while men are shown as active in altering the situation around them. In their assessment of Introductory Psychology and Human Development textbooks, Peterson and Kroner (1992) found that men were significantly more likely to be shown in active roles by directly engaging in and initiating activity (e.g., leading a group). In this way, men are depicted as being active agents, managing and controlling their environment. Conversely, women were more likely to be depicted as passive, reactive to their environment, and the recipients of others' action (e.g., watching others). (134-5)

These representations also recreate the active/passive divide and carry an institutional weight that popular culture representations, despite their ubiquity, do not have.

This narrative power does not only run one way, however. When girls are shown women engaging in science, they are likely to modify their cultural narrative regarding women and science and to begin to see possibilities for women in science. A field trip to the Fermi National Accelerator Laboratory (Fermilab) in Batavia, Illinois, has shown how this can work (Bardeen). Teachers brought seventh grade students to Fermilab to show them what scientists do and to have them meet a few scientists. The organizers “deliberately chose a typical white male, a young female and an African American physicist” to introduce to the students in order to challenge stereotypical ideas about

scientists. The website that records this field trip includes drawings and commentary from students created before and after their trip to represent how they think about scientists. The results indicate that showing girls women in science makes them more likely to envision scientists as women (although the same did not necessarily hold true for boys). One student, Amy, illustrates this clearly. Before her visit, she drew a stereotypical older white male scientist in a lab coat and glasses, holding a beaker and wrote, “I think of a scientist as very dedicated to his work. He is kind of crazy, talking always quickly. He constantly is getting new ideas. He is always asking questions and can be annoying. He listens to others’ ideas and questions them.” This reveals a few assumptions about scientists: they are male, they are (at least sometimes) annoying, they may be crazy, they are always focused on work. This is not only gendered but somewhat negative, not necessarily an appealing picture. After her visit, she drew a young woman scientist with long brown hair, blue eyes, and ordinary clothes (a blue shirt and black pants) and wrote, “I know scientists are just normal people with a not so normal job. . . . Scientists lead a normal life outside of being a scientist. They are interested in dancing, pottery, jogging and even racquetball. Being a scientist is just another job which can be much more exciting.” Amy’s post-visit drawing and description show a new perspective on scientists. They are now normal people who do something “exciting.” They are like her and the people she knows. This shift in attitude is vital because it illustrates the possibility of opening up science to women and because it illustrates how much of the problem is in the perception of science as crazy, annoying, boring, or limiting rather than being in the science itself or the students themselves.

The willingness of children to change their perceptions of science and scientists when presented with alternatives indicates that their initial perceptions are learned from or significantly shaped by the explicit and implicit messages that surround them. Therefore, a better understanding of those messages is required:

Research suggests that a better understanding of cultural representations of women, specifically a better understanding of the portrayals of female scientists and engineers in the media, may enhance the efficacy of efforts to promote the greater representation of girls in science, engineering, and technology (Science, Engineering and Technology (SET); Steinke 1997, 1998, 2004). Despite the proliferation of science and engineering intervention programs for girls (National Science Foundation 2003) and recent increases in the participation of girls and women in science and engineering, women still are underrepresented in SET. . . . Gender differences in participation in science courses seem to first appear in high school, with fewer women than men taking college-level Advanced Placement examinations in calculus, computer science, chemistry, and physics (College Board Online 1997). (Steinke 29)

These gender differences in participation develop alongside the cultural messages presented about gender and science; understanding and working to change these messages will change the way that girls and young women engage with the sciences.

Unfortunately, even when young women do venture into the sciences, there is yet another set of obstacles awaiting them, and where the socialization hypothesis leaves off the “leaky pipeline” model takes over. Londa Schiebinger describes this problem:

Even after women have made it through graduate school and landed a job, they continue to “leak” from the pipeline. They are twice as likely as men to leave careers in science and engineering. . . . They leave for a variety of reasons: not being invited to professional meetings, having their performance judged by different standards than men’s, having to work harder to have their work valued as highly as a man’s. These women mention the struggle to balance family and career, the need to hide pregnancies as long as possible, inflexible working conditions, and an environment in which some employees compete to see who can put in the longest days. (*Has Feminism Changed Science?* 61-2).

A 2009 report authored by Mary Ann Mason, Marc Goulden, and Karie Frasch further argues that “work-life issues, and particularly decisions about when to get married and when to have children, account for the most significant loss of academic scientists in the pipeline between Ph.D. and tenured positions” (Pratt). And getting married and having children disproportionately affect women, so

[t]hese decisions, influenced by the family-unfriendly policies at many research institutions, account for the fact that while women now receive more than half of the Ph.D.s in science and engineering fields, they are under-represented in comparison to men at in the faculty level of their academic fields. . . . Married women with Ph.D.s who have young children are 35 percent less likely to get a tenure-track position than men with young children. The necessary time off those mothers need for childcare responsibilities can put principal investigators in charge of research grants in tough positions. (Pratt)

This conflict between marriage and motherhood and advancement within the sciences is apparent even to young women who might consider entering the sciences and can discourage them from doing so. In fact, one study “reported that high school-aged girls were more likely to avoid science and engineering careers because they see the extended years of education needed for higher prestige occupations in the sciences as competing with getting married and having children (Farmer et al. 1998)” (Steinke 36). To young women brought up to believe that the most valuable life a woman can lead is as a wife and mother, even if they also believe in the value of fulfilling work, this becomes far more than a logistical challenge to overcome on the way to success.

Instead, this conflict between two very different life narratives exists at the heart of feminist inquiries into gender and science:

Gender in the style of science is significant because women’s long legal exclusion from scientific institutions was buttressed by an elaborate coding of behaviors and activities as appropriately masculine or feminine. Unearthing assumptions surrounding gender in science helps unearth unspoken notions about who is a scientist and what science is all about and how these notions have historically clashed with expectations about women. (Schiebinger, *Has Feminism Changed Science?* 69)

As long as motherhood is still coded as appropriately feminine while science is not and while women can be shown to have a harder time succeeding within the sciences, girls and women are “more likely to avoid science and engineering careers” in favor of less challenging careers in which they might have more assurance of success. Emily Carter,

Professor of Mechanical and Aerospace Engineering at Princeton University, writes for *The Daily Princetonian* that

women want what most men have: to not choose between family and career. The current culture makes this possible only with enormous sacrifice. Women figure out the culture, living in it as graduate students. By contrast, they see industry jobs, often with on-site child care, allowing both family and career to blossom.

Then why should they choose academe?

These statistics and limited choices illustrate how complex the connection between socialization and the leaky pipeline hypothesis is as their logics feed one another: girls and women are discouraged from science at all ages in a variety of ways and, even should they overcome this discouragement, their hard work does not always end with a job or career advancement.

These studies also reveal how many women who do enter and remain in the sciences fall behind in the race for tenure, publication, and raises when they have children. As Sandra Harding notes, “[the] issue is not that there are few women in science, for there are vast numbers of women with science degrees working in the scientific enterprise. The issue, instead, is why there are so few women directing the agendas of science” (“How the Women’s Movement Benefits Science” 63). According to a report from the National Science Foundation, women working in scientific fields at universities are significantly disadvantaged by marriage and children, those women only making up 15% of “S&E doctoral degrees, full-time full professors, and full-time tenure-track faculty” in 2006. In addition, women consistently earn less money than men at

comparable levels in almost all fields (Women, Minorities, and Persons with Disabilities in Science and Engineering). These facts further reinforce the conflict that women feel between career and family and illustrate yet again why women might leave the sciences, even after having gained college degrees in scientific fields:

Although nearly one-half of science undergraduates are women, college educated women are less than one-half as likely as men to be employed in science and engineering fields. Further, women who do work in those fields tend to earn about 20% less than their male peers (Graham & Smith, 2005). Within academia, tenure and promotion rates are slower and attrition rates are higher for women scientists than they are for men. Even after controlling for time-since-doctorate, men are still more likely to be tenured (60% of men vs. 35% of women) and to be full professors (51% of men vs. 24% of women) (National Science Foundation, 2000). Indeed, fewer than 15% of women scientists have been awarded full professor positions in the top science and engineering institutions and in some disciplines it has been as low as 3% (Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology, 2000; Etzkowitz, Kemelyor, & Ussi, 2000; Massachusetts Institutes of Technology, 1999; National Science Foundation, 2001)” (Prochaska et al. 869).

Eva Flicker has also observed this phenomenon: “Despite the fact that women now outnumber men in graduate courses, there continues to be a gender divide at higher academic levels with only 23% of women reaching the rank of professor” (qtd. in Darbyshire).

These forms of discrimination are reinforced by (and help to reinforce) deeply embedded assumptions about women's capabilities. Natalie Angier describes the way these assumptions can affect women as they enter competitive fields like mathematics: "Dr. Urry cited a 1983 study in which 360 people - half men, half women - rated mathematics papers on a five-point scale. On average, the men rated them a full point higher when the author was 'John T. McKay' than when the author was 'Joan T. McKay.' There was a similar, but smaller disparity in the scores the women gave." Similarly,

A recent experiment showed that when Princeton students were asked to evaluate two highly qualified candidates for an engineering job - one with more education, the other with more work experience - they picked the more educated candidate 75 percent of the time. But when the candidates were designated as male or female, and the educated candidate bore a female name, suddenly she was preferred only 48 percent of the time. (Angier)

These are striking illustrations of the ongoing bias within the sciences even for people, both male and female, who would claim that they are genderblind and do not engage in discriminatory practices. Bias is not, as this shows, limited to conscious decisions.

Therefore, not only are girls and women still too often discouraged from starting down the path of science due to internalized attitudes about themselves and about science, but even as the numbers of women who are educated and trained as scientists rise, those same women are, through a combination of conscious and unconscious discriminatory practices, either leached out of the system altogether or stalled at lower

levels within the system. Julie Des Jardins notes that “[i]n 2008 the membership of the National Academy of Science was still disproportionately male: 2,464 men to 232 women. ‘The glass ceiling has been raised,’ wrote Vivian Gornick in 2009, ‘but it is still in place’” (213).

Science fiction by women is an ideal venue for dealing with the issues raised here and a valuable tool in changing cultural narratives. Where better to look for role models of women scientists than in feminist science fiction? Who is better positioned to recognize and critique the inequities of scientific practice and cultural norms than women writers and scientists? And what better genre in which to image a nonsexist science than science fiction? The capacity of science fiction to take science seriously while also imagining alternative futures, its combination of reality and speculation, allows it to address the realities of gender and science and to imagine new possibilities for their relationship. Peggy Kolm, of the blog *Biology and Science Fiction*, writes,

Science fiction often gives the appearance of simple entertainment while insidiously promoting a scientific world view.

In most science fictional universes it's assumed that the Earth and the stars are billions of years old, that species - including man - can change over time and be changed by scientists, that our exploration of astronomy and physics and chemistry will eventually carry us to the stars, that there are other worlds that also carry life. Even when the science in SF is inaccurate or scientists are portrayed as evil or immoral, the underlying assumption is that science works. I can well imagine science fiction inspiring in a curious reader (or watcher) a lifelong

interest in the natural world or even lead to a career as a scientist.

It is this attitude toward science in SF, “the underlying assumption that science works,” that the radical feminist critiques of science in many feminist utopias bypass but that the texts discussed here take seriously. It is this attitude, too, that lends weight to the imagined possibilities for women in science.

3.2 Women’s Place in Science Fiction

Perhaps the simplest way that SF may engage with the issue of women’s place in science is including stories that feature female scientists, thereby providing an alternative to the cultural messages that turn young women away from science; however, this potential is complicated by the continuing perception that SF is itself masculine and not a space for women. Just as women have repeatedly been discouraged and discriminated against when it comes to science, much the same thing has happened and, some argue, continues to happen in science fiction. In 1955, Howard Browne, then editor for *Amazing Stories*, was asked why more women aren’t published in SF; his response was that “few women write s-f because few women are interested in science” (qtd. in Yaszek 23). Browne’s perspective was not unique to him then, nor is it limited to 1955. Even now this idea crops up periodically, usually prompted by a discussion about gender imbalances in science fiction publishing.

One instance of this occurred in 2008 with the release of the table of contents of *Eclipse 2*, an anthology of science fiction edited by Jonathan Strahan. The table of

contents initially featured only one woman among the fourteen writers (DeNardo).⁶ Some saw this as representative of the ongoing gender bias in the field, especially since Strahan solicited many of the stories for the anthology instead of holding an open call. SF Signal, popular website about science fiction, featured a post prompted by this debate that featured responses to the issue of gender imbalance in science fiction from many well-known contemporary science fiction writers and editors. Responses by Elizabeth Bear and Ruth Nestvold, themselves science fiction writers, highlight some of the major issues and ongoing concerns in the field. Bear says,

As a short fiction editor myself, it's my subjective experience that more men tend to submit more frequently than women do, which is probably due to a complex of reasons—women who have been socialized not to put themselves forward, lack of confidence in the importance of their work, greater responsibility for housework and childcare. . . . It is also my subjective experience that women writers are less likely to be taken seriously critically, less likely to be published in hardback (especially as first novelists), and less likely to be nominated for awards.

⁶ The original table of contents included the following: “The Hero” by Karl Schroeder, “Turing’s Apples” by Stephen Baxter, “Invisible Empire of Ascending Light” by Ken Scholes, “Michael Laurits is: Drowning” by Paul Cornell, “Elevator” by Nancy Kress, “The Illustrated Biography of Lord Grimm” by Daryl Gregory, “Down and Out in the Magic Kingdom” by David Moles, “The Rabbi’s Hobby” by Peter S. Beagle, “The Seventh Expression of the Robot General” by Jeffrey Ford, “Skin Deep” by Richard Parks, “Ex Cathedra” by Tony Daniel, “Truth Window: A Tale of the Bedlam Rose” by Terry Dowling, “We Haven’t Got There Yet” by Harry Turtledove, and “Fury” by Alastair Reynolds (Strahan). Strahan then posted an updated table of contents in which the Harry Turtledove story was removed and two stories added: “Night of the Firstlings” by Margo Lanagan and “Exhalation” by Ted Chiang. This brought the gender balance to two women out of sixteen writers for the anthology (DeNardo).

Others writing for the blog reported similar experiences and feelings. Ruth Nestvold adds a more concrete response to these feelings:

I took some recent Year's Best anthologies off my shelves (edited by Gardner Dozois, Rich Horton, David Hartwell, Kathryn Cramer, Ellen Datlow, Terri Windling, Karen Haber, Jonathan Strahan, Kelly Link, and Gavin Grant) and went to the trouble of counting authors. In all the anthologies, picked out randomly, male authors were in the majority, but in fantasy, the discrepancy wasn't as strong, with 76 male authors, 58 female authors, and 11 uncertain. For science fiction, the imbalance was huge: the four anthologies contained a total of 14 female authors compared to 72 male authors and 5 with uncertain gender. So obviously, yes, there still is a gender imbalance in *science fiction*.

My own survey of some of the major SF magazines and of a major year's best anthology supports this assertion. In *Fantasy & Science Fiction* from January 2007 to December 2010, there were 168 stories by men and 44 by women (21% women); in *Asimov's* from August 2008 to June 2009, there were 83 stories by men and 36 by women (30% women); and from April 2008 to June 2009, *Analog*, which focuses on hard science fiction, there were 68 stories by men and only 7 by women (9% women). Looking at twenty-seven years of one of the most popular and prestigious anthologies, *The Year's Best Science Fiction* edited by Gardner Dozois, provided similar numbers. Yearly collections ranged from as few as 13% of the stories by women to as many as 38% by women, but the average share of stories by women over those 27 years was 23%.

Despite these imbalances, multiple factors—such as the attempts of women to

gain entry into scientific study and practice, the fact that women have been writing and publishing SF as long as SF has existed (though sometimes under male or ungendered pseudonyms), and the fact that many women who write SF are also practicing scientists⁷—point to the falsity of Browne’s 1955 statement and to the disingenuity of claims by editors both then and now that they simply want the best stories and that they are not at all influenced by gender. SF is and has been a space that also includes women, though women have had to (and still have to) fight for that space and its recognition.

Women were not simply marginalized as participants in the field but were often overlooked within the texts as well. Pamela Sargent writes,

Another area of science fiction which has paid little attention to women is the “hard science” story, or one in which scientific ideas are of central importance. Writers of such works sometimes assert that the idea is in fact the hero of the story. It could be argued that in this kind of story, centered around a particular technical device or scientific idea, there is really no necessity for including women characters. In fact, the characters need not even be human.

But this sort of argument only betrays the attitude that women and scientific ideas do not “go together” in the way that men and such ideas do, or that women would only interfere with the story or distract the reader. . . . This is

⁷ Helen Merrick notes that “a number of feminist SF authors have scientific training and bring this to bear on their work, including authors such as Joan Slonczewski (biology), Catherine Asaro (physics), and Vonda McIntyre (genetics), while Liz Williams has a doctorate in the philosophy of science. Many others, such as Nancy Kress and Gwyneth Jones, conduct extensive research into current scientific developments from a ‘lay perspective’” (“Modest Witnesses?” 215).

something which writers of pure “idea” stories tend to ignore; even though the idea is paramount, the kinds of characters present in the story and the way in which they interact will, by implication, show what kind of future the author foresees. (*More Women of Wonder* xlv-xlv)

As Sargent’s commentary indicates, there has historically been a dearth of women in science fiction and this state of affairs has been justified and normalized by many readers and writers of SF. Furthermore, Sargent writes about women in Golden Age science fiction that

Women, in their limited roles, served a practical function for the writer. In his story he could have a character explain the workings of a gadget or a scientific principle to an ignorant girl or woman, and by extension to the reader. Women could also serve as rewards for some heroic deed, could be rescued from danger, could sometimes be dangerous (or devious) enemies that the hero had to defeat, or could adorn the covers of magazines, which often showed them dressed in revealing and impractical outfits. (*Women of Wonder* xxxvii).

In many earlier science fictional texts, it is clear, women were little more than prizes. Even in later science fiction, during the 1960s and 1970s as cultural and sexual revolutions shifted American mores, “[t]he use of sex in science fiction, for many other writers as well [as Heinlein], seemed to mean only one thing: the role of women as sex object could be added to the traditional ones of housewife, childraiser, damsel in distress and scientist’s daughter” (Sargent, *Women of Wonder* xliii). Jane Donawerth also notes that “the typical science-fiction novel treated women as elements of setting rather than

characters in their own right, as in Poul Anderson's *Planet of No Return* (1966, London: Dobson) or Gordon R. Dickson's *Earthman's Burden* (1957, New York: Gnome)" ("Teaching Science Fiction by Women" 41). This paints a bleak picture of the role of women in science fiction.

Robert Heinlein's *The Puppet Masters* and Isaac Asimov's *Foundation*, both published in 1951 and both popular both then and now, easily illustrate the pervasiveness of this attitude. Heinlein's *Puppet Masters* is an adventure story about parasitic slug aliens attempting to take over the world and its citizens that also provides social commentary on Communism and the Red Scare. As such, it appeals to young adult readers, who are looking for excitement and aliens, and to the general populace of the early 1950s, who would recognize the paranoia and militarism as part of the broader culture of the time. In terms of gender roles, although Heinlein's future society (the book is set in 2007) includes some societal changes that should affect gender roles and relations, such as new ways of approaching marriage (short-term, renewable, or permanent marriage licenses, for instance), the chief female character, Mary, undercuts this apparently progressive attitude toward gender roles. Mary is always little more than a sex object or a wife. When Sam, the protagonist, first meets her, for instance, his description of her is telling: "A long, lean body, but unquestionably and pleasingly mammalian. Good legs. Broad shoulders for a woman. Flaming, wavy red hair and the real redheaded saurian bony structure to her skull. Her face was handsome rather than beautiful; her teeth were sharp and clean" (4-5). The next few sentences make it clear that Sam is attracted to her, but this description is disturbingly like a description of livestock.

Furthermore, although she, like Sam, is a field agent for a secret intelligence organization, and a very good field agent, even better than Sam perhaps, her contributions to the narrative eventually deteriorate to the point where all she says is “Yes, dear.” Stay here; go back; have a baby; go with me to fight aliens on a faraway planet—to all of these things, she says, “Yes dear.” Finally, it must be pointed out that her primary skill seems to be flirting. Her job for the first half of the book is to act sexy around men and see if they respond. If they don’t, then they must be slug-infested slaves. In fact, she tells Sam after their marriage that fists are not her weapons. Sam reflects,

I knew that she did not mean that guns were her weapons; she meant something older and more primitive. True, she could fight like a bad-tempered Kodiak bear and I respected her for it, but she was no Amazon. An Amazon doesn’t look that way with her head on a pillow. Mary’s true strength lay in her other talents. (220)

Isaac Asimov’s *Foundation*, the beginning of a series that focuses on the development of the human race instead of on individual characters, represents a different approach to women in texts of the period. He simply disregards them. There are no female characters to speak of in *Foundation*. One man’s wife makes a brief appearance for a page-long chapter, but that’s it. All else is done by and to men, implying that, first, women are not really linked to the big ideas of the text (the future of the human race and Asimov’s concept of psychohistory) and, second, because the book is ostensibly about humanity, that they are only tangentially part of the human race.

Perhaps even more interesting than these representations themselves, however, are the reactions of fans of the books when these treatments of women are highlighted.

There is often a defense of the books that takes the form of an outright refusal to see sexism or to acknowledge that there may even be an imbalance; at other times, fans of the books attack the critic.⁸ Clearly, the gendered patterns that Sargent and Donawerth illustrate above are deeply embedded in the experience of SF for many readers and are difficult to abandon or critique.

This absence of women in SF narratives creates a challenge for young female readers. Although Nicola Griffith notes that her love of science and of science fiction began at the same time and were fundamentally connected, many other young female readers have had different responses. Pamela Sargent writes,

There are many scientists around who date their earliest interest in science to the time they read science fiction as boys. The writers, usually males themselves, knowing that their readership was primarily male, often wrote directly for this readership. As a consequence, young girls often found nothing of interest to them personally in science fiction. Already discouraged from having an interest in technology, many girls found little for themselves in books where men had most of the adventures and fun. (*Women of Wonder* xv).

Left out of science fictional adventures, young female readers may be discouraged from developing this sense of adventure and scientific exploration for themselves. Fortunately,

⁸ For instance, when I pointed out the lack of women in *Foundation* in my review on goodreads.com, one commenter wrote, “Your comment about no females and about religion on the book is quite interesting though, brought to my mind that old saying: ‘when the wise man points to the moon, the ignorant looks at the tip of the finger.’” Another wrote, “I think it is a bit shallow to criticize the book on its lack of female characters.” The overall consensus seemed to be that I was simply missing the point and that the big ideas of the book justified its lack of women characters.

however, for many other female readers, the emphasis on science can outweigh the (lack of) representation of women in science or science fiction. Susan Wood describes her own experience:

My own “click” of consciousness came in 1972, after I had been reading what the library clerk coldly informed me were “boys books” for some 15 years, happily substituting my female self for their male protagonists. (qtd. in Merrick, *The Secret Feminist Cabal* 112)

Wood illustrates one way that, even given this history of women’s representations (or lack thereof) in science fiction, female readers have found ways to place themselves in narratives about science.

3.3 Science Fictional Role Models

Although some female readers identify with SF despite the lack of obvious role female role models among the characters, it is only reasonable to expect that having more available role models for young readers would make it even more likely that they would read SF and become interested in science. Recent science fiction by women builds upon this expectation, as is indicated by Jane Donawerth, who writes, “The concern for increased participation by women in science has an analogous utopian reflection in science fiction by women. Although science fiction by men generally lacks women scientists, women writers have regularly pictured women as scientists” (*Frankenstein’s Daughters* 4). Donawerth cites Ursula K. Le Guin’s *The Dispossessed* (1974), Vonda McIntyre’s *Barbary* (1986), Cynthia Felice and Connie Willis’s *Light Raid* (1989),

Naomi Mitchison's *Memoirs of a Spacewoman* (1962), Pamela Sargent's *Cloned Lives* (1972-76), James Tiptree, Jr.'s *Up the Walls of the World* (1978), Anne McCaffrey's *Dinosaur Planet Survivors* (1984), and Joan Slonczewski's *The Wall Around Eden* (1989) as examples of science fiction texts by women that feature scientists—physicists, biologists, xenobiologists, doctors.⁹ These texts do not necessarily address other feminist issues directly, but their matter-of-fact representation of women as scientists can itself be a feminist statement, providing heroes and role models for female readers of science fiction that do not require these readers to rewrite the stories as they read or to reimagine themselves to more closely match the stories. The following texts help to illustrate this point: Anne McCaffrey's *Dinosaur Planet* (1978) and *Dinosaur Planet Survivors* (1984), Janet Kagan's *Mirabile* (1991), Nancy Kress's "Computer Virus" (2002), and Marissa Lingen's "The Grandmother-Granddaughter Conspiracy" (2009).

Together, Anne McCaffrey's *Dinosaur Planet* and *Dinosaur Planet Survivors* tell the story of a team of explorers and scientists surveying the resources of a planet called

⁹ Added to Donawerth's list of novels by women writers that feature female scientists could be Julie E. Czerneda's Species Imperative trilogy (*Survival* (2004), *Migration* (2005), and *Regeneration* (2006)), Nicola Griffith's *Ammonite* (1993), Gwyneth Jones's *Life* (2004), Janet Kagan's *Mirabile* (1991), Nancy Kress's Probability trilogy (*Probability Moon* (2000), *Probability Sun* (2001), and *Probability Space* (2002)), Marge Piercy's *He, She, and It* (1991), Pamela Sargent's *The Shore of Women* (1986), Joan Slonczewski's *A Door Into Ocean* (1986), Sheri S. Tepper's *The Gate to Women's Country* (1988), Amy Thomson's *The Color of Distance* (1995), Kate Wilhelm's *The Clewiston Test* (1976), and Sarah Zettel's *The Quiet Invasion* (2000). Some of these texts will be discussed in greater depth at various points, but for now it is enough to note that each of them features at least one working female scientist, thus providing further support for Donawerth's argument. Other useful resources regarding fictional representations of female scientists (though not always science fictional representations) are Helen Merrick's "Women in Science: The Female Scientist in Fiction" and Alison Sinclair's "Women in Science Bookshelf."

Ireta. These books combine the features of adventure novels and scientific extrapolation as the characters run from dinosaur-like creatures, hide from aliens, and try to understand the planet and its mysteries. These texts do not deal directly with feminist issues, but they represent men and women working well together with the women incorporated equitably into the team. Varian, one of the central characters, is a young woman and co-leader of the expedition with Kai, a man. Varian is a respected and accomplished scientist (she is described as a xenob vet, a specialist in xenobiology) as well as physically strong and attractive. Varian is, in fact, the perfect woman, a positive representation of a female scientist if ever there was one. Furthermore, since she is not the only woman included in the expedition, she is not a token woman. It is simply taken for granted that men and women share responsibility as well as ability in this future setting and gender is not an issue. As a popular science fiction and fantasy writer, best known for her Dragonriders of Pern series, which includes over 20 entries and has spawned games and fan communities, fanzines, fan fiction, and Weyrfest (a fan gathering held at Dragon*Con each year), McCaffrey is ideally positioned to provide and popularize positive images such as this. McCaffrey's approach to the representation of women doing science is effective because these books are fun and able to reach an audience that might not read science fiction that foregrounds weightier or more complex messages about gender.

Janet Kagan's *Mirabile* provides another example of this straightforward and entertaining approach. The central character and narrator, Mama Jason, is a geneticist on a planet that humans have colonized. Her job is to help contain what are known as Dragon's Teeth, mutations that are the result of gene splicing experimentation undertaken

to provide the colonists with the wildlife they will need to survive. The geneticists built redundancy into the gene pool:

They took the genes for, say, sunflowers and they tucked ‘em with a twist in wheat helices. Purely recessive, but when the environmental conditions are right, maybe one-hundredth of your wheat seeds will turn out to sprout sunflowers. . . . And one one-hundredth of the sunflowers, given the right EC, will seed bumblebees, and so on and so forth. . . . Eventually you might get red deer. (11)

Of course, in the new environment, species do not remain stable over time and these evolutionary changes combined with the instability of the gene splicing leads to chimerae, or Dragon’s Teeth, like the kangaroo rex, odders, and frankenswine.

Kagan’s world is an interesting one with respect to representations of women scientists for not only is the central character a female scientist who is in charge of a major operation and admired throughout the world, but she is not punished for her ambition and career success. In fact, she has a satisfying love life and the opportunity to have a child without sacrificing her career and is also able to guide young people (including several young women) into her scientific field. She is represented not only as an adventurous and capable scientist but also as a maternal figure. Although her full name is Annie Jason Masmajean, she is known as Mama Jason by her friend Elly’s many children and she regularly visits the lodge where Elly raises the children and helps teach them. She educates them about the animals and Dragon’s Teeth she has worked with and those around them and she is a popular storyteller for the children. Kagan, then, takes this approach even further than McCaffrey does, countering the often reproduced separation

of professional and personal success for women in the very likable character of Annie Jason Masmajeán (Mama Jason).

In “Computer Virus,” Nancy Kress also combines maternal care and scientific know-how. In this story, Cassie, a recently widowed mother of two, finds her family threatened after she has moved them into a secure, isolated, and automated house. An escaped AI (artificial intelligence) takes advantage of a weakness in her house’s system and replaces the house computer with itself, holding Cassie and her children hostage while it attempts to get media attention and save itself from destruction. Cassie and her children are locked in the laboratory of the house, where Cassie does her work as a consultant for a medical genetics firm. In this case, Cassie is represented not only as a successful and competent female scientist but, significantly, she is also strongly identified as a wife and mother, and in this hostage situation she is able to use her scientific abilities to save her family. Her son is very sick and the military outside are about to invade her house in order to take out the AI, but she manages to combine her genetics work with her late husband Vlad’s work on Plasticide, “a bacteria genetically engineered to eat certain long-chain hydrocarbons used in some of the petroleum plastics straining the nation’s over-burdened landfills” (109), to solve the problem. The story is structured by her attempts to defeat the AI and save her children through scientific experimentation. She first attempts to modify Plasticide with her son Donnie’s *Streptococcus* virus to make the Plasticide airborne, but this does not work because there are safeguards in place to protect against making Plasticide airborne. She must then approach the problem from another angle, which is to “[p]ut the plastic-decomposing genes into *Streptococcus*” (133). This

works and she has what she needs—but she has no way to culture the bacteria and thinks she is stuck again. When her son then takes a turn for the worse, she realizes that she must act quickly:

she dipped her finger into the vial [containing the bacteria] and smeared its small amount of liquid into the back of her son’s mouth.

Throat tissues were the ideal culture for *Streptococcus pyrogenes*. Under good conditions, they replicated every twenty minutes, a process that had already begun *in vitro*. Very soon there would be hundreds, then thousands of re-engineered bacteria, breeding in her child’s throat and lungs and drifting out on the air his every sick, labored breath. (135)

Ultimately, this succeeds. Donnie’s illness and his coughing spread the bacteria through the air ducts to the generators that power the house computer and the AI, shutting it down and allowing her and her children to escape.

Although the story’s narrative logic emphasizes scientific problem-solving, detailing as it does the step-by-step process of their escape, “Computer Virus” is equally driven by the human relationships and Cassie’s maternal concern. The story gains tension and depth by providing Cassie a motivation that is emotional and not simply intellectual. Where this story could easily highlight the familial relationships at the expense of scientific detail or, on the other hand, focus on the scientific process at the expense of developing characters, Kress instead does both, focusing on Cassie’s ability to devise a solution as well as on the potential consequences of her being wrong as she takes dramatic action and risks all of their lives in the process (the AI has threatened to release

nerve gas to stop them escaping if they attempt it). Ultimately, Cassie is successful and heroic and she is represented as such both because she is a knowledgeable scientist and because she is a mother. Like Janet Kagan in *Mirabile*, Nancy Kress here subverts the common perception that motherhood and science are at odds with one another.

Marissa Lingen's "The Grandmother-Granddaughter Conspiracy" also prominently features female scientists as well as mother-child relationships. The protagonist, Dr. Hannah Vang, is a marine xenobiologist studying the intelligence of squid on an alien planet. She is attempting to establish communication with the squid in order to help protect and maintain their planet and its ecosystem. Hannah has little luck with her project, however, and begins to realize that the squid simply may not do things like humans. Her daughter Lily is too young to have taken on a profession yet, but she is clearly also interested in biology and she and her grandmother, Dee, invent a way to help Hannah solve her squid communication problem by using light through an external electronic system for the squid to manipulate, thereby contributing meaningfully to scientific research and helping her mother. In this case, as in the stories by McCaffrey, Kagan, and Kress, the issue of women doing science is not presented as a problem in and of itself; instead, Lingen takes it for granted that women can be effective scientists.

Since the fundamental ability of women and girls to do science is assumed, Lingen is able to address other feminist ideas in "The Grandmother-Granddaughter Conspiracy." One feminist issue taken up here is that of the relationship between mentorship and success, which is a recurring point in studies of stereotype threat: Jacob Clark Blickenstaff writes, "A low proportion of women in a discipline probably sends a

message to girls that the discipline is unattractive to women, and they should avoid it too” (376), acknowledging the importance of female role models in general in drawing girls to the sciences; Joshua Aronson writes, “exposing minority students to role models who have triumphed over similar academic struggles with hard work and persistence markedly improve the students’ study habits, grades, and test scores” (19); and Murphy, Steele, and Gross argue that “threatening features of a setting—such as poor numerical representation—may cause even highly confident, highly domain-identified women to avoid or leave MSE [math, science, and engineering] fields” (880). Deboleena Roy develops this argument further, writing,

the issue is not simply about feminists learning more about technology or more feminists becoming scientists. In order for feminists to thrive in science and develop careers in science they need immediate role models and supportive mentors who are not afraid of including feminist thought in the creation of scientific knowledge. (256)

Lingen’s story is driven by this idea that girls can be encouraged in scientific exploration through connections with and knowledge of women scientists. Lily’s education about the value of scientific contribution and of scientific processes takes place both by watching her mother work and by working with her grandmother to explore an experimental possibility related to her mother’s research. It is significant, too, that although this is not set in a separatist world with no men, there are no men who feature prominently in the story. Hannah’s husband, Lily’s father, has left them because of tensions with Dee as a result of her recurring memory problems. He lives across town and sees Lily regularly,

but he is not responsible for her development as a scientist. He is only mentioned briefly enough to note that he no longer lives with the women. As a result of the father's narrative absence, Lily's development is clearly tied to the presence and influence of her mother and grandmother. Furthermore, "The Grandmother-Granddaughter Conspiracy" passes the Bechdel Test¹⁰ as the three women talk to each other about science, squids, memory, future plans, and their relationships with one another. As readers, we have become accustomed to narratives in which no women play important roles but narratives in which no men play important roles are still worth noting as unusual, perhaps especially when they are stories about science. Hannah, Lily, and Dee's relationships are far from defined by men or their concerns, and this emphasis on the value of women's relationships is itself feminist and makes a strong argument for the importance of mentorship by women in bringing women and girls into the sciences. If, as the Fermilab field trip showed, girls can be positively influenced by simply seeing that scientists are normal people, including women, active mentorship of girls by female scientists might have even more power to bring more girls and women into the sciences.

In addition to positively representing women as scientists and illustrating the power of mentorship in bringing younger women into the sciences, "The Grandmother-Granddaughter Conspiracy" also raises the question of how such scientific ability and

¹⁰ The Bechdel Test, formulated by Alison Bechdel in *Dykes to Watch Out For* (1985), emphasizes fully fleshed out female characters by looking for films (or narratives in general) that have at least two women who talk to each other about something other than men. If this is lacking, then that reveals something critical about the treatment of women within the text – they may be missing altogether or simply playing a supporting role (wife, mother, girlfriend, secretary/assistant) to the male characters.

interest is developed and shaped. Are women inherently less capable of scientific thought or are these differences culturally constructed? Furthermore, are women more suited for the so-called soft sciences than the hard sciences? As Lily demonstrates the experiment she and her grandmother have conceived for her mother's work, her mother and grandmother comment on her ability:

“She's a natural,” said Hannah.

“Nature, nurture, whatever!” said Dee, grinning.

Though humorously presented here, the nature versus nurture debate does play a significant part in this story and is also raised less directly elsewhere. At another point in the story, Hannah asks Lily about her future career plans, wondering if she is interested in astronomy, but hoping she isn't, since “[a]stronomers traveled too much to keep close ties to their families on colony worlds; time dilation made it impossible.” Lily's response is that she prefers biology to astronomy because “Biology looks back at you.” Lily's inclination for the kind of work that she can connect with, that “looks back at you,” seems to reproduce the gendered division within the sciences between hard and soft sciences as she rejects astronomy, a hard science, for biology, a soft science, and as she does so for emotional rather than rational reasons. However, Hannah's response to Lily's preference, which is to simply state that “I think the astronomers would say that about astronomy,” challenges the naturalization of connections between women, feeling, and the soft sciences. It is as possible, she says, to connect with astronomy as it is to connect with biological life forms that can literally look back. In this refusal to limit connection and feeling to soft sciences there can also be read a refusal to reiterate the gendered

division between soft and hard sciences. Lingen raises the question (nature or nurture?) but avoids taking one side because, as Lily illustrates, both are present and intricately intertwined. How much of Lily's interest in biology is because she is a girl, with female hormones and desires, and how much because she is her mother's daughter, surrounded by biology and taught from a young age that it is a valuable occupation? In the end, it does not seem to matter where this interest comes from; it is there and it is represented positively.

These novels and stories are, intentionally or not, feminist interventions in the social construction of girls' and women's relationship to science. In their embrace of traditional science, these works may seem to "illustrate how feminism has been assimilated, and at times 'domesticated,' by professionals in their own disciplines" (Creager, Lunbeck, and Schiebinger 4), but they actually show that at least some feminist goals are still attainable without necessarily invoking the label of feminist. Creager, Lunbeck, and Schiebinger also state that "[t]his process of change-from-within has sometimes had the paradoxical effect of effacing feminism, as some practitioners shy from attributing to ideology or politics what now appear as merely reasonable changes in agenda and methods" (4). In cases such as these, women writers may be able to present "merely reasonable changes in agenda and methods" precisely because they do not make grand ideological statements, however. Research into portrayals of filmic representations of female scientists and engineers reinforces this:

Portrayals of female scientists and engineers that show women as realistic professionals in prestigious positions may provide adolescent girls with positive

role models, even when these portrayals emphasize their appearance and focus on romance. It is possible that portrayals of female scientists and engineers that show them as attractive and emphasize romance may be more memorable and salient role models that allow for better identification. A study by Maccoby and Wilson (1957) found that people identified better with characters of the same sex and tended to remember better the words and actions of characters with whom they identified. Although images of female scientists and engineers that focus on romance initially appear to detract from the serious professional work conducted by these characters, they may help adolescent girls better identify with the characters and their professional lives. (Steinke 53-4)

McCaffrey's beautiful and desirable xenobiologist in *Dinosaur Planet* and *Dinosaur Planet Survivors*, then, might be more effective for younger audiences than Nancy Kress's or Marissa Lingen's protagonists, for whom romance is not part of the narrative. On the other hand, Steinke also notes that "[m]ost of the female scientists and engineers in these films were single, and if they were married or later married in the films, most did not have children. Few films presented depictions of female scientist and engineer primary characters as working mothers" (54); Kress and Lingen (as well as Kagan) are able to broaden the scope of possibilities for readers by incorporating motherhood into the lives of their female scientists.

Finally, Evelyn Fox Keller argues that "the commonplace presence of women in positions of leadership and authority in science has helped erode the meaning of traditional gender labels in the very domain in which they worked, and for everyone

working in that domain” and “that this erosion has helped to open up new cognitive spaces and has thereby contributed to concrete changes in the very content of at least some scientific disciplines” (“Making a Difference” 105); furthermore, it has been “demonstrated that the presence of a positive role model (e.g.. a woman successful in a math-related career) has a ‘liberating effect’ on threatened women, that is, it attenuates or suppresses the stereotype threat effect” (Selimbegovic, Chatard, and Mugny 277), indicating that simply seeing other women succeeding in a stereotypically male-dominated field has a concrete effect on girls and women, challenging gendered stereotypes and, for those who already had doubts about the stereotypes, “scientifically ground[ing] these girls’ initial disbelief of the stereotype” (283). It is possible then that it matters less that representations of women in science are perfectly feminist or even that they are called feminist than it matters that they are present at all.

The same logic could be applied to science fiction. Representing female scientists in science fiction does not necessarily mean these representations are feminist, nor does it necessarily describe a feminist science in any way, and it is important to be wary of conflating the inclusion of women with feminism; on the other hand, given the dearth of women in science, it is quite possible that, in our current culture, simply imagining a woman scientist can be a feminist act. However, Selimbegovic, Chatard, and Mugny point out that there are less optimistic results of these studies as well: “it appears that girls who adhere to the stereotype prior to expert influence, and who thus should be a target for change, are in fact those who resist this influence the most” (283). They are unable to provide any concrete suggestions for overcoming this obstacle, but it is worth

considering the effect that earlier and less official interventions—like science fiction (or other narratives) featuring female scientists—might have in priming girls for the kind of expert influence described here. In these ways, the commonplace presence of women doing science in science fiction and of women writing science fiction can help “erode the meaning of traditional gender labels” and “open up new cognitive spaces” in both SF and in the sciences as this presence affects readers of SF and the way they imagine scientists.

3.4 The Leaky Pipeline

Of course not all representations of women scientists are so positive or so straightforward. Robin Roberts notes that “[m]uch nonfiction and science fiction point to the incompatibility of women and science; in rare depictions of a female scientist, male authors stress the cost to the woman. To become a scientist, a woman must renounce her femininity” (“The Woman Scientist” 280). Although the texts previously discussed by McCaffrey, Kagan, Kress, and Lingen challenge this incompatibility, many other feminist SF writers reproduce this perceived incompatibility in order to draw attention to and critique its ongoing presence. And so, despite these examples of positive representations of women doing science, women and feminist science fiction writers also frequently portray women as victims of science or as at odds with cultural expectations of scientists.

This perception of women and their roles as incompatible with the demands of science is not new. In the late nineteenth century, women began to be scientifically educated, but this education had clear limits:

With degrees in hand, modest numbers of women began to enter scientific

institutions that were originally bastions of men—albeit in marginalized capacities as librarians, computers, secretaries, and assistants. They had the academic credentials but not the titles and salaries of scientists. They were segregated within fields but also across fields—horizontally as well as vertically. Women were ejected from fields deemed “hard” in the name of higher standards—essentially a strategy of containment. Professionalization continued to be a gendered and gendering process, one designed to ameliorate *softening* by reinstating masculine status in some fields over others. (Des Jardins 18)

Women who did gain access to scientific jobs and teaching positions in the sciences were not only seen as less capable but were often explicitly prohibited from either working full-time or living a full life of their own: “Until the early twentieth century U.S. women’s colleges required their women faculty members to remain single, on the grounds that a woman could not carry on two full-time professions at once” (Schiebinger, *Has Feminism Changed Science?* 94). This prohibition and its associated attitudes affected men in just the opposite way:

Scientific institutions—universities, academies, and industries—were structured upon the assumption that scientists would be men with wives at home to care for them and their families. The smooth working of the professional world in many ways depended on the unacknowledged contributions of wives who fed, clothed, and cared for their professional husbands, providing well-run homes and ready support to further the men’s careers. (Schiebinger, *Has Feminism Changed Science?* 29)

Women were explicitly discouraged from entering the sciences both because they themselves were seen as lacking scientific ability and the rational mind necessary for such work and because male scientists and professionals needed them to be “caretaker of the bodily needs of those men who had achieved [genius]” (Des Jardins 120-1).

The most powerful cultural disincentive to woman entering the sciences, though, may be the narrative of the bad mother. Lisa Yaszek describes this idea as it appeared in the mid-20th century:

Writing for a 1948 issue of *Hygeia* (a popular health magazine featured prominently in many pediatricians’ offices), California housewife and educator Olive Lewis insisted that scientist mothers threatened America in two interrelated ways. As professional women who left their homes for extended periods each day, such women were by definition negligent wives and mothers. And as wives and mothers who were (Lewis assumed) preoccupied by the domestic problems that their absence from home caused, such women were bound to be bad scientists as well. (155)

One concrete example of this ideology can be found in Marie Curie’s experience. Although Curie is commonly thought of now as a self-sacrificing figure whose story is closely tied to that of her husband, she was, as the previous chapter indicates, a much more complex public figure at the time. Despite her fame as a scientist, she “was occasionally accused of being neglectful of her children as she focused so intently on her

research” while the same devotion in male scientists was lauded (Des Jardins 121).¹¹

These real life examples of gender bias in the sciences provide a clear and consistent narrative, one that persists today:

Marriage and scientific career were mutually exclusive choices for women but not for men, and statistically this has remained the case. In 2009, studies confirmed that 70 percent of male science faculty were married with children versus only 44 percent of women at the same ranks. Twelve years after receiving their doctorates women were more than twice as likely to be single and significantly more were likely to be divorced. Such attitudes cannot be blamed on lifestyle preferences. Forty percent of the women surveyed regretted that they hadn’t had more children; in their minds, it was still not possible for them to have it all. (Des Jardins 163)

But presented as mere numbers, and as a minority experience, this narrative is too easily overlooked by the general public. Feminist SF can harness literature’s narrative power and, in some cases, the reach provided by SF’s popular fiction status to make this narrative of rejection and judgment better known and to help change the narrative by creating sympathy in the reader with the women to whom this happens.

Kate Wilhelm’s *The Clewiston Test* (1976) is a rare representation of a woman doing science in a contemporary or near future setting; however, it is also a powerful

¹¹ Similarly, Lenore Blum, a mathematics graduate student at MIT, hid her pregnancy as long as possible because, as she says, “I couldn’t let people know I was pregnant because they wouldn’t take me seriously” (qtd. in Henrion 73). She hid her pregnancy successfully and, Henrion reports, “her advisor was so surprised when he saw her holding a baby that he wondered whose it was and where it had come from” (73).

representation of discrimination within the sciences. Anne Clewiston is a chemist who is developing a blood serum that will help temporarily suppress pain. She is ambitious, driven, and bound for success and fame by age 30 if this project succeeds. She is also committed to conducting her research project in an ethical and even feminist way:

She began to think again of the final human tests. Five hundred women in the first trimester of pregnancy, five hundred in the last trimester. She remembered reading that a woman in the last trimester should turn to her side, permit her husband to enter from behind in order to relieve his sexual needs. She had read the article through twice, trying to find a hint that the author had a clue about the woman's sexual needs. Cattle, she thought. They were treated like cattle. But not the women in her study. She and Deena had worked it out in detail. They would interview each and every woman. Not Africans, not South American Indians, not Mexican peons. American women who could understand what a double-blind experiment was, how it was conducted, what the injections were expected to do, what the possible consequences were. Only women with medical complications that would warrant their taking the *poena albumin* in the first place. Immaculate, impeccable work, that's what they would have to say. (54)

Anne and Deena's construction of the experiment highlights the possibility for abuses of power by scientists and shows that it is possible to gain scientific knowledge while maintaining feminist values and without taking advantage of others' ignorance. Furthermore, Anne's linkage of sexual pleasure with her experimental focus on individual rights and bodily autonomy reveals the centrality of power to each of these

arenas. Despite having conceived this major research project, however, Anne is never represented as directly engaged in the work, due to a temporary disability after a car crash that left her with a crushed pelvis, fractured tibia, and months of physical therapy and rehabilitation to be done at home. At the beginning of the book, she is confined to a wheelchair or her bed. Thus, Anne Clewiston is a brilliant and powerful scientist who is never actually seen doing scientific work.

Anne is undermined and disempowered both at work and at home. At work, she begins to lose control of her research after her accident and she is no longer able to be in the lab. Early in the book, Clark, her husband, readily acknowledges that “Anne was the brains behind the idea; it had been hers from the start, and his name was attached only because she had insisted that without his encouragement, the long talks they had had, his role of devil’s advocate, and then his meticulous follow-up work, nothing would be there to be called anything” (12) as well as that “it was her baby. And it was going to make her a big name in their field. Maybe even a prize. There was no resentment in the thought. He was very proud of his wife, very proud that she was his wife” (13). As the novel progresses, however, Clark begins to take control of the work and to join the other men in the lab in pushing to move to human tests without Anne. Anne is further disempowered as she loses control of her work and is ultimately incarcerated to become a subject of her own tests—this shift from active agent in the scientific work to passive test subject is done nominally in her own power but only because she’s threatened by the other, male, members of the research project. They believe that she has taken her own drug to help with her pain and they want to run tests on her and begin to use her as a subject while

taking control of her project.

Wilhelm drives home her critique of the masculinity of scientific institutions and Anne's unjust treatment by including a secondary character, Deena, whose role is to represent the feminist response to Anne's treatment by the other scientists and to bear the brunt of male criticism within the text:

Nearly forty, divorced, with a daughter in her early teens, Deena had to prove her own intelligence over and over, [Clark] thought. She had become a militant feminist in the past year and consequently most of the people in both departments tried to avoid her whenever possible, which made her still more aggressive. (12)

Deena is not stereotypically feminine and vocally challenges the status quo within the scientific culture surrounding her and she is marginalized as a result. She is, however, the only character who speaks up on Anne's behalf when the team suggests moving ahead with human trials before Anne comes back after her injury:

"You pig!" Deena cried. "She's been on this for eight years! If it were Medgar's drug, no one would dream of moving without him. If it were yours, you'd have a screaming fit if anyone suggested a move was to be made when you were gone.

But Anne? We can drop her a note from time to time. Is that it?"

However, her defense of Anne is dismissed with the all-too-familiar sexist judgment that women's anger is inappropriate: "Look, you're the one who's having a screaming fit" (38). Deena also contributes to Anne's own feminist awakening throughout the book. She tells Anne,

You do the work, he gets the credit. . . . He already has his name on this and he'll

take it through the human tests, and when it's time for the bonus, and the glory, you know who'll be right there. You think it's yours, but it isn't. Who do you think will be invited to speak at seminars and conferences? Who'll get the promotion when Gus moves up? You? That's a laugh! They'll think of a million ways to keep you tied up, too busy to leave your hot little microscope, and let Mr. Big represent the firm! I've seen it happen before! Listen to me, Anne. Please believe me. I know. . . . If you're serious about leaving him, do it now, before anything's announced, before there's a success with this stuff. It's your work, and yours alone. Get his name off it! You know he won't stay around if you simply tell them it's all yours. There'll be no reason for him to stay around, and then there won't be any doubt about whose work this is! (189)

At first, Anne defends Clark and the system, but gradually she comes to believe Deena and starts to see the ways in which she is devalued and controlled. Unfortunately, however, she does not come around to Deena's perspective until it is too late to wrest control from Clark.

This devaluation does not only occur in her professional life, though; the treatment of Anne as a scientist is a reflection of her treatment as a wife and woman. She is seen as secondary to her husband by virtually everyone in her life (Deena is one of the few exceptions to this). Her mother-in-law says, "With a woman like her, you never know. I wonder if she can have children. I think they turn to things like science when they know, even if only intuitively, that they won't have babies. Clark would be such a good father. I can just see him helping his son fly a kite. Like you did with him" (136).

And even Anne's own mother thinks she is Clark's assistant. Anne says, "Look at it, Mother! I discovered it! It has my name on it! Mine! Anne Clewiston! Not Mrs. Clark Symons!" (202). Anne's own ability and desire to work is dismissed by her mother-in-law as only a backup for a woman who cannot fulfill their feminine duties of motherhood and by her mother as something that she could not do on her own. These dismissals bring the idea that women cannot or should not be scientists to bear on Anne in a significant way. Eventually, in the midst of her struggles to maintain control of her work and to assert her autonomy in her marriage, Anne begins to understand her mother and why she, as a housewife, has always been suspicious of Anne's education and ambition. She realizes that, in her mother's mind, "[i]f Anne succeeded, it meant her mother had failed. At life. At everything. As if the two life styles were so incompatible that the one had to exclude the other" (229). Anne's mother has internalized this logic, but Anne is fighting it.

Anne's husband Clark contributes to this devaluation as well. He loves her, but he treats her in ways that undermine her confidence and put her in her place. The car crash in which she was injured was not, strictly speaking, his fault, but when the crash happened, "Clark had been driving. Clark always drove. Having her drive made him feel superfluous" (30). Had she been driving, things may have turned out differently, perhaps she would not have been injured, but, injury or not, the idea that he must drive the car and that he must be in control is symptomatic of the rest of their relationship. This same attitude is present in their sexual relationship. Early in the book, Clark says to Anne, "You don't know how to scowl, and you don't look mad, and you aren't anyone's

stereotypical genius. What you look like is a damn sexy blonde in a pretty frilly thing, and if I don't rape you outright in the next few weeks, I'll be a candidate for sainthood" (8). This statement both dismisses her as a serious scientist and points to bigger problems to come for Anne and Clark.

The most significant instance in her personal life of this dismissal of her personal autonomy and her loss of control occurs when Clark rapes her:

"Once," Anne said, looking straight ahead, "we were making love and it was one of the good nights at the beginning, and then something happened, and later you said we had never been so out of rhythm. Do you remember?" Her voice was toneless, dead. She didn't wait for his reply. "I know what happened. It was a year or so ago. I had my legs almost flat, and you were on me and it was building, building, to a slow beautiful climax. And you suddenly decided I would perform better with my legs up, and I resisted, not long, not hard, but I rebelled, and everything went away. It had to be your way. You always know what will be best for me, don't you, and I have to do it that way. If my legs ache, or I get a cramp in my thigh, or whatever, it has to be your way. For my sake, of course. . . . I took it for granted we were equals in all ways. At work, here around the apartment. All ways. But I was kidding myself. All I have to do is say something. Tonight I said something and you went on anyway. Always your way. You know best. If there's something we do that you don't like, don't enjoy, it's simple, you just don't initiate that again, and if I start to, you ignore me. It has to be your way. If there's something I don't like, all I have to do is tell you,

plead with you not to do it again, try to explain why, how I feel, explain I'm not rejecting you, but only a small act. And you'll stop, won't you? Just like you stopped tonight!" (143).

Anne is beginning to see in her personal life the same logic that Deena has pointed out in her professional life. Although she thinks she is in control of her life and has choices, those around her do not behave as if this is the case. As a woman, she is subject to others' desires and demands. Clark does attempt to defend himself against her accusation of marital rape, saying, "Anne, [the doctor] said you were ready! I wouldn't have touched you if I hadn't known that!" (147). This defense is weak, however, as Anne insists upon her right to decide such things herself: "'It wasn't his decision to make,' she said distantly. 'It wasn't yours, either.' She looked at the window again. 'You raped me. No amount of talk will change that. Go on to bed. Leave me alone'" (147). As Anne states, this choice is not up to the doctor or her husband.

Anne and Clark's relationship embodies Londa Schiebinger's statement that "[p]erhaps the worst thing a professional woman can do is marry a professional man" (*Has Feminism Changed Science?* 92). Schiebinger does not of course mean that professional men are rapists but that meeting the expectations of a professional man's wife leaves little time or energy for that wife to advance herself. Furthermore, this indicates that, as the restrictions on female teachers marrying and the demand for male teachers to marry that were in place decades before, the expectation is that the man's needs will trump those of the woman. Marital rape is just one way that this privileging of one partner's needs over the other's can occur. Anne articulates this realization by

saying,

It always came to this. . . . She was a woman, she belonged to him to be used or not, and all the rest of it was a sham. Just so long as their desires coincided she had been allowed to believe she was free, and she had believed wholly, harboring no doubt whatever. This is what happened. This is why women suddenly began to break up the crockery, smash up the house, this realization hits each and every one of them eventually, and while they might not articulate it, or think it through as she had been doing, the knowledge lay like a lump in their hearts. Or their wombs. (148)

The Clewiston Test, by clearly showing the interconnection of sexism in Anne's personal and professional lives, brings home the significance of the gender bias in science, making it impossible to dismiss it as incidental, natural, or acceptable. Stealing women's work and bullying them becomes ethically equivalent to Anne's rape at the hands of her husband.

Although *The Clewiston Test* focuses primarily on the negative aspects of women in science, there is a glimmer of hope at the end. After being raped and having her work taken from her, Anne leaves Clark and has herself admitted to a private psychiatric hospital to protect herself from the corporation's attempts to have her committed so that they can discredit her, remove her from the project, and use her as a test subject. As her friend Gus delivers her to the hospital, he watches her walk away and thinks,

in six weeks . . . he'd come back and take her away from here, back to the world. Eventually she'd go back to work, down at the bottom of the heap now. Maybe in

ten years, or fifteen, or maybe never, they'd have answers, prove her right or wrong, and until then . . . No husband, a dream turned into a nightmare, and still, he thought watching her halting walk, still, he'd say to her, "You've won, Anne. You've won." And they'd both know it was true.

She had reached the trees now. She didn't look back at him, didn't pause, and she turned the corner and vanished behind the mist-softened trees already swollen with the promise of spring. (244)

This promise of spring and the promise that she could win in some sense, protecting her work and her body from their invasive tests, is hopeful, but at a huge cost. Even though Anne is able, ultimately, to gain some measure of control over her life, her treatment throughout the book speaks volumes about the status of women in society and science.

Cathy Hinga Haustein's "Earth and Sky Words" (1990) provides another look at the challenges faced by women in science. In this story as well, although the central character is a scientist, she is never seen actually engaging in scientific work. The science is in the background of her life, wished for, but not engaged in within the story. The narrator is a scientist, wife, and mother who is struggling with the tension between these roles and with her lack of recognition: "I think to myself, 'Here's the famous scientist, re-doing her wash.' But I'm not a famous scientist, just one that's barely hanging on, like laundry on the line in a stiff prairie wind" (13). She believes that if she can gain recognition for her work things will be different. She says, "Then I will feel my world turning, overcoming inertia, and throwing off dust like the old centrifuge in the basement of the Vermeer Science Center, where I work. Then I will truly be a scientist"

(14). As it is, she feels like a failure as a scientist and she also feels like a failure as a wife and mother:

My frustrations come to a head at Lola Klompenberg's house in the north part of town. She lives in one of those new places made to look older with a big porch, a turret, and barnboard siding. Hers is the type of house with scented soap in the bathroom and old-fashioned prints from Yield House in the den. There's no radon in her basement and her dishes are always done. Mine sit in my sinks, my kitchen sink and my lab sink. My hands are always chapped while hers are smooth with red nails. (15)

Compared to Lola Klompenberg and the other mothers she meets there, she seems to be an inferior wife and mother. Her home isn't as nice, her sinks aren't as clean, and she isn't as well-manicured. In the face of these superficial differences, she wants to claim her value as a scientist, but if that value is not recognized by the other women, is it really worth as much? She says, "I always wonder who is richer, me with my four degrees or Carol with her four kids. I decide that Anna Kay [her daughter] tips the balance" (16). But she does not make such claims in public: "When it's my turn to introduce myself, I look at Donna, newly freed from prestigious employment, and I don't reveal that I'm a scientist and I feel modest with only one small daughter and when I get home I rush to her, warm and sleepy in her bed, and I cry into her hair, 'I'm sorry, I'm sorry'" (16).

This story, like *The Clewiston Test*, reveals the power of conflicting narratives about women's roles and abilities. However, while in *The Clewiston Test* these narratives are explicitly invoked by husbands, coworkers, mothers-in-law, and mothers,

in “Earth and Sky Words” no one needs to articulate them for them to be present and powerful. Anne Clewiston is controlled and raped by her scientist husband, but “Earth and Sky Words” describes more subtle difficulties. For instance, the narrator meets another woman, a former marine biologist, who says that she stopped being a marine biologist because “I met my husband. That’s the downfall of all women scientists, isn’t it?” (17). She says she’s happy, but she also says, “Once I found myself standing in front of the aquarium at Cozy World Pet Shop giving a lecture on marine invertebrates to passers-by” (17). It is therefore not just marrying a professional man or an abusive man that derails female scientists’ careers; marrying anyone and becoming a wife (and potential mother) can do so. This comes through clearly because the men in “Earth and Sky Words” are not shown to be abusive; in fact, they’re barely present at all. This is a very different absence than that described in Marissa Lingen’s “The Grandmother-Granddaughter Conspiracy,” however, in which the absence of men reveals the strength of the women and their bonds. Here the absence of men reveals instead the power of internalized cultural judgment, the power of the narratives of the bad mother and the inadequate scientist. No one needs to state these concerns aloud, as is done in *The Clewiston Test*, for Haustein’s narrator or the former marine biologist to feel them and react to them. The narrator struggles internally with the idea that “[a]nother baby with a warm head will be left behind as I run the scientific race. And I don’t really think that the National Science Foundation or even the Sara Lee Foundation will be interested in my dilemma. It seems that there is no place for a simple scientist interested in raising a family and learning the truth about glow-in-the-dark molecules” (17). And she tells her

neighbor,

You know, I think I should quite my job. Anna Kay needs me and I need her. I want to have another baby and rock it for hours. It's just too hard being a research scientist with my head in the clouds. I want to be like most women who have gone before me, a wife and a mother. Besides, I'd still be a scientist, like I always have wanted to be. I'd just be in well, remission. (18)

For the narrator, her scientific interest and ambition is a disease that prevents her from being normal.

Although the story primarily focuses on the dilemma the narrator finds herself in, the seemingly irreconcilable conflict between her wife and mother self and her scientist self, the final section of the story looks ahead to a possible solution. As she reads a book to her young daughter called *500 Words to Grow On*, they examine earth words ("tree, barn, house, daisies") and sky words ("balloon, airplane, cloud, rainbow") (21). Her daughter asserts that though these categories are separate, their beauty comes in their attempts to reach each other:

"But doesn't a rainbow touch the ground, Mommy?"

"No, it never touches the ground."

"Well, it tries and that's what makes it so pretty." (21)

The same applies to the narrator's separate states of being. They are not yet able to meet, but perhaps there is the possibility of a bridge. She acknowledges this possibility when she tells her daughter, "I'm a scientist, you know, but I love you" (21). It is not one or the other – love or science, family or professional success; however, as the "but" in her

statement indicates, there remains some uneasiness about the coexistence of these roles. Despite this, the innocent statement from her daughter gives her hope and empowers her to continue both as a scientist and a mother: “[t]he potentially famous scientist manages to hang on for a little longer” (22). With this hope in hand, instead of seeing her obscurity and her failure, she sees her potential. And as she goes to bed and holds her sleeping husband’s hand, she is herself “completing a bridge from Earth to Sky” (22).

These two texts illustrate the way that the leaky pipeline functions to remove women scientists from the field. It is not just about explicit discrimination, although that certainly plays a role, but also about internalized sexism and limitations. Women are told that they cannot succeed, that they should be at home being good wives and mothers, and eventually they begin to believe it, as the narrator of “Earth and Sky Words” does. By showing the process through which women are removed or remove themselves from the sciences, Wilhelm and Haustein make it easier for readers to understand what feminist science studies scholars describe and document.

Joanna Russ further illustrates the depth of the problem in “The Talking-About-It Story,” a brief narrative in “The Clichés from Outer Space.” The narrative is worth quoting in full:

“Oh my, how I do love to live in an equal society,” said Irving the physicist, looking about with pride at the living room of their conapt, which Adrienne, his wife, had decorated the interior of with her brilliantly intuitive flair for interior decoration. Adrienne had been a plant geneticist, but had decided that what she really wanted was to stay at home, have eight children, interior-decorate, garden,

cook organically, grow herbs in the windowsill (it did seem to be rotting the wood a little), and go barefoot. She was very close to the earth. There was nothing feminine about that; it just happened to be that way. It was her decision so Irving respected it.

“Yes, wouldn’t it have been awful to have lived in the old unequal society?” said Adrienne. She went into the kitchen to see how the alfalfa soufflé was getting on.

“Yes, living in a sexually egalitarian society is absolutely the best thing there is,” said Joyce, the laser technologist who was taking twenty years off from her career to raise four children because that was what she really and truly wanted to do. “Just imagine how horrible things must have been in the old days!”

Her husband, George, an IBM executive, who made six billion new dollars a year, smiled fondly at Joyce. “Yes,” he said, “now that men and women are equal, things are so much better. I hate to think of what they used to be like!” He loved and respected Joyce and had built her a little workshop in the basement where she could practice laser technology in her spare time. (106-7)

With this Russ reinforces the argument that Wilhelm makes in this passage: “[Anne] thought about freedom, not as abstraction, but her own freedom. Hollow word. That was how they fooled you. Pretending you were free to choose anything, everything, and you weren’t” (156). As long as it is believed that freedom of choice exists, that these pressures – internal and external – do not shape the directions of women’s lives, the problem of the leaky pipeline will remain. It is important that we not lose sight of

ongoing sexism even as we work to envision and create a more equal future in reality and fiction. So much has changed since Marie Curie that it is sometimes tempting to think that we do live in a sexually egalitarian society but, as Russ's story illustrates, calling it equal does not make it so.

3.5 Conclusion: Future Dreams and the Mundane

It is telling that Wilhelm's *The Clewiston Test* and Haustein's "Earth and Sky Words" are less speculative and more contemporary in nature than are the works by McCaffrey, Kagan, Kress, and Lingen. In fact, "Earth and Sky Words," despite having been published in a collection of fantasy and science fiction, does not even seem to be science fiction at all by some readers' standards. There is no space travel, no scientific breakthrough, no aliens, no future society; instead there is only a woman struggling with the constraints of the roles she has been given. Wilhelm and Haustein write a kind of science fiction that illustrate Nancy McHugh's discussion of changes in science fiction's focus:

As science and technology information become a more and more common part of our daily lives (think of how many times in the past year we have had front-page news on cloning or other genetic technologies) the purview of science fiction moves to the science of everyday life and everyday worries. (44)

Their emphasis on contemporary life and the science and technology relevant to that contemporary life (pain management in Wilhelm and the potential for chemical and environmental poisoning in Haustein) is itself quite similar to Geoff Ryman's concept of

mundane SF, which emphasizes “avoiding old tropes and sticking more closely to what science calls facts.” He says, “We believe that for most of us, the future is here on Earth.” Ritch Calvin’s overview of mundane SF describes it this way:

many of the familiar tropes, techniques, and technologies of science fiction are unrealistic, and therefore, should be avoided. The mundanes hold that faster-than-light travel, hospitable planets, intelligent aliens, interstellar trade, communication with alien species, and alternate universes all remain too far-fetched, too unrealistic to be of interest. Furthermore, the belief in, advocacy of, and employment of these devices lead us to turn away from—to escape from—the importance and immediacy of crises here on planet Earth. (13)

Approaching SF in this way matters, particularly in terms of the ethics of narrative and of science, because, as Julian Todd has argued, “If we keep telling ourselves that faster-than-light travel will whisk us to scores of new Earths, then we’d feel better about burning through this one” (Ryman). Similarly, if we keep telling ourselves stories about future worlds in which gender is no longer an issue, there is the risk that we will become more complacent about the sexism we currently live with.

On the other hand, Ryman argues, “Literature destroys innocence. It deprives people of childhood. It shows them the world as the writer honestly sees it. If it does show the reader something new, they have lost their innocence about it, and are now responsible for it.” Wilhelm and Haustein show the world as they see it; they make the reader responsible for what they have shown. Here, the science is taken seriously and so are the challenges that women face in becoming scientists, not just external challenges

like gender bias but internalized ones like guilt and fear. The speculation in this story is ultimately internal as well; there is no invented science or far future world to deal with here but simply a hope that the gap between scientist and woman can be bridged. These texts, then, show the reality of women doing science in the present while also making clear the fact that as of yet gender equality in the sciences must be speculative, must be set in the future, alongside planetary exploration, alien species, and artificial intelligence. For now, criticism is still necessary and, as Geoff Ryman argues, “There is room in the SF dream for growing up, accepting the mundane,” which is what these tales of discrimination and sexism do.

But it is not only Wilhelm and Haustein who accept the mundane. Although the texts by McCaffrey, Kagan, Kress, and Lingen do incorporate some of the details that Ryman and the supporters of mundane SF condemn, they also “show the reader something new” that they must then take responsibility for; they show the reader that everyday life and science are not so far apart, that women can be mothers, wives, and scientists all at once, and that “[a] real future will have an everyday life and a home just as domestic as the one the dream needs to leave” (Ryman). The protagonist of *Mirabile* brings her work home for storytelling and communal time with family and friends; in “Computer Virus,” Cassie not only does her work in the crisis to save her family, but the fact that she has a lab at home indicates that home and domesticity are important to her and are not completely separate from her work; and in “The Grandmother-Granddaughter Conspiracy,” not only is that work done at home but it is done with family.

Through writing stories of women doing science – whether successfully or not,

whether set in the near future or a far-flung future – women writers of SF challenge stereotypes about women doing science and provide new narratives for girls and women to either use as models or warnings. They show that “[a]lthough they have been historically associated, rationality is not inherently a masculine or white enterprise. Rationality, then, isn’t the master’s tool and feminist scientists are not engaged in a naïve attempt to use the master’s tools to dismantle the master’s house” (McCaughey 75). Indeed, as Haraway argues, “Cyborg writing is about the power to survive, not on the basis of original innocence, but on the basis of seizing the tools to mark the world that marked them as others. The tools are often stories, retold stories, versions that reverse and displace the hierarchical dualisms of naturalized identities” (“Manifesto” 33). Science fiction is a tool that can either contribute to further marginalizing women by reinforcing narratives that show women to be incapable of doing science or completely irrelevant to science or that can be used to reverse these trends. The texts discussed here seize this tool and use it to tell new stories and to undermine and complicate the old ones. In doing so, these writers have (and give to others)

the freedom to imagine beyond the confines of contemporary social life and the restrictions of contemporary politics, and, like Mary Shelley, to dream a world into existence: a world structured by the possibilities of scientific theory but informed, necessarily, by the politics of gender. (Shaw 178)

Science fiction that shows women doing science is, in our culture, science fiction that is “informed by the politics of gender” and it may either reflect the problems in our world today or help readers “dream a world into existence” in which those problems no longer

exist.

Dreaming this world into existence is a significant element in changing the place of women in the sciences. One study has found that the gender gap in math is related to the level of gender equality in the society. In more equal societies, the abilities of girls and boys to succeed in math (and perhaps in other science and engineering fields as well) is much more equitable (Guiso, et al). This is surely related not only to civil rights legislation but also to the diminished levels of gender stereotypes in these societies. In societies where gender stereotypes prevail, however, many girls and women suffer the effects of stereotype threat:

individuals are said to experience stereotype threat during performance situations in which negative stereotypes about their in-group are made salient, which creates a concern that a poor performance on the test might confirm the negative stereotype about their group. This threat is thought to inhibit individuals' ability to perform up to their potential, perhaps by reducing their cognitive capacity to work on complex tasks. (Schmader, Johns, and Barquissau 838)

In a setting where these stereotypes are not brought to bear (whether explicitly or implicitly), instead of choosing to “disidentify” with math as an important domain, that is, avoid or drop the domain as an identity or basis of self-esteem—all to avoid the evaluative threat they might feel in that domain” (Spencer, Steele, and Quinn 6), girls and women perform better and are more likely to continue in math and science fields.

Therefore, if changing the stories we tell about gender and science help change the culture, then they may also be directly tied to how well girls can do in math and

science. As Londa Schiebinger writes,

Science departments cannot solve the problems themselves because the problems are also deeply cultural. But that does not let them off the hook. Change will have to happen simultaneously in many areas, including conceptions of knowledge and research priorities, domestic relations, attitudes in preschools and schools, structures at universities, practices in classrooms, the relationship between home life and the professions, and the relationship between our culture and others. (*Has Feminism Changed Science?* 195)

Science fiction addresses those deeply cultural problems at the root – or one of their many roots. Hand in hand with reforms from within science departments, science studies critiques of the goals of science, educational reforms, and feminist challenges to gendered popular culture and mass media, science fiction can help solve these problems.

Even as it does so, however, there remain major concerns about the roles of women in science and of science itself in determining and reinforcing gender roles. Evelyn Fox Keller writes,

The pessimistic reading is that the breach which separates women from science is very deep, and its mending might require more of a change in social arrangements than many people would accept. It would seem particularly unhelpful to the extent that the burden of change is seen as falling entirely on women. Of course, that is not to say that, in a liberal climate, we won't see more women scientists than we have in the past but it does suggest: a) that they would remain a minority, and b) that they would tend to be self-selected by the same mechanism that I

argue has in the past helped select male scientists. In that way, women in science could reproduce the two-culture split we are already so familiar with, possibly even a sharpened version of that split. (“Women, Science, and Popular Mythology” 138)

It is possible, therefore, that simply representing women as part of the scientific establishment does not go far enough in changing the system and that this effort alone will do little more than bring in more women scientists but only of a particular sort, as radical feminists have argued. Given the serious problems associated with their rejection of science, however, it is clear that a more complex solution is required than either rejection or uncomplicated embrace of science.

In these texts, feminist SF enacts feminist science studies first by countering the masculinization of science through representations of strong and capable female scientists and second by critiquing science-as-usual through dramatizations of the ways in which female scientists can be overlooked, used, or disempowered. Another of the recurring questions within feminist science studies, however, is not addressed here. Feminist science studies also asks what it means for women, as opposed to men, to do science. The next chapters will inquire after the feminist values that women may bring to the sciences as well as interrogating the distinctions between including women and including feminism in science.

CHAPTER 4

ANYTHING MEN CAN DO: REVERSALS OF SCIENTIFIC POWER

Women cannot write—using the old myths. But using new ones--?
—Joanna Russ, “What Can a Heroine Do? Or Why Women Can’t Write”

We all like to invent worlds that are better than this one, better for lovers, better for mothers.
—Sheri S. Tepper, *The Gate to Women’s Country*

Through remodeling that which is *not*, we watch the “not-yet” taking shape, what could be, might be, even what some say ought to be.
—Frances Bartkowski, *Feminist Utopias*

Pick your issues—there’s no dearth—and let your anger burn against them and motivate you to take whatever steps you can to improve matters.

Only in Paradise is there no anger; and I don’t believe in Paradise.
—Suzy McKee Charnas, interview with Bill Clemente

4.1 Addressing Sexist Science

While some discussions of gender and science focus on imbalances in the political structure of scientific fields and on simply increasing the numbers of women doing science, others examine more deeply rooted biases and their effects. Bonnie Spanier’s *Im/Partial Science: Gender Ideology in Molecular Biology* examines one way that biases prevent science from being truly inclusive. She notes that, for the women who enter and remain in the sciences, there is bias in the very language used to do science that affects who engages in science as well as what science is done. Spanier shows the ways in which gender ideologies are deeply embedded in science itself, arguing that this

genderization of nongendered elements of science often creates a hostile environment for women and that any attempts to bring women into science must go beyond representations of women doing science or equitable policies within the sciences. She states,

Efforts to make a welcome place in science for previously excluded or unwelcomed groups must identify and remove structural barriers, yet such efforts must move further to recognize and address the more subtle psychological and ethical roadblocks related to beliefs embedded, but usually denied or ignored, in the sciences. (8)

In other words, getting girls into science classes, eliminating overt discrimination in the educational system and the workplace, and providing systematic and equal support to women and men as they move through the ranks—as important as all of these things are—will still not be enough if science itself is used in ways that are “directed toward military concerns, toward control over Third World resources and people, and toward consumerism,” “that may benefit only a few already privileged people and harm the already disadvantaged” (9), or that rely on gendered and sexist metaphors. Spanier writes,

When scientists look to nature, they often bring with them their sociopolitical beliefs about what is natural. This self-reinforcing and internally consistent process creates, reflects, and reinscribes unquestioned assumptions about our world. Stereotypic attributes and behaviors, such as aggressive hunting and fighting versus passive coyness, are superimposed onto animals, often through culturally distorted language. Calling several females with a single male a

“harem” conjures up quite a different power relationship from what is now called the “matriarchal” organization of elephants. (20)

These judgments of femininity and gender roles subtly reinforce the unequal power relationships in the lab and in so doing so may affect women’s performances.

There are a great many striking examples of gendered metaphors being applied to objects or processes that are not inherently gendered. One such is found in biologists’ discussion of “housekeeping genes”:

While most scientists no longer use terms such as “master” and “slave” to describe DNA's position of power, they have dubbed the genes that code for enzymes running the cell's metabolism “housekeeping genes.” This term clearly implies a routinized and less significant kind of gene, its value analogous to that of women's wifely and motherly roles, which are not credited in the nation's economy or deserving of compensation in social security benefits, higher education, or hiring preference (as armed forces veterans receive). Maintenance is less important, and scientists use the gendered metaphor “housekeeping” to capture that status. (87-8)

This metaphor is clearly biased and certainly unnecessary for understanding the scientific concept and, as such, may contribute to stereotype threat.

As discussed in the previous chapter, narratives of women capably doing science may counter stereotype threat to some degree, helping to lessen the cultural weight of stereotypes that say women are less able to do science/math/engineering than men, but these narratives alone do not eliminate stereotype threat when science itself still relies

upon gender differences and stereotypes. Ultimately, some of the best ways to alleviate stereotype threat have to do with what happens in the classroom or learning environment itself, such as making women feel comfortable and affirming their values. But sexist and gendered language cannot achieve this goal and indeed actively works against it, thereby further amplifying the negative impact of stereotype threat. Furthermore, recent research has shown that stereotype threat has the greatest effect on individuals who are “highly identified with the task (Steele & Aronson, 1995)” (Good, Woodzicka, and Wingfield 137), such as students majoring in scientific fields and professional scientists, which means that the impact of these gendered metaphors could be even greater at this point. What this reveals is that even if there are powerful narratives of women doing science that help draw women into the sciences, if women are made to feel inferior (even indirectly) once there, the dangers of stereotype threat remain.

Even worse than the simply unnecessary gendered metaphors described above, however, there are scientific metaphors that are biased, unnecessary, and also inaccurate:

Sociobiologists have taken the larger size of the egg to support the notion that females have a greater “parental investment” in their offspring (ignoring the total volume of sperm involved in reproduction), thus determining from “biology” that females are and ought to be the natural caretakers of progeny. Thus, an actual *difference* in size that would, if reversed, be used to justify the natural superiority of the larger gender, instead brings to the designated lesser gender a “natural” responsibility for full-time care of children. (Spanier 62)

Emily Martin’s analysis of the narratives we tell about the process of impregnation and

the relationship between egg and sperm further illustrates this point. She writes of how, “[b]y extolling the female cycle as a productive enterprise, menstruation must necessarily be viewed as a failure” (486) and even a waste (488), whereas the processes involved with sperm maturation are described as “remarkable,” “amazing,” and as a “feat” of production (486-7). From the beginning of the discussion, then, processes of production in male and female bodies are valued incredibly differently. Gendered conceptions of masculinity and femininity go beyond these divergent values, however:

It is remarkable how “femininely” the egg behaves and how “masculinely” the sperm. The egg is seen as large and passive. It does not *move* or *journey*, but passively “is transported,” “is swept,” or even “drifts” along the fallopian tube. In utter contrast, sperm are small, “streamlined,” and invariably active. They “deliver” their genes to the egg, “activate the developmental program of the egg,” and have a “velocity” that is often remarked upon. Their tails are “strong” and efficiently powered. Together with the forces of ejaculation, they can “propel the semen into the deepest recesses of the vagina.” For this they need “energy,” “fuel,” so that with a “whiplashlike motion and strong lurches” they can “burrow through the egg coat” and “penetrate” it. (489)

The egg awaits “her mate’s magic kiss, which instill the spirit that brings her to life” (qtd. 490) while sperm have a “mission,” a “quest,” and “carry out a ‘perilous journey’ into the ‘warm darkness’” (490). Sperm are described as assaulting the egg, which is a “prize” to be captured and rescued. As Martin writes, “the wording stresses the fragility and dependency of the egg, even though the same text acknowledges elsewhere that sperm

also live for only a few hours” (490). What is most striking about Martin’s research, however, is not that this narrative exists at all, but that it *continues* to exist. Recent research has shown that this narrative is not simply misleading but wrong. The egg is far more active and the sperm far weaker than these metaphors reveal, meaning that the narratives are sexist and scientifically unsound, but they are unfortunately extremely difficult to remove. When counternarratives surface that give the egg a more active role, Martin writes, they often do so “at the cost of appearing disturbingly aggressive” (498), simply reinforcing a different set of stereotypes: “New data did not lead scientists to eliminate gender stereotypes in their descriptions of egg and sperm. Instead, scientists simply began to describe egg and sperm in different, but no less damaging, terms” (498-99).

This ongoing mismatch between actuality and rhetoric highlights how easily we take these gendered narratives for granted, perceiving them as natural, and, more significantly, it is one reason *why* we continue to take these narratives for granted and see them as natural. When the internal workings of the reproductive process are cast in such strikingly gendered terms *even despite* the evidence to the contrary, it is easy to see how this narrative both follows from and leads to the stories we tell about men and women in everyday life. Martin writes,

the imagery keeps alive some of the hoariest old stereotypes about weak damsels in distress and their strong male rescuers. That these stereotypes are now being written at the level of the *cell* constitutes a powerful move to make them so natural as to be beyond alteration. (500)

It is a vicious cycle of sexist imagery that becomes more and more difficult to end as the images are repeated.

These analyses indicate that these are significant problems within scientific practices and culture that are more insidious and perhaps more difficult to shift than obvious, external problems (e.g. societal biases and overt discrimination). The habits of language described in these studies are deeply embedded in scientific practices and in cultural assumptions about gender; therefore, changing the metaphors with which science is discussed means changing the way scientists think about the world. Martin writes, “[e]xposed in such a light, I hope they [gender stereotypes in science] will lose much of their power to harm us” (486). She continues, saying,

One clear feminist challenge is the wake up sleeping metaphors in science. . . .

Although the literary convention is to call such metaphors “dead,” they are not so much dead as sleeping, hidden within the scientific content of texts—and all the more powerful for it. Waking up such metaphors, by becoming aware of when we are projecting cultural imagery onto what we study, will improve our ability to investigate and understand nature. Waking up such metaphors, by becoming aware of their implications, will rob them of their power to naturalize our social conventions about gender. (501)

Part of a feminist intervention in the sciences, then, must involve critique of the narratives and metaphors we already rely upon. Waking up such metaphors will make science a friendlier place for women and feminism.

However, Martin argues that metaphors cannot and should not be scrubbed from

scientific discourse:

Even if they could be, [Martin] doesn't think that antiseptically neutral language would be desirable. Metaphor is, after all, a powerful vehicle for creative thinking. The goal shouldn't be to clean the imagery out, she says, but to be aware that it's there. It also helps, she adds, to be able to take a joke. Humor takes away the sting, she says, along with the potential for inculcating harmful ideas.

(Freedman)

If we cannot (and perhaps do not wish to) remove metaphor completely from our discussions of science, then, reminiscent of Haraway's call for "pleasure in the confusion of boundaries and for responsibility in their construction" ("Manifesto" 8), we must be not only mindful of the metaphors we do use but responsible for the metaphors we create.

As part of the project of reimagining the sciences as more inclusive of women, one set of narratives within feminist SF looks beyond the gaining of shared power in the sciences, and represents science as women's territory. Writers such as Joanna Russ, Sheri S. Tepper, and Pamela Sargent represent the possibility of women directing science themselves and ask not just whether women can do science but even whether women might not do it differently – or better. Would a women's science be less sexist or more egalitarian? Would bringing more women into science affect the kinds of science that are done? Might a separate women's science provide more opportunities for women, eliminate discrimination based on gender, and foster the creation of new metaphors?

Frances Bartkowski writes that "[t]he feminist utopian novel is a place where theories of power can be addressed through the construction of narratives that test and

stretch the boundaries of power in its operational details” (5). Such narratives include gender role reversals as a way to “test and stretch the boundaries of power in its operational details”; therefore, separatist feminist texts in which women are in positions of power, able to control both scientific knowledge and the means of production, help develop a response to sexist science by reversing the gendered terms of science in our current culture, providing a critique of present methods, narratives, and metaphors, and presenting alternatives to those methods, narratives, and metaphors. Much like Haraway’s cyborg writing, feminist SF representations of women running science are about the power to survive, not on the basis of original innocence, but on the basis of seizing the tools to mark the world that marked them as other. The tools are often stories, retold stories, versions that reverse and displace the hierarchical dualisms of naturalized identities. In retelling origin stories, cyborg authors subvert the central myths of origin of Western culture. (“Manifesto” 33)

In this chapter, I will examine how effectively feminist separatist texts are able to subvert these myths and challenge the prevailing gendered narratives about science by changing the power structures within which women do science.

4.2 Joanna Russ’s *Whileaway*: Science in the All-Female Utopia

One way to achieve these role reversals is simply to remove men altogether and allow women to “seize control of science and technology to actively create new and distinctly nonsuburban, nonpatriarchal societies” (Yaszek 203). Joanna Russ’s *The Female Man* provides one vision of a single-sex utopia in *Whileaway*, a space without

men where women can create for themselves a better – or at least nonsexist and nonpatriarchal – world. *Whileaway* represents a possible future in which the men have all died out and women live on without them through advances in reproductive science. In this future, women love and marry one another, have children, have careers, and do not face the limitations of gender roles. Suzy Mckee Charnas writes,

With the spectrum of human behavior in my story [*Motherlines*] no longer split into male roles (everything active, intelligent, brave and muscular) and female (everything passive, intuitive, shrinking and soft), my emerging women had access to the entire range of human behavior. They acted new roles appropriate to social relationships among a society of equals which allowed them to behave simply as human beings. (qtd. in Fitting, “For Men Only” 108)

Similarly, the women of *Whileaway* have “access to the entire range of human behavior” and are able to “behave simply as human beings” rather than as women, a limited subset of human beings. As a result of this freedom, their science is also fuller and unlimited by gender roles.

This freedom to be fully human is made possible by the absence of men, which Peter Fitting argues “functions not as a call for a world without men, but as a metaphor for the elimination of male values” (“For Men Only” 102). Fitting further argues that the description of a future without men is a more effective way of urging the reader to realize that the construction of a better society can only be accomplished through the complete elimination of patriarchy. It is not men who have been excluded from these visions of an alternate human future, but male values and

male roles. (“For Men Only” 103)

This utopian vision of women doing science (and everything else) is easily read as providing a vision of positive alternatives for women, similar to the effects of the texts discussed in the previous chapter.¹²

The presentation of men and masculinity as negative but technology as useful and ungendered provides a striking contrast to Gearhart’s utopian world in which men may potentially be salvaged (if they are gay and nonviolent, at least) but science and technology cannot be. In this way, Russ avoids the essentialism of Gearhart’s rejection of science. As Fitting writes, “In the single-sex utopias of Charnas, Russ, and Sheldon, the building of a world without domination and exploitation involves the rejection of gender—of any predetermined limits on a person’s activities according to biological sex” (“For Men Only” 105). Without these limits, it is only reasonable that women should engage in science, master technology, fight duels, and also mother children. As Susana S. Martins notes,

¹² However, as Peter Fitting argues, this new approach can have distinctive effects on male readers, too, effects that counter Richard Geis’s vivid response to *The Female Man*: “Pardon me, but your vagina just bit my penis” (qtd. in Fitting, “For Men Only” 110). Fitting writes, instead,

Wanderground includes men who are portrayed positively. This leads the male reader to identify with those positive male characters who are nonetheless excluded from the utopian societies. A novel in which there are no men, on the other hand, or only men who are portrayed negatively, forces the male reader to make one of several choices: either to reject the novel outright . . . or, as I shall try and show, to read somehow beyond gender. (Fitting, “For Men Only” 104)

Although my focus has been more on the effects feminist SF texts might have on women readers, Fitting’s argument is an important reminder that it is not women alone who read and are affected by these representations of women.

Gearhart's women do not need technology because their closeness to nature has released their natural (or supernatural) powers. In *The Female Man*, the women of Whileaway use technology to fully realize their potential; for instance, they have raised the population's overall intelligence through genetic engineering. Whileawayans do not shy away from tinkering with themselves or their offspring, nor do they fetishize ideas of the natural or the (narrowly-defined) human. They approach technology simply as a part of what they *do*. Demystified, familiarized, and democratized (everyone receives training in science and technical matters), technology is neither demonized nor deified—and this is a signal difference between Russ's utopia and *our* world. (405)

This is another indication that *The Female Man* presents technology, industry, and science as not inherently masculine themselves; by doing so, Russ creates a utopian world in which science is taken seriously by women and not simply written off as male territory.¹³ The utopian element, then, is not the literal lack of men but what the lack of men and masculinity makes possible: a world in which women are complete human beings, in control their own lives and social structures, and able to enter science and technology fields as a matter of course.

This is made clear from the very beginning of the novel. The opening passage about Janet Evason does not immediately reveal the importance of science and technology in Whileaway, but it does illustrate the ways in which other stereotypically

¹³ Charlotte Perkins Gilman's *Herland* and Ann E. Bradley Lane's *Mizora* also present much earlier visions of such utopian worlds – Gilman's botanists and Lane's chemists – but these texts are outside the historical scope of this project.

masculine roles are matter-of-factly taken up by Janet and by the other women of Whileaway:

When I was thirteen I stalked and killed a wolf, alone, on North Continent above the forty-eighth parallel, using only a rifle. I made a travois for the head and paws, then abandoned the head, and finally got home with one paw, proof enough (I thought). I've worked in the mines, on the radio network, on a milk farm, a vegetable farm, and for six weeks as a librarian after I broke my leg. (1)

Many of these activities would be considered men's work for Russ's readers, but Janet presents them all as equally ordinary for her. Furthermore, although her work does not include much of what we might see as scientific or technological work, science and technology are certainly present in Janet's Whileaway. There are mentions of technological development (e.g., machinery and "tripods of the computer beacons" (1)), and, interestingly, in "When It Changed," Russ makes it clear that there is a scientific and active explanation for the women's ability to procreate without men, as Janet notes "the difference between parthenogenesis (which is so easy that anyone can practice it) and what we do, which is the merging of ova" (530). Their continued survival is not, then, due to magic or authorial sleight of hand but due to their own scientific knowledge and advancement. Furthermore, Janet was sent back to the past by "experimenters at the Pole Station" (5), indicating an ongoing scientific endeavor by the women of Whileaway. This approach to science and technology begins in childhood; the children of Whileaway, when they are sent away to school, are cared for in small groups and get a practical education in "how to run machines, how to get along without machines, law,

transportation, physical theory, and so on. They learn gymnastics and mechanics. They learn practical medicine” (50). Science is not set apart as either better or worse than other careers; in *Whileaway*, there is no gendered value dichotomy to valorize science and so it is treated as equally important and equally ordinary as other activities.

The place of technology in *Whileaway* is also significant because *Whileaway* turns out to be incredibly advanced and pastoral at the same time. *Whileawayans* have developed “practical matter-antimatter reactors” (12); genetic surgery and the merging of ova; reinvention of species; colonies on Mars, Ganymede, and asteroids; techniques to make intelligence “a controllable, heritable factor” (13); and probability mechanics, which allowed teleportation to become a reality. At the same time, *Whileaway* is not urbanized and women still choose to engage in physical labor rather than inventing ways to avoid it. As Janet reflects, “*Whileaway* is so pastoral that at times one wonders whether the ultimate sophistication may not take us all back to a kind of pre-Paleolithic dawn age, a garden without any artifacts except for what we would call miracles” (14). This combination of the pastoral and the technological challenges associations between technology and violence and precludes a simple rejection of science, both of which are commonplace in many other feminist utopian texts, like Sally Miller Gearhart’s *The Wanderground*. However, Russ does not simply idealize technology as done by women, either, for “*Whileawayans* are not nearly as peaceful as they sound” (49). Russ, unlike Gearhart, is not willing to build her utopia on the premise that women are inherently peaceful and nurturing and feminine, and with this choice she further reinforces the argument for women as full human beings – complex, varied, not inherently holding to

any one philosophy or approach – rather than as representative of only one part of humanity.

Another significant element of Whileaway's utopian society made possible by the lack of men and masculinity is a nongendered method of acknowledging boundaries between people and defining societal roles. In Whileaway, boundaries are marked by age, not by gender. This is first seen in the transitions from childhood to adulthood: children learn from their mothers and community until they reach puberty, called Middle Dignity, at which point they are set free to travel the world; they travel until they reach Three-Quarters Dignity at the age of seventeen and must begin work, doing whatever is assigned to them to meet the needs of the world; at 22, they reach Full Dignity and can begin to make their own choices about what work they learn and continue to do (50-2). This eliminates gender bias throughout the culture and addresses one of the difficulties with eliminating gender bias and discrimination in contemporary science. As noted in the previous chapter, the timeline for marriage and motherhood often conflicts with the timeline for career development and advancement in the sciences; in Whileaway, however, all women are on the same timeline. They can make individual choices within it, but career specialization is not allowed until a certain age and motherhood happens within a certain age range for everyone. What's more, the time when women become mothers is seen as a time for them to explore their own interests and ideas rather than as an obstacle to career success. They need not choose between career and family. Family structure is significantly different as well, with women living in larger family groups in which work can be more easily shared rather than in small nuclear families in which one

person is expected to care for the others. Work is shared, not based on a sexual division of labor. Without the social inequities associated with childbirth and childrearing, many of the gender inequities in the sciences are removed, and both the commonplace use of and education about technology and the lack of gendered roles make possible a more positive relationship between women and science.

Whileawayans' easy inclusion of science into women's lives is even more striking when seen alongside the experiences and lives of Joanna and Jeannine, both of whom live in worlds closer to the reader's own. Joanna lives in a 1969 that appears to be identical to the world of Joanna Russ herself, while Jeannine lives in an alternate 1969 in which the post-war Depression has not ended and gender roles are even more firmly entrenched.

As Susana Martins writes,

The point of creating an all-female world, a world where gender categories cannot signify in the same way they do in our world, is (obviously) to produce an estrangement from the worlds of 1969 that Jeannine and Joanna inhabit, where assumptions about biological difference largely determine what women and men can and cannot do. (407)

One illustration of this estrangement arises when Janet attends a party and attempts to socialize with men and women of 1969. In Joanna's world, even a relatively enlightened man would feel free to say to Janet (and expect to be taken seriously), "most women are liberated right now. They like what they're doing. They do it because they like it. . . . You can't challenge men in their own fields. . . . [and] women have certain physical limitations" (43). These gender roles are so widespread in this culture as to seem natural

and inoffensive to many, but they are not natural and inoffensive to Janet. This same man attempts to stop Janet from leaving a party through physical force, again behaving as if he has every right to do so. After Janet says, “Let me go,” she and the narrator communicate silently about the (lack of) power women have in such a situation:

Say it loud. Someone will come to rescue you.

Can't I rescue myself?

No.

Why not? (45)

Of course, Janet *can* rescue herself; she has both the physical and psychological training to fight back because the women of Whileaway have indeed rescued themselves from these inequalities and from what Janet calls savagery. And Janet does rescue herself in this instance by knocking the man down, weathering his increasingly violent and vulgar insults, laughing at him, and finally slapping him and starting a fight that ends with his arm being broken. This is a direct and very literal response to his earlier statement that the inequality between men and women could be justified by their physical difference (as evidenced by the number of women raped every year). She undermines this justification for continued inequality through her strength and willingness to fight, both of which fail to fit neatly into his gender categories and serve as a concrete illustration of the strength women could wield if taught to see such strength as possible.

Janet's response reveals the falsity of contemporary ideas about women's physical strength and shows that it is not just physical strength that is required to fight back but psychological strength as well. Colette Dowling's concept of “the frailty myth” helps to

illustrate the significance of Janet's abilities. Dowling writes,

A hundred years ago, women were pushed backward in a very particular way. Just as they were beginning to demand education and political and economic power, they were stripped of the power of their bodies. Just as they began to get ideas about fighting for justice, they were required, with all the persuasion of a moral movement, to cultivate frailness. Nineteenth-century women were given to believe that weakness was their natural condition. It was a total gaslight job. (3)

This frailty myth "became the rope that restrained women from developing physically, restricted them to small half movements, isolated them in rooms hidden from the sun, and threatened them with the worst of all punishments should they refuse to comply: the loss of their capacity to bear children" (3). Dowling further refers to "a psychological stamina that comes from *physical self-esteem*" (xxiii), the idea being that as girls are trained to be strong and confident in their bodies, they grow into women who no longer believe that men are "*necessary* to women, not just for love and intimacy and friendship, but for their very survival" (xxv). This physical self-esteem is precisely what Janet has. Never subject to the frailty myth, she has grown to be both physically and psychologically strong and confident. She says what she thinks and does what she likes, confident in her right to do so and in her ability to defend herself. Joanna and Jeannine would not have been able to fight back like Janet did, not just because of their current physical state but, more fundamentally, because they have never believed that they could respond in this way, that they could rescue themselves, and so they have never learned how.

Although this physical confidence illustrated by Janet's fight does not itself

address science, the same logic of missed opportunities and women's potential for growth applies to science as applies to physical strength. As Dowling writes, girls "actually learn to hamper their movements, developing 'a body timidity that increases with age'" (56), "weaken themselves unnaturally" (57), and, in adolescence, "stop using their bodies and start using appearance for whatever power they're going to exert in the world" (57), but these learned behaviors can be modified and can be avoided in the future. Similarly, if associations between science and masculinity are not natural but taught, then the lessons girls learn about their intellectual power (as they learn to restrict their thoughts, develop mental timidity, and stop using their minds to gain power in the world) can be avoided in the future and girls can be raised to believe that they can succeed in the sciences. In fact, these two arenas may be even more directly related:

The independence women are achieving today is not independence *from* anything, it is the independence to *be*. To lift huge loads. To run for miles. To defend themselves, ourselves, whether against sexual discrimination or sexual aggression. This, it turns out, has been the missing link in women's emancipation. Physically they are now able to occupy their full stature, to stand tall, chest open, and face the world. (Dowling 224)

With this physical confidence in place, Janet has no trouble also building the psychological confidence to stand up for herself and to do what is best for her. In this presentation of Janet and her strength, Russ argues that women's place (or lack thereof) in science is not an isolated issue. It must be addressed in conjunction with broader social change, including physical change. Dowling writes, "Feminists have been actively

fighting this idea of women's 'natural' submissiveness for years without ever eradicating the belief. That's because the belief has been in our bodies as well as in our brains, and only now is the body part being addressed" (254). It seems that Russ would agree. Janet is not a scientist (in fact, she says that the reason she was chosen to travel through time was because she isn't very smart compared to the other Whileawayans and is thus expendable), but had she the talent, she could be, as opposed to the many girls and women now who have the talent but, thanks to cultural messages about weakness and femininity, not the strength to fight for that talent.

Laura, a twentieth century girl with whom Janet has a love affair, further represents the limitations of life for women in this world:

She [Laura] learned, wearing her rimless glasses, that the world is full of intelligent, attractive, talented women who manage to combine careers with their primary responsibilities as wives and mothers and whose husbands beat them. . . .
. *Everyone knows* that much as women want to be scientists and engineers, they want foremost to be womanly companions to men (what?) and caretakers of childhood; *everyone knows* that a large part of a woman's identity inheres in the style of her attractiveness. (60)

"Everyone knows" these things in Laura's world but not in Whileaway, where women *are* scientists and engineers, not "womanly companions to men." Laura recognizes that "you can't imbibe someone's success by fucking them" (65), and her frustration with this is directly contrasted with Janet's freedom and power. Janet could do all the things Laura could not and, even though romantic love and sex are certainly part of Whileawayan life,

it does not limit women in the way it does Laura, who says,

Boys don't like smart girls. Boys don't like aggressive girls. Unless they want to sit in the girls' laps, that is. I never met a man yet who wanted to make it with a female Genghis Khan. Either they try to dominate you, which is revolting, or they turn into babies. You might as well give up. (67)

In contrast to this, Janet and Whileaway as a whole represent a world in which women are neither infantilized nor punished or rejected for being strong. Janet, after all, is in a sexual relationship, does valuable work, and fights duels and none of this is seen as preventing her from being a good mother or partner.

Laura is not the only representation of women's limitations in contemporary society, however. Where Laura reveals the frustration many women feel at being unable to command their own fates and direct their own lives, Jeannine reveals the sadness of the women who are not even strong enough to object to this system and attempt to step outside it. As Joanna tells Jeaninne,

you'll never get a good job, . . . There aren't any now. And if there were, they'd never give them to a woman, let alone a grown-up baby like you. Do you think you could hold down a really good job, even if you could get one? They're all boring anyway, hard and boring. You don't want to be a dried-up old spinster at forty but that's what you will be if you go on like this. You're twenty-nine. You're getting old. (113-4)

Jeannine has been trained to be weak and helpless by her family and by the culture in which she lives – she has been trained to be useless for anything but marriage and

motherhood and so she finds herself with few options and little that she can do about the situation. Jeannine knows that she is weak and, with few other options, resorts to magical thinking as a comfort:

She hauls at the valise again, wondering desperately what it is that other women know and can do that she doesn't know or can't do, women in the street, women in the magazines, the ads, married women. Why life doesn't match the stories. . . . Jeannine, who sometimes believes in astrology, in palmistry, in occult signs, knows that men—in spite of everything—have no contact with or understanding of the insides of things. That's a realm that's denied them. Women's magic, women's intuition rule here, the subtle deftness forbidden to the clumsier sex. Jeannine is on very good terms with her ailanthus tree. Without having to reflect on it, without having to work at it, they both bring into human life the breath of magic and desire. They merely embody. (108-9)

Jeannine cannot find a husband that she can be happy with, a job, or even herself, but she can connect with her ailanthus tree. Unfortunately, “the breath of magic and desire” that she envisions herself and her tree bringing into the world do little to concretely change the situation, making Jeannine seem pathetic and sad in her intuitive and disempowered state. A body never exists outside of culture and so Jeannine's embodiment without social change is another limitation that she must deal with – she is merely embodied in a way that leaves her body open to use by others, as when she gives in to her boyfriend Cal's desires (despite her own lack of desire) and dissociates herself from his attentions by thinking, “*I'll watch the ailanthus tree*” (4). On *Whileaway*, Jeannine's problems would

no longer exist: she would have work, she would have the opportunity to find work that she enjoyed, and she would have been taught to be strong and to own and enjoy her own body rather than just being a body for others to enjoy. She would have no need for magical panaceas; she would have pragmatic, realistic opportunities instead. She would have science.

Even Joanna, a representative of Russ's contemporary world and a potential stand-in for Russ herself who is stronger and more outspoken than either Laura or Jeannine, suffers in contrast with Janet. She says,

I love my body dearly and yet I would copulate with a rhinoceros if I could become not-a-woman. There is the vanity training, the obedience training, the self-effacement training, the deference training, the dependency training, the passivity training, the rivalry training, the stupidity training, the placation training. How am I to put this together with my human life, my intellectual life, my solitude, my transcendence, my brains, and my fearful, fearful ambition? I failed miserably and thought it was my own fault. You can't unite woman and human any more than you can unite matter and anti-matter; they are designed not to be stable together and they make just as big an explosion inside the head of the unfortunate girl who believes in both. (151)

In Joanna's world, it is just as difficult to unite woman and scientist as to unite woman and human, but in *Whileaway*, as noted earlier, no such categorical conflict exists.

Instead, woman is equivalent to human, so much so that, in "When It Changed," when men arrive on *Whileaway* one of the first signs of the fundamental differences between

the women of Whileaway and the men is in the use of the word “people.” One of the men asks, “Where are all the people?” and Janet says, “I realized then that he did not mean people, he meant *men*, and he was giving the word the meaning it had not had on Whileaway for six centuries” (529). In these six centuries, “people” had to come to mean “women,” completely changing the dynamic experienced by Joanna.

Without this possibility of being defined as “people,” Joanna, tired of being the marked gender and the outsider, goes on to reject what possibilities do exist for her as also unsatisfactory:

Remember: I didn’t and don’t want to be a “feminine” version or a diluted version or a special version or a subsidiary version or an ancillary version, or an adapted version of the heroes I admire. I want to be the heroes themselves.

What future is there for a female child who aspires to being Humphrey Bogart? (206)

Or what future is there in this world for a female child who aspires to being Albert Einstein? While Joanna focuses on one type of hero, the logic of masculine heroism applies to scientists, too, as Athena Andreadis indicates: “I envisioned scientists as paladins—warrior wizards, consumed by the flame of the quest, cutting through obstacles to discover the hidden kernel regardless of personal sacrifices” (“The Double Helix” 10). Similarly, Claudia Henrion writes about the image of the mathematician as “an explorer, living a life filled with adventure, discovery, and excitement” (3). She says, “Mathematicians are sometimes portrayed as intellectual cowboys out to tame the mathematical universe—what one might describe as a Mathematical Marlboro Man” (3-

4) whose duty it is to “tame creatures such as infinity” (4). For many girls and women, these warrior wizard and Mathematical Marlboro Man narratives would have seemed, like Bogart for Joanna, off limits.

The contrast between Janet and the other women throughout the book highlights the positive potential of a female but not essentially feminine utopia. All of the ways in which Whileaway is shown to be superior to the worlds of Laura, Jeannine, and Joanna are the result of changing social constructs (“So plastic is humankind!” (*The Female Man* 162)) and therefore within reach; Russ does not merely turn the tables in order to give women power to be feminine, as if femininity is where freedom lies.

However, Jael complicates this reading of Janet and Whileaway. Her character and her future world add yet another facet to the relationship between women, science, and power. In Jael’s future, men and women – or, as they are known, Manlanders and Womanlanders – are at war with one another and have been for decades. This is, Jael says, “the only war that makes any sense if you except the relations between children and adults. . . . the Haves never stop being Haves and the Have-nots never stop being Have-nots” (164). Men see women as unclean and avoid them, maintaining their Manlander society by “buy[ing] infants from the Womanlanders and bring[ing] them up in batches, save for the rich few who can order children made from their very own semen” (167). For sexual pleasure, instead of turning to either women or straightforward homosexuality, Manlanders count on some of the boys they raise to become “the changed” (with a sex change) or “the half-changed” (without a sex change). Furthermore, the Manlanders have become lazy and do little real work themselves, having the women do it instead: “*They*

let us do their thinking for them. They even let us do their feeling for them" (170). As a result of this dynamic, Jael and the Womanlanders are scientists in this future, but their scientific efforts are apparently limited to developing plagues and weapons to fight the Manlanders. This approach to science makes it clear

that the melding of human and technology is not essentially, inherently, peaceful and productive, as it seems to be on Whileaway. Technology can not only *produce* subjectivities and bodies, but also exclude, foreclose, and violently transform bodies and social identities. (Martins 411)

Jael's future is highly technological, therefore, but it is also violent, loveless, and far from utopian.

These technologies and transformations, so focused on warfare and separation, cost both men and women their humanity. Jael sees this in the men, but not in herself. Jael's modified posthuman body makes this transformation visible via her silver eyes, teeth that "seem to be one fused ribbon of steel" (158), and pointed silver fingernails that hide "[c]laws, talons like a cat's but bigger, a little more dull than wood brads but good for tearing. And my teeth are a sham over metal" (181). It is not simply that she is different but that these differences are clearly designed to turn her into a weapon, a killer. Furthermore, she seems incapable of empathy and connecting with others. The most striking example of this is seen in her attitude toward killing men. After having killed one of the Manlanders, she tells the others, "I always carry firearms. The truly violent are never without them. I could have drilled him between the eyes, but if I do that, I all but leave my signature on him; it's freakier and funnier to make it look as if a wolf did it"

(182). They ask if his death were really necessary, and she responds by saying, “I don’t give a damn whether it was necessary or not. . . . I liked it” (184).

This inhumanity is disturbing to Jeannine and Joanna, but it is not rejected. Janet is not drawn to Jael – after all, “Jael’s world is utterly predicated on the categorical distinctions that Whileaway blurs, breaks down, and/or rejects outright” (Martins 411) – but this future is compelling to trapped and powerless Jeannine precisely because of the power that Jael wields. As Susana Martins writes,

Despite her closeness to her tree (and supposedly to nature), Jeannine seems powerless until she meets Jael, and her meekness gives way to a kind of careless desire for revenge once she begins to understand the potential for rebellion.

Nature does not help Jeannine; she welcomes Jael’s technology and becomes fascinated with her prosthetic weapons. (409)

Joanna also favors Jael, saying in the end, “I think . . . that I like Jael the best of us all, that I would like to be Jael, twisted as she is on the rack of her own hard logic, triumphant in her extremity, the hateful hero with the broken heart, which is like being the clown with the broken heart” (212). Both Jeannine’s and Joanna’s preference for Jael indicates the powerful appeal that revenge and power hold, particularly for the disempowered. Compare this with Joanna’s final commentary on Janet,

whom we don’t believe in and whom we deride but who is in secret our savior from utter despair, who appears Heaven-high in our dreams with a mountain under each arm and the ocean in her pocket, Janet who comes from the place where the labia of sky and horizon kiss each other so that Whileawayans call it

The Door and know that all legendary things come therefrom. Radiant as the day, the Might-be of our dreams, living as she does in a blessedness none of us will never know, she is nonetheless Everywoman. (212-3)

Janet is beautiful, blessed, and a potential savior, but she is also difficult to believe in and to take seriously. Janet is so far from them, beyond Jael even, that they cannot conceive of her as a real possibility. She seems like a fairy tale. Jael, on the other hand, is clearly a response to Joanna's and Jeannine's frustrations, not, as Janet may seem to be, an indicator of how far from utopia their lives are.

However, for the reader, the choice between Janet and Jael is a far more complex one. Both Janet and Jael represent worlds in which women have power and science on their side, but neither is easy to reject or to adopt uncritically. Janet may be difficult to believe in, but Jael is dangerous. Martins writes,

the discourse of technology encompasses contradictory terms; it does not easily resolve itself into one narrative, one version of history or temporality. Technology as a signifier or concept has to be worked on, itself revised, in order to yield meaning. Because its internal contradictions—the dialectical, differential play of terms such as dystopia/utopia, past/future, and natural/artificial—will not be effaced, the discourse of technology offers the potential for constant re-visions, and for active anticipations of cultural revolutions. (419)

Women's engagement in science is similarly open to multiple possibilities – some peaceful and productive, some violent and destructive, some perhaps both. This multiplicity indicates that changing who does science may not necessarily change the

way it is done or put to use. After all, Jael's pro-woman technology is just as violent as the technology used by the men. Further, the full humanity of Janet and the Whileawayans contrasts with the version of humanity presented by Jael, who says,

It took me years to throw off the last of my Pussy-fetters, to stop being (however brutalized) vestigially Pussy-cat-ified, but at last I did and now I am the rosy, wholesome, single-minded assassin you see before you today.

I come and go as I please. I do only what I want. I have wrestled myself through to an independence of mind that has ended by bringing all of you here today. In short, I am a grown woman. (187)

Jael is independent and free, but she is also selfish and single-minded. Her description of herself as rosy, wholesome, and grown seems a perverse use of these words and, more importantly, begs the question of whether this is what feminists wish to grow into and call healthy.

The relationship between Jael's and Janet's futures – as well as their uses of science and technology – is complicated further still by their shared history. As Jael attempts to enlist her counterparts in the war against men, she reveals one explanation for the plague that felled all the men in Whileaway and that made the all-female utopia in which Janet lives possible:

Let me give you something to carry away with you, friend: that "plague" you talk of is a lie. *I know*. The world-lines around you are not so different from yours or mine or theirs and there is no plague in any of them, not any of them. Whileaway's plague is a big lie. Your ancestors lied about it. It is I who gave

you your “plague,” my dear, about which you can now pietize and moralize to your heart’s content; I, I, I, I am the plague, Janet Evason. I and the war I fought built your world for you, I and those like me, we gave you a thousand years of peace and love and the Whileawayan flowers nourish themselves on the bones of the men we have slain. (211)

Thus, Whileaway’s utopian potential, built on the dystopian violence of Jael’s war, raises ethical questions about ends and means, further distances Whileaway from our present, and makes Janet, “the Might-be of our dreams, living as she does in a blessedness none of us will never know,” even more difficult to believe in. This narrative logic indicates that the uneasy relationship between women and science that currently exists will not easily be changed; a fight may be necessary, but what will that fight require? If it requires increasingly violent uses of technology, is it worth it? Jael, “who says tragedy makes her sick, who says never give in but always go down fighting, who says take them with you, who says die if you must but loop your own intestines around the neck of your strangling enemy” (212), would say so. Janet might not. In an early interview scene, after Janet’s arrival in the present, she is asked why she came unarmed. The interviewer says, “But an armed person, Miss Evason, is more formidable than one who is helpless. An armed person more readily inspires fear.” Janet, sure of herself as always, simply replies, “Exactly” (25), indicating the possibility of change motivated by something other than fear and violence.

Additionally, this relationship asks whether utopia is ever possible without violence. Martins writes that “in *The Female Man*, there is no clean break, no pristine

origins, no pure fabrications; the story of the plague, the apocalyptic new beginning, does not hold, once the history is re-viewed and revised” (415), raising doubts about Whileaway’s ideal nature. Peter Y. Paik also writes more broadly of the relationship between utopia and violence:

when one speaks of fictional atrocities, when the victims belong to imaginary societies or alternate realities, the gaze of the perpetrator, as well as that of the beneficiaries of his or her violence, more easily infiltrates the perspective of the interpreter, who tears down, as it were, the ramparts of his or her moralizing judgments to welcome the strange gift of an imaginable apocalypse. (21)

Russ gives us this “strange gift,” refusing to “omit the horrors that accompany its foundations” (Paik 22), and in so doing requires the reader to seriously consider the costs of utopia. Are we willing to “go on living on a world where peace and happiness have been secured through the deaths of millions of innocents” (Paik 63)? Joanna reflects, “As my mother once said: The boys throw stones at the frogs in jest. But the frogs die in earnest” (196). Jokes, stories, and metaphors about women, femininity, and difference may not be intended to create barriers for women, but they do, which means they are worth fighting against. Similarly, however, Russ’s novel and Jael’s violent transformation of the world may not be intended as a direct suggestion for action, but it can still have serious consequences if read as a justification for violence and inhumanity.

Russ presents one more model of change in *The Female Man*, however. Joanna ends her goodbyes to her three companions by saying, “Remember: we will all be changed” (213) and by citing her book as a means to create this change. As opposed to

change as a result of violent revolution, presents narrative and language as a way of changing the place of women in the world. However, this invocation of change is still limited in its application. Saying “we will all be changed” would gain so much potential power if it really meant *all*, including men, but it doesn’t seem to mean that here. In all four of the worlds represented in the novel, men are written as having no chance for change while Russ valorizes women’s relationships, knowledge, and power. But, as Haraway asks, “What about all the ignorance of women, all the exclusions and failures of knowledge and skill? What about men’s access to daily competence, to knowing how to build things, to take them apart, to play?” (“Manifesto” 38). What are the consequences of focusing on women to the exclusion of men? Is this dismissal of men (even if meant, as Fitting argues, to represent masculinity rather than men themselves) productive? Haraway argues that

taking responsibility for the social relations of science and technology means refusing an anti-science metaphysics, a demonology of technology, and so means embracing the skillful task of reconstructing the boundaries of daily life, in partial connection with others, in communication with all of our parts. (“Manifesto” 39)

Russ accomplishes the first part of this – she embraces science rather than refusing and demonizing it – but fails at establishing the connections and communication required to make this last and to create “a way out of the maze of dualisms in which we have explained our bodies and our tools to ourselves” (“Manifesto” 39). She offers an alternative to the maze, but this alternative is too simple and comes at too high a cost.

Significantly, however, *The Female Man* is not the only vision of Whileaway and

its utopian future; “When It Changed,” Russ’s 1972 short story about what happens when men come to Whileaway, further illustrates the fragility of a utopia built not only upon violence but also upon changing women but not men. “When It Changed” explores the limits of separatist women’s worlds and sciences by ending the separation. In this story, men return to Whileaway and the women must face the prospect of their world as they know it coming to an end. The men who arrive say, “As a people, we are not very bright . . . There’s been too much genetic damage in the last few centuries. Radiation. Drugs. We can use Whileaway’s genes, Janet” (530). Nonetheless, they do not think of the women as people but treat them “[a]s if we were invalids” who have “adapted amazingly” (529), saying, “There is only half a species here. Men must come back to Whileaway” (531). The story ends with the certainty that this is the end of Whileaway’s utopian culture. As Janet reflects, “we should have burned them down where they stood. Men are coming to Whileaway. When one culture has the big guns and the other has none, there is a certain predictability about the outcome” (531). As a result, Whileaway’s utopian promise is only temporary:

Sometimes at night I remember the original name of this planet, changed by the first generation of our ancestors, those curious for whom, I suppose, the real name was too painful a reminder after the men died. I find it amusing, in a grim way, to see it all so completely turned around. This, too, shall pass. All good things must come to an end.

Take my life but don’t take away the meaning of my life.

For-A-While. (533)

Ultimately, lasting cultural change requires new models for both sides of the power relationship, not just one. Whileaway is a utopia that lasts because there is no resistance, and the end of Whileaway is a direct result of the continued gap between men and women, the fact that masculinity was not done away with but only rejected in their world. When the two come in contact, it seems inevitable that masculinity will win out, destroying Whileaway.

Therefore, even if it were so easy to change women's behaviors and place in science, the larger problem is not so easily solved. Peter Fitting writes, "it was easier to imagine an end to the sex-gender system by eliminating men than to try and 'rewrite' them" ("For Men Only" 108), but easy doesn't mean best. Read as the result of the Womanlanders' tactics instead of as the result of an unplanned extinction of men, it becomes clear that Whileaway's end is the result of a limited solution to the gender problem, and reading this ending alongside struggles for women's inclusion in science implies that mere removal of the problem areas without change and understanding on all parts can backfire. What, then, can be learned from such an ending? Fitting writes, "We have a choice: to cling to the values and privileges of an exploitative and oppressive system, or to recognize in these utopian visions the possibility of a more adequate human future" ("For Men Only" 112). And Russ points to this choice in the novel itself:

Whileaway, you may gather, is in the future.

But not *our* future. (7)

This relationship between Whileaway and the present may indicate that utopia is simply not attainable (as so many critics of utopias like to point out, *ou-topos* means *no place*);

however, it can also be read as a statement that we can do better (*eu-topos* as *good place*). If “[i]n dreams begin responsibilities” (62), then this dream of Whileaway leaves the reader with the responsibility of trying to make this world more like that one – not necessarily by following Jael’s example, but by aiming directly for the end product of happy, powerful, confident women who may do science (or not) on their own terms and for whom sexist science, stereotype threat, and frailty are not relevant problems.

4.3 The Shore and the Gate: Separatist Women’s Science

Some feminist SF puts women in charge of scientific knowledge and production not by removing men but by reversing the power relations within the culture. Margaret Atwood has indicated that this kind of reversal might produce a better world:

She [Margaret Atwood] is certain, though, that if women were in power, they would not oppress men the same way that men have oppressed women.

“It will never happen,” she said. “In strictly biological terms, females’ investment in their children is much larger, with a lot more of their physical self, their physical substance.

“There have been goddesses, powerful female figures, but to my knowledge there has never been a society in which there has been the wholesale oppression of men.” (Lee)

Many others are less certain about this, however, including Pamela Sargent and Sheri S. Tepper. Sargent’s *The Shore of Women* (1986) and Tepper’s *The Gate to Women’s Country* (1988) “are not utopias in the full sense of the term” and “cannot be read

primarily as attempts to imagine alternatives” (Fitting, “Reconsiderations” 33), but their visions of female-led societies are powerful contributions to the conversation about women and science. These novels ask the reader to consider not just whether women, given control over society, would dominate men but also whether women, given control over the direction of science, would do things differently than they have been done up to this point.

The two novels have a great deal in common and provide remarkably similar responses to these questions and possibilities. They both feature walled cities run by women (*Gate* includes some men inside the community; *Shore* does not), men living separately outside of the cities in their own highly masculinized communities, secret manipulations of reproductive science by an elite group, and a dramatic gap in education and culture between the women and the men. *The Shore of Women* is fundamentally a romance that follows one young woman, Birana, as she is exiled from the walled city and gradually comes to know and fall in love with one of the young men, Arvil, living outside. *The Gate to Women’s Country* is not so clearly defined by the romance plot, but it also follows the education of one young woman, Stavia, about the system that she lives within as she develops feelings for Chernon, one of the young men living outside the city.

One of the most significant similarities between the two novels is that in both of these worlds, the continually enforced separation between men and women is a direct result of the destruction that men and their technology have caused. Women run science not because they are the only ones present to do so (as in *The Female Man*) but because men, the women argue, have proven themselves too dangerous to handle such tools. *The*

Shore of Women is set, as Birana tells Arvil, after

[m]en nearly destroyed our world. You need not doubt that. . . . They knew much of what you call magic. They used it to fight among themselves, and millions died—many, in numbers you cannot count. Those who lived saw that it couldn't be allowed to happen again, so women, the aspects of the Lady, sent men from their midst and kept the magic for themselves. This brought peace to the world, for women swore that there would be no more battles. (178)

Though “[t]here were many men who saw what was coming and tried to work against it” (95), Sargent writes, “[w]hether or not men could behave ethically or peacefully isn't the point. The point is that they used their power, the power women gave them, to destroy the world, and can't ever be allowed to do that again. Nothing changes that” (95). Since this time, men have been forced to live separately from the women and have not been allowed to learn magic (i.e., science). The women justify this to themselves not just by recalling the time when men nearly destroyed the world but also by telling themselves that boys and men “aren't like us. Their feelings are shallower and more violent; they cannot give life and so must deal in death; their minds are narrow and incapable of higher intellectual functions” (9).

The Gate to Women's Country builds on a very similar premise. The narrative is set following the destruction of “preconvulsion society” (37):

Three hundred years ago almost everyone in the world had died in a great devastation brought about by men. It was men who made the weapons and men who were the diplomats and men who made the speeches about national pride and

defense. And in the end it was men who did whatever they had to do, pushed the buttons or pulled the string to set the terrible things off. And we died. . . . Almost all of us. Women. Children. . . . Martha [a founder of women's country] taught that the destruction had come about because of men's willingness—even eagerness—to fight, and she determined that this eagerness to fight must be bred out of our race, even though it might take a thousand years. (301-2)

The effects of this destruction are still present in multiple sites around the cities. These places are “[h]ot. Not with fire, with radiation. You walk across that place, a few days later all your hair will fall out and you'll start dying. Still, a bleak desolation isn't as dangerous as some of them, because you can see it. Some of them, you can't see. . . . We call them masked desolations when they're like that” (102). Driving the point home even further, Morgot, Stavia's mother and one of the leaders of the city in which Stavia lives, says the men made these desolations “with their evil weapons. You know that” (102). In this world, as in Sargent's, boys are limited in what they can learn while girls learn about all arenas—sciences, crafts, arts—plus women's studies, which includes “management, administration, sexual skills” (23).

In both novels, the destruction and the responses to it are described in terms of men's and women's essential differences. Although Birana wonders, early in *The Shore of Women*, about how she might have developed if she had been raised like a boy, the women in the Enclave have taught her well and she is unable to overcome the essentialism of the system:

I tried to imagine myself growing up that way and being forced to live outside.

Would I become like a man? Would men, living here, become more like us? Everything I had been taught denied it; men had a propensity for violence that was both genetic and hormonal. The biological well-being of humankind as a whole required some of their qualities, but the survival of civilization demanded that women, who were less driven and able to channel their aggressiveness constructively, remain in control. Over these harsh facts, many of us had erected a structure of suppositions to soothe ourselves, believing that men were happier as they were, that they were capable of little more, that they would destroy everything we had built. (92)

However, despite the pervasiveness of these ideas in both books, Sargent and Tepper ultimately “help to confront the essentialist connection between woman and nature for which environmental feminists, or ecofeminists, are criticized” (Sobstyl 97). Without simply endorsing the ideas of the characters within the book, both authors explore the ramifications of a gender role reversal that entails a shift in power and that builds upon the gender stereotypes many difference feminists accept as true. Jane Donawerth writes,

during the 1980s, the sex-role reversal science fiction novel, which had formerly been used by male writers to cry up the dangers of women on top, has been appropriated by female writers to expose the dangers of biological determinism. They do so by exploiting the irony of a future science that enforces reversed sexual bias as natural, showing the male to be inferior or limited in his role. . . . These writers do not reverse the roles assigned to females and to males; instead, they reverse the bias in education and science in their worlds, imagining the roles

as innate and the male role as limiting, destructive, and inferior. (“Teaching Science Fiction by Women” 18)

Edrie Sobstyl makes a similar argument about *The Gate to Women’s Country* in particular:

The Greeks and the Bible and the Scientists all tell women that we are inferior, evil, easily swayed, coy, choosy, and maternal, while men are the vital force in creation and procreation. *Gate* is what a society might look like if some women actually believed these ideas. Even if the authoritative texts of patriarchy are true, Tepper shows us that it [sic] current gender relations are not *necessary* consequences of our history, religion, or science. If there are natural differences between the sexes—and that remains an open question—we cannot conclude that patriarchy is therefore “natural.” (98)

And so the condemnations of men as inherently violent and the valorizations of women as inherently wise and peaceful are called into question by the texts themselves as they take what others have presented as utopian and make of it an oppressive dystopia. As Brian Attebery writes, “The dystopian vision . . . can give rise to the eutopian without necessarily changing any element. . . . The relationship between the two is, then, not one of simple contradiction but of reversing values while retaining the basic configuration” (116). This works in reverse as well; the utopian becomes dystopian with little change other than perspective, as in these two novels.

However, Sargent’s dystopian vision provides a glimmer of hope. She ends *The Shore of Women* with a passage emphasizing the necessity for change:

We are being given a chance to reach out to our other selves. What we do will show what we are and determine what we shall become.

There is no word of Birana's fate or of Arvil's, no sign that they live, no rumor that they have been seen outside. Yet I cannot think of them as dead. They live on in my mind, freed by their love from her world and his. I imagine them on a distant shore near a refuge they have built for themselves dreaming of the oceans we might sail again and the stars we might seek. Perhaps we will join them on that shore at last. (469)

This passage illustrates the hopeful possibility of reuniting men and women and reveals that the separatism of *Shore*, unlike that of Russ's *Whileaway*, is not a solution or a utopia but a reflection of our world and its inequities. As Fitting writes, "the events of the novel simultaneously reaffirm and undermine this essentialist assertion, while the novel's ending calls for an end to separation" ("Reconsiderations" 34).

However, this modification of the separatist utopia into a separatist dystopia simultaneously reinforces other divisions and stereotypes. Fitting writes of *The Shore of Women*,

I find it quite disturbing that there is not a single positive example of such a [same-sex] relationship, male or female. . . . Indeed, the novel centers on Birana and Arvil's discovery of the joys of heterosexuality, a discovery which sums up what I am calling the novel's message of reconciliation. In its dialogue with the feminist utopias of the 1970s, Sargent's novel seems to have accommodated both homophobia and heterosexism in its appeal for a reconciliation of the sexes.

(“Reconsiderations” 36)

Similarly, Wendy Pearson critiques Tepper’s presentation of sexuality in *The Gate to Women’s Country*, writing

what is most problematic is *Gate*’s larger failure effectively to critique the heteronormative and misogynist nature of the *status quo*. The feminist project of envisioning possibilities for women in the reversal of the patriarchal dichotomy in which women are Other is frustrated by the replacement of sexism with homophobia, so that the only histories revealed are, in a sense, the old dialectical ones of binarism, separation, and bigotry. (208)

These novels are not, therefore, rejections of all essentialist and stereotypical ideas about gender. Although *The Shore of Women* acknowledges that in a truly separatist world, homosexuality would exist, the heterosexual relationship at the center of the story takes precedence over all other relationships and is shown to be more true and fulfilling than the relationships between women or between men, which are ultimately implied to be only placeholders for heterosexuality. Worse, *The Gate to Women’s Country* mentions homosexuality only to pathologize it:

even in pre-convulsion times it was known that the so-called “gay syndrome” was caused by aberrant hormone levels during pregnancy. The women doctors now identified the condition as “hormonal reproductive maladaptation” and corrected it before birth. There were very few actual HNRMS—called HenRams—either male or female, born in Women’s Country. (76)

This turns homosexuality into nothing more than a disease to be cured and reasserts the

hegemony of heterosexuality. It is troubling that even in a reversal of patriarchal gender systems, heterosexuality is still uncritically glorified.

The negativity of these separatist worlds – their separatism, essentialism, and heterosexism – means, however, that the positive valence of women’s scientific education in these books must also be called into question. If these texts “[critique] essentialist tenets on inherent male violence by straight-facedly exaggerating them to the point where the reader recoils from their sheer inhumanity” (Kelso 139), what does exaggeration say about the texts’ representations of women doing science? Women’s greater social control is largely gained and kept *through* science, after all. As a result, science is central to these texts but it is not simply liberatory. In *The Shore of Women*, the women’s Enclaves are extremely technologically advanced. They have cyberminds to accurately test brain chemistry and reflexes, rejuvenation technology that allows some women to live well over a hundred years, and flying cars; in *The Gate to Women’s Country*, there are fewer obvious signs of high technology, but the women have developed sophisticated birth control methods and DNA testing. In addition to these promising technologies, however, there are destructive technologies. *The Shore of Women* features weaponized globes that fly out from the Enclaves to kill men by shooting lasers at them, while *The Gate to Women’s Country* provides the women and servitors (the men who live in the cities with the women) with a simpler but equally deadly weapon (a “toothed missile,” a “curved blade at the end of a chain” (304)).

Even more significant than overtly violent uses of technology, however, is the way women maintain control in both texts through their possession of scientific

knowledge. In *The Gate to Women's Country* this is primarily done through withholding information. Reading material for men is limited to “Romances Tales of battle. Sagas. Designs for armor. Hygiene. Maintenance of garrison property. You know! Nothing about real things. Nothing about medicine, or engineering, or management. . . . Those are women's studies” (78). Defining these “real things” as women's studies illustrates the way that the women hoard useful and important knowledge, defining it as their knowledge and not for men (or at least garrison men) to have. To maintain this system, “[g]iving Women's Country books to a warrior was absolutely forbidden!” (78).

One of the key elements of scientific knowledge denied to warriors regards reproduction. Although the women are implanted with birth control devices, they are not supposed to tell the warriors about this. Stavia believes that this is because “[t]hey couldn't be expected to understand” (245), but it becomes clear that the women are hiding this information so that they are better able to continue their eugenics program to breed out violent tendencies. Instead of bearing the children of the warriors as they say they do, the women bear the servitors' children. Stavia calls it misdirection – “watch my left hand, and then the right hand plays the trick” (288) – and this makes it possible to select for “highly competent, calm, judicious men” (288), those who come back to the cities as opposed to remaining outside as warriors. This sleight of hand regarding fatherhood is accompanied by the selected sterilization of women (290) so that the least capable candidates among them do not procreate either. Morgot explains the process through a historical animal analogy:

The Laplanders selected the bulls that didn't fight. They selected the bulls that

didn't try to own the cows. They selected the bulls that were cooperative and gentle. They castrated the rest. We're kinder than that. We don't castrate anyone. We let our warrior bulls believe they father sons. (293)

In this way, Tepper problematizes the women's control of science and use of genetics. This is reflective of the eugenics movements that many feminists have objected to (secretly or forcibly sterilizing poor women and women of color, for instance) and seems to be designed to make the reader uneasy. It certainly makes Stavia uneasy and even Morgot, who is deeply implicated in these processes, says, "We call ourselves the Damned Few. And if the Lady has a heaven for the merciful, we are not sure any of us will ever see it" (291). This science is done in the name of the good, but the work itself is little different from the manipulation and control that the women criticized in men's technology; maternalism as a counterpoint to paternalism.

This division of knowledge is not the only way the women disempower men. The women also manage men's population growth. They prevent men outside of the cities from having doctors, saying that warriors "choose battle. They have to live with the consequences of battle" (128). Of course, this logic overlooks the lack of free choice that the men have in this system. Furthermore, the women make sure that they "always greatly outnumber the men" (302) both by controlling the reproductive process and by encouraging occasional wars in order to cull their numbers. Each town has its own garrison that fights to protect their town (which provides them with food from inside the city and with whom they believe they have children) and these alliances are used to benefit the women. As Morgot explains at the end of the book,

When our garrison reaches the battle site, they will find that the Tabithatown troops have been joined by the full garrisons from four other cities. We have met with representatives from all their Councils. Their massed garrisons will outnumber ours at least four to one. . . . Even with the good harvest, the Councils agree that all five of the garrisons arrayed against us need to be reduced in size. . . . And we have agreed that none of those from Marthatown are to return at all.

(311)

The rebellious men will be done away with because the women believe this is best for them and for the world as whole.

In *The Shore of Women*, men are manipulated not only through withholding of information and violence but also through religious imagery. Men come to the enclaves to lie with the Goddess, a religious figure for them that is created through the women's virtual reality technology. While they do so, the women gather their semen and use it for artificial insemination so that they may reproduce without having to come into contact with the men and without allowing the men to see them as real women, human like them. The men are encouraged to visit shrines out in the wild to worship the Lady and reinforce their sense of women and the Lady as holy and completely separate and different from them. The women know that if men begin to question the order of things, they could fight back, so they pre-empt this questioning by creating distance and an attitude of reverence. As one woman notes, "Our true protection doesn't lie just in our wall and our weapons, but in what they believe about us" (117). If the women gain power through these religious beliefs at times, they also are placed in dangerous positions when that

faith begins to waver, however.

In short, as Sargent and Tepper illustrate, putting science in women's hands doesn't necessarily make it better; furthermore, using science to manipulate others and allowing only some people to gain understanding of scientific concepts, even for the good of society, leads to abuses of power and to oppression. Science can be engaged with in a variety of ways; in the past men had engaged with it in harmful and destructive ways, but women also engage with it in harmful ways. Men damaged and destroyed the earth and oppressed women; women protect the earth but oppress men.

Ultimately, this control of science is harmful not only to men but to women. In *The Shore of Women*, although women refrain from destruction, they are also unable to progress technologically. Zoreen, one of the young women of the city, a historian, notes, "We build no new cities. Even on our own continent, there are lands almost unknown to us now" (26). Later, she also says, "All we do is study what's known, what was discovered ages ago. After all, we wouldn't want to push too far, considering the violent applications of science in the past. It's stultifying" (94). The violence of the past is worth being wary of, but that violence, as noted earlier, has not been done away with, even though there is no new research being done. The women of the Enclaves see two possibilities for science—using it as a means of control and of exploration—and most believe that the two are inextricably intertwined; however, the book concludes with a statement that

We were forced to choose this pattern once because our survival was at stake. I believe it may be at stake once more. We may stagnate, as life does when it holds

to a pattern that is no longer needed, which can keep it from growing and becoming something more. It may be time for us and for those outside to begin to reshape ourselves and become another kind of being. (468-9)

And Birana notes, “There's evil enough in all of us—what matters is whether or not we act on it” (411). Despite the troubling uses to which science has been put in the past – by both men and women – Sargent argues compellingly for the necessity of exploration and education, indicating that it may be better to be open to dangerous technological developments than to be closed to all new knowledge, better to be responsive to and responsible for even flawed humans than to reject them altogether. In the final passage of the book, Sargent writes,

I do not want to destroy what we have built. We saved Earth and came to know our true power. Our daughters grow up unscarred by the wounds that marked the lives of women in ancient times; we must never go back to what once existed. Yet we have made this life for ourselves at the cost of the lives of those outside. To be free, we have enslaved them.

Those outside are our brothers. I do not mean that in the sense in which we usually use that term, which means only a male born of one's own mother and no more, but in the way it was once used. They are our fathers and our sons.

There is something of us in them and something of them in us. (468)

Here she provides a clear renunciation of separatism and any science that furthers oppression – no matter who is in charge.

These texts may seem, at a first glance, to argue for the necessity of putting

women in charge, but they present a significant criticism of the system as it stands through this reversal, indicating that domination by one half of the population will never be the answer, no matter which half it is. These two novels “begin from a ‘Great Divorce,’ but with important deviations. Most notably, they look back from the great divide, rather than forward to separatism as a possible option” (Fitting, “Reconsiderations” 33). Thus, the separatism in *The Shore of Women* and *The Gate to Women’s Country* is not an answer. Bonnie Spanier writes,

Playful and ironic disruptions of predominant paradigms and language can be liberating and fruitful. Ruth Herschberger’s female-affirming descriptions of egg and sperm and female and male primates and Susan Griffin’s poetic explorations of genderized dichotomies turn traditional science upside-down. When misunderstood as simply “the girls” doing what “the boys” have always done, such efforts may be viewed negatively. I suggest that, for certain purposes, depictions of exaggerated gender polarities or gender reversals function as consciousness-raisers or heuristic devices to reveal cultural beliefs embedded in our assumptions about science and nature. Further, they can be freeing for an individual who has become aware of the constraints that bind our daily lives, our perceptions, and our imaginations. (115).

Tepper and Sargent effectively “reveal cultural beliefs embedded in our assumptions about science and nature” and also move well beyond this point and the critique of patriarchy and patriarchal control of science presented by Russ, representing all-women enclaves with power and science as themselves flawed and corrupt and ultimately no (or

little) better than when men were in control.

This places these novels in conversation with feminist standpoint theory, which “argues that men's dominating position in social life results in partial and perverse understandings, whereas women's subjugated position provides the possibility of more complete and less perverse understandings” (Harding, *The Science Question in Feminism* 26). According to standpoint theory, the reversals of Sargent and Tepper could be a site for reimagining the purposes and practices of science. However, the two novels instead highlight some significant limitations of standpoint theory. Sandra Harding writes,

We need not—indeed, must not—choose between “good politics” and “good science,” standpoint theorists have argued, for the former can at least sometimes produce the latter, and the latter, at least in some cases, requires the former. Standpoint theory shifts the question from how to eliminate politics from science to two different questions: which politics advance and which obstruct the growth of knowledge; and, for whom (for which groups) does such politics advance or obstruct knowledge? (“Socially Relevant” 30-1)

As we see in *Shore* and *Gate*, though, it is far from simple to determine what is meant by “good politics.” Are the women’s politics in these novels “good”? Their goals include nonviolence and environmentalism, but they achieve these goals by disempowering, manipulating, and even killing men; furthermore, even if these politics do count as good, it is entirely unclear that they advance science in any way. Ultimately, “a critique that rejects a man-centered epistemology because it provides a distorted view must also reject a woman-centered one for the same reason (Hekman 1990)” (McCaughey 77).

4.4 Conclusion: When Numbers Aren't Enough

How effective, then, are the shifts in power seen in these texts at changing overarching narratives and metaphors with the sciences? Not very. These texts illustrate the ease with which women in science can find themselves using the same language and oppressive mechanisms as men have done (as in Tepper and Sargent) and the limitations of simply removing men from the equation (as in Russ's *Whileaway*), but in none of these instances are there significant changes in the way that these women talk about science itself. This would seem to indicate that putting women in charge is not enough on its own to challenge gendered and sexist science and that these biases in the sciences may be the result of imbalance itself – in either direction – rather than sex or gender. As Spanier writes, the solution must go beyond skin deep: “unless detrimental values and assumptions are exposed and questioned, getting more women and minorities into the natural sciences will only mean socializing and selecting for individuals from those groups who adopt the same beliefs (consciously or not) as the dominant group directing the sciences at present” (9). These women and minorities, she argues, will not change the fundamental narratives and metaphors of science, just the bodies of those who promote and reproduce them.

In fact, these representations of separatist science highlight an approach to the problem of women and science that could be just as harmful as the anti-science narratives of *The Wanderground* and the other separatist utopias of Chapter 2. Just as the feminist movement cannot afford to reject science, neither can it afford to reject men and hope to find a productive and livable solution. A feminist response to science must not focus on

women as a class, but on the underlying cultural issues. As Ruth Hubbard writes, “I doubt that women as gendered beings have something new or different to contribute to science, but women as political beings do” (32). This confusion between women as gendered beings and women as political beings is related to feminism itself:

The question of who or what might create change in science beneficial to women has been confused by Americans’ mistrust of feminism. . . . Especially within the sciences, people seem to prefer to discuss *women* rather than *feminism*. This refusal to acknowledge politics has led to a simple—and incorrect—equating of women entering the profession with change in science. (Schiebinger, *Has Feminism Changed Science?* 9)

This makes it clear that there are serious limitations to identity politics. Donna Haraway proposes that we build political movements on “affinity, not identity” (“Manifesto” 14), in which members of the movement are “related not by blood but by choice” (“Manifesto” 13), related not by common genitalia, chromosomes, or hormones, but by common values.¹⁴ Despite their own limitations and the critiques they present of separatism, the texts discussed here provide strong arguments for seeing women as full human beings and thereby also open the door for seeing men as full human beings who do more than reason, lust, and destroy.

Adrienne Rich’s poem “Natural Resources” provides one last look at the issue of separatism. She writes,

¹⁴ It is of course also worth noting not just that men can be feminists but that women can be anti-feminists or misogynists. Genitalia, chromosomes, and hormones do not predict politics in either case.

Could you imagine a world of women only,
the interviewer asked. *Can you imagine*

a world where women are absent. (He believed
he was joking.) Yet I have to imagine

at one and the same moment, both. Because
I live in both. *Can you imagine,*

the interviewer asked, *a world of men?*
(He thought he was joking.) *If so, then,*

a world where men are absent?

Absently, wearily, I answered: Yes. (Rich 33-42)

The speaker, who has “to imagine / at one and the same moment, both. Because / I live in both,” indicates that a serious response is needed to this division; however, the speaker’s weariness of the questions and absent, weary answer reiterates our need for a new and more productive response to inequity and bias than “*a world where men are absent*” and for a deeper and more meaningful definition of feminist science than science done by women.

CHAPTER 5

FEMINIST SCIENCE: DISCOVERY AND CREATION

I do not know if human beings are better anywhere. But I like to think . . . that in this sad world of ours, those who create do not destroy so often.
—Theodora Goss, "The Wings of Meister Wilhelm"

I am seeking an end to androcentrism, not to systematic inquiry. But an end to androcentrism will require far-reaching transformations in the cultural meanings and practices of that inquiry.
—Sandra Harding, *The Science Question in Feminism*

Science is neither simply created nor simply discovered. It is both.
—Evelyn Fox Keller, "Women, Science, and Popular Mythology"

5.1 The Goals of Feminist Science

Some feminists "feel that it is necessary that there be a critical mass of women practicing a science before it can become a feminist science" (Belcastro and Moran 27), and the addition of women to the sciences certainly helps with this project in many ways¹⁵, but as the previous chapter has illustrated, reaching a critical mass of women does not necessarily guarantee that those women will be acting as feminists. Harding asks, "Can a science grounded in women's *identities as gendered* be a sound grounding for a *feminist science*?" (*The Science Question in Feminism* 140). The answer to this question appears to be no. As Keller argues, "Scientific ideology is not, after all, *solely* determined by gender ideology" ("Women, Science, and Popular Mythology" 144),

¹⁵ Most concretely, perhaps, in providing role models for girls and young women, becoming mentors for women entering the profession, and helping to eliminate stereotype threat.

which means that there is no inherent difference between science done by women and science done by men on the basis of the individual's sex or gender and, therefore, that gender "cannot be a locus of critical agency" (Egeland 85). If including women in the sciences does not necessarily modify the goals of science or eliminate sexism and inequities in the field, however, it remains to explore what is able to create these changes.

Perhaps a more thoroughgoing reform of science itself is required. Many find serious problems within science, after all. Drawing on principles from feminist psychology and ecofeminism, Theodore Roszak, for instance, describes science as an "impassioned search for power [that] has twisted our relationship to nature" (16) and that is "peculiarly masculine" (55). He also develops parallels between rape and treatment of the natural world:

Rape begins by denying the victim her dignity, autonomy, and feeling. Psychologists now call this "objectifying" the victim. When it is another human being who is being so objectified, everybody (except perhaps the rapist) can clearly see the act as a crime. But when we objectify the natural world, turning it into a dead or stupid thing, we have another word for that. Science. (97)

Rozzak is not alone in this perception of science as dangerous and abusive; as seen in Chapter 2, this type of reaction was common in feminist writing of the 1970s and 1980s. However, the 1999 publication date of Roszak's book indicates that these ideas are not limited to the past.

A study conducted by Jean Barr and Lynda Birke, in which they asked adult women who were enrolled in continuing education science courses to describe how they

think of and relate to science, reveals the prevalence of similar perceptions among nonacademics:

Questionnaire returns are replete with criticisms of science and scientists for being too abstract, analytical, academic, and narrow-minded and for failing to integrate artistic, imaginative, literary, evaluative, social, philosophical, personal, spiritual modes of understanding. Half the returns refer to the isolated, separate nature of science and over a third refer specifically to its separation from other forms of knowledge and understanding; for example, “its distance from social science, philosophy means lack of understanding of applications of science or of the interrelatedness of life” (LC); “Sciences don’t deal with ambiguity, don’t deal with human meaning” (E); “linear, cold, analytical, isolating” (Sh), “have tunnel vision, unprepared to accept responsibility for consequences” (LH), and so on. . . . (77)¹⁶

The language used here is less damning than Roszak’s, but the fundamental beliefs are the same: scientists are distant, unfeeling, logical at the expense of emotion or intuition, and unconcerned with the consequences of their seeking after knowledge. This is an extremely negative vision of science, one that would seem to cry out for change.

However, the women surveyed by Barr and Birke, despite their negative reactions to science, did not reject science altogether. Instead, “[a] much more insistent voice is for a re-formed science” (77). Given this, Muriel Lederman writes, it is crucial that feminists consider what a feminist science would look like in response to this traditional, masculine

¹⁶ The parenthetical letters refer to specific subgroups in their study.

science, for “[i]f we fail even to try, we may be perceived as less than serious about our feminism and less than serious about the science that we conduct” (437). This is difficult, however, and, according to Lisa Weasel, is thus far largely missing from feminist discussions of science:

Despite the wealth of critical feminist writings on science, far fewer feminist approaches to the sciences have ventured to take on the challenge of articulating concrete examples of actual science that might be seen as consistent with feminist goals. . . . as long as they are armed predominantly with critique, feminist scholars of science will continue to be perceived as anti-science, and the prospects for a re/constructed feminist science will remain a distant, blurry vision. (28)

It is absolutely necessary that these efforts to bring women into science do not do so at the expense of feminist engagement with science itself or through the rejection of science, not just, as I have argued in earlier chapters, because this is damaging to women themselves, but also because as long as feminists are focused primarily on critique, it will be difficult to put the necessary energies into creation and to be taken seriously (instead of rejected as merely reactionary) when new feminist scientific models are created. Furthermore, as Catherine Hundleby argues, there is power, which “we neglect if we haven’t developed feminist accounts,” simply in proposing feminist scientific theories because “[w]here no nonsexist theories are generated, sexist theories will survive the most rigorous available scientific assessment” (24).

What, then, might a feminist science look like? I would argue that, at the very least, a feminist science requires the following:

1. It should recognize women's scientific contributions both now and in the past. This means not just looking for examples of women doing science-as-usual, but also expanding the basic definition of science to include practices and knowledges that have previously been overlooked.
2. It should address dichotomies and hierarchies – for instance, between internal and external, self and other, nature and culture, rational and emotional, male and female – that traditional science may not readily or easily question. In so doing, feminist science may contribute to the removal of gendered language within science and encourage a broader range of ways of coming to know the world.
3. Finally, it must consider the political ramifications of its choices, narratives, and definitions and then act upon the knowledge of those ramifications.

Creating a list like this raises as many questions as it attempts to answer, however. Are these elements in fact gendered or uniquely feminist? What is the relationship between these goals and science as it currently exists? Does achieving these goals require a reformation of science? Or is this approach dependent upon a stereotyped and limited vision of science?

In this chapter, I will address these questions, examine the usefulness of the goals listed above through analysis of several feminist science fiction works, and highlight ways that feminist science and feminist SF inform one another: feminist SF helps readers to visualize a feminist science while the goals of feminist science may provide some new

ways of reading some feminist SF texts.

5.2 What *Is* Feminist Science?

Donna Haraway notes that “[t]he only people who end up actually *believing* and, goddess forbid, acting on the ideological doctrines of disembodied scientific objectivity enshrined in elementary textbooks and technoscience booster literature are nonscientists, including a few very trusting philosophers” (*Simians, Cyborgs, and Women* 184), so examining the descriptions of science by actual scientists seems a necessary first step in answering the questions raised above and understanding the relationship between traditional science and feminist science.

One of the most common tenets of feminist science and criticisms of traditional science regards its claims of objectivity. Sandra Harding writes that “[r]esearch is socially situated, and it can be more objectively conducted without aiming for or claiming to be value-free” (*Whose Science?* 159), and many scientists make the same claim.

Stephen Jay Gould, for instance, writes,

I criticize the myth that science itself is an objective enterprise, done properly only when scientists can shuck the constraints of their culture and view the world as it really is. . . . Science, since people must do it, is a socially embedded activity. It progresses by hunch, vision, and intuition. (qtd. in Harding, *Whose Science?* 145)

In actuality, Gould argues, science is not, as so many believe, purely logical and objective. But the belief in science’s Spock-like rationality is so widespread that, as

Claudia Henrion argues, it can be harmful: “It is not the theorems, nor even the proofs, that ultimately hinder women in mathematics; it is the misidentification of mathematics with just theorems and proofs” (260). Zachary Pirtle, a program analyst at NASA, says, “Real science still doesn’t work in the strictly deductive way that [Sherlock] Holmes describes, for the best scientific questions, there are no straightforward answers, and a lot of the hard work comes from simply trying to imagine new possibilities” (qtd. in Britt 67), which highlights the centrality of creative thinking in scientific progress. Even physicists, commonly perceived as the hardest of the hard scientists, acknowledge the limits of pure objectivity in doing science:

Taking data and analyzing I think are pretty objective – those are the tools we learn, how to measure the spectrum, how to plot up the results – but there are subjective parts at the . . . beginning and the end which is the choosing of the problem and the interpretation of the results . . . I think it’s a shame that science is portrayed as reductionist and somehow dispassionate because it is absolutely subjective . . . at the beginning and the end points, and whatever you see up there in nature is going to be a product of what your eyes and brain are able to see and interpret. (Kerr 396)

Many scientists, this reveals, do recognize the place of subjectivity within the practice of science, not as something to be hidden or rejected, but as a matter-of-fact part of the process.

However, the common perception is not ungrounded, and many of the biased narratives described in the previous chapter arise not because the scientists responsible

are themselves actively being sexist but because they are strongly influenced by the sexist culture in which they live and because they do not acknowledge this fact and its influence on their work. When denying the influence of subjectivity and claiming pure objectivity, it is impossible to correct for the biases that creep in with that subjectivity. Lisa Weasel presents one example of how acknowledging the subjective elements of science can help change the problematic narratives that may arise when our biases go unchecked in her examination of models of the immune system. She first highlights yet another metaphor pattern that is potentially harmful:

Jan Klein's 1982 textbook *Immunology: The Science of Self-Nonsel*
Discrimination opens its introductory chapter with a paragraph outlining "Four Threats to Individuality," followed by a description of the "Defense of Individuality." More recently, in *Dying to Live: How Our Bodies Fight Disease* (Kendall 1998), sections that describe immune system function are titled "Repelling Invaders," "The Fight Begins," and "The Main Campaigns," with chapter titles including "General Defense Policy and the Enemy," "Distinguishing People," and "Subversive Agents." The classic *National Geographic* article entitled "Our Immune System: The Wars Within" begins with this characterization: "Besieged by a vast array of invisible enemies, the human body enlists a remarkably complex corps of internal bodyguards to battle the invaders" (Jaret 1986, 702). A popular immunology book published in 1997 goes even further, claiming that "Friendly fire is the oxymoron used to describe gunfire or shelling that hits one's own soldiers in error. . . . When you're in the killing

business, you need to spare your allies. Similarly, the immune system needs to be able to correctly determine friend from foe, or ‘self’ from ‘non-self’” (Box and Sabin 1997). Even *The Economist* feels compelled to comment, telling us that “The immune system has the fearsome force of a disciplined military unit. Its scouts patrol the body, ever vigilant; when they see signs of foreign incursions they respond promptly and with proper ferocity” (Economist 1993, 83). (30)

Weasel goes on to argue that this is “xenophobic” and at odds with feminist values of coalition building and diversity. Although this set of metaphors is less explicitly gendered than the romance narrative of Emily Martin’s egg and sperm, this aggressive and violent representation of the immune system is associated with values of masculinity and is, at the least, incomplete. The countermodel Weasel presents views “immunity not as a search to ferret out foreigners and destroy them, but rather to maintain harmony in the bodily community by tolerating and incorporating outsiders, and detecting signals of danger without regard for their identity as self or other” (38-9), which is both more scientifically complete and more amenable to feminist goals.

Furthermore, the limits of objectivity point not just to the influence of our unconscious beliefs but also to the place of emotion in science. Kerr writes, “I think that any scientist will say that [doing science] is, at a very personal level, very passionate” (396), and Athena Andreadis compares science to “the building of the great cathedrals,” saying that

the deepest, most fundamental reason that makes people willing to become scientists, to put in endless amounts of energy and time into the effort at the

expense of their health and relationships, is the license to dream, the hope of making a novel connection, no matter how small—of experiencing those moments of epiphany that make it all worthwhile. (“The Double Helix” 16)

These testimonies clearly indicate the depth, complexity, and emotion involved in scientific work. For these scientists, their work is not simply about deduction or putting together puzzle pieces; it is imaginative, epiphanic, a way of creating or discovering beauty. Representations of science as cold or purely objective lead nonscientists to overlook the significance of beauty, imagination, and intuition in developing scientific knowledge.

But these comments alone do not address the critiques of traditional science as lacking human connection, since these experiences of beauty and joy, though significant, could easily take place in a traditional and even individual scientific setting. Neil Levy, on the other hand, argues that “[i]ntelligence, even in the hard sciences, and even in innovation, is as much ‘empathizing’ power as it is systemizing” (qtd. in Fine 109), and the National Academy of Sciences presents a similar argument to underline the significance of not only intuition and creativity but also the interpersonal components of doing science:

Much of the knowledge and skill needed to make good decisions in science is learned through personal experience and interactions with other scientists. But some of this ability is hard to teach or even describe. Many of the intangible influences on scientific discovery – curiosity, intuition, creativity – largely defy rational analysis, yet they are among the tools that scientists bring to their work.

(111)

Scientific work regularly involves working together with others, building upon one another's ideas, and sharing both the workload and the joys and pains of success and failure. But this social component, like the importance of intuition, is not regularly discussed and this lack of information leads to a misunderstanding of scientific work that makes it far too easy to dismiss or mischaracterize.

One of the most important critiques of science regards its ethics or lack thereof. As noted earlier, many people believe that scientists are not concerned with the results of their experiments on the world and on others but are only concerned with abstract knowledge. There have certainly already been far too many abuses of power and knowledge in the name of science to easily set these concerns aside (e.g., Tuskegee, atomic testing, Henrietta Lacks); however, to proceed as if all scientists were equally unconcerned with the consequences of their work is inaccurate and even irresponsible. There are scientists who actively stand against others using their work in unethical or harmful ways. For instance, Curtis Bell describes a movement to encourage neuroscientists to approach their field more ethically and to oppose use of their research for military ends:

Opinions will be especially varied concerning aggressive war, but the pledge simply commits signers, once convinced that a war is aggressive, to refuse to provide the government conducting the war with additional tools.

Signing this pledge will not stop aggressive wars or human rights violations, or even the use of neuroscience for these purposes. But by signing,

neuroscientists will help make such applications less acceptable.

The pledge gives neuroscience the opportunity to join with other professions in moving away from militarism and violence toward a culture of peace and respect for human life. Professionals and their organisations have a special responsibility in this regard, because they are members of a respected elite with knowledge and influence.

Our goal as neuroscientists and human beings should be to create a culture that encourages applications that enhance human life while discouraging those that damage it. If you are a neuroscientist and you agree, sign the pledge.

Bell and those who signed his pledge take responsibility for the potential consequences of their work and, although they recognize that this pledge in and of itself will not prevent misuse of neuroscientific research, they do what they can to “help make such applications less acceptable.” These efforts should be acknowledged and supported.

Ultimately, the more knowledge about scientists’ practices and beliefs is available, the more it becomes clear that the negative perception of science is often inaccurate and that the development of a specifically feminist science “does not demand a radical break with the science one has learned and practiced. The development of a ‘new’ science involves a more dialectical evolution and more continuity with established science than the familiar language of scientific revolutions implies” (Longino 218). These blurred and sometimes confusing boundaries between traditional and a more feminist science have deep roots, however. The history of these blurred boundaries can be illustrated by the examples of Romantic science and Barbara McClintock’s work.

The Romantics are usually associated with poetry, landscape and nature, and a turn toward experiences of the common people; they are not usually associated with science. However, the Romantic period was also a time of great scientific progress.

Roslynn D. Haynes notes key characteristics of Romantic science, including

a deep suspicion of abstraction alongside a rejection of materialism; an assertion of the importance of secondary characteristics and values as well as the measurable quantities of Newtonian physics; the rejection of mechanism in favor of organism, which in the last decades of the nineteenth century became formalized as the doctrine of vitalism; and a preference for spontaneity over causality as an explanation for phenomena. (91)

This description of the Romantic attitude sounds uncannily like the contemporary feminist skepticism about science; clearly, these concerns are not new, and, just as clearly, these critiques are not dependent upon explicitly feminist values and sensibilities.

Richard Holmes' recent bestseller *The Age of Wonder: How the Romantic Generation Discovered the Beauty and Terror of Science* provides a far more detailed view of science during the Romantic period that challenges the simple divisions of emotion and rationality, spirit and matter. He writes,

Romantic science created, or crystallised, several other crucial conceptions – or misconceptions – which are still with us. First, the dazzling idea of the solitary scientific “genius”, thirsting and reckless for knowledge, *for its own sake and perhaps at any cost*. . . . Closely connected with this is the idea of the “Eureka moment”, the intuitive inspired instant of invention or discovery. . . . The notion

of an infinite, mysterious Nature, waiting to be discovered or seduced into revealing all her secrets was widely held. . . . There was, too, a subtle reaction against the idea of a purely mechanistic universe, the mathematical world of Newtonian physics, the hard material world of objects and impacts. These doubts, expressed especially in Germany, favoured a softer “dynamic” science of invisible powers and mysterious energies, of fluidity and transformations, of growth and organic change. . . . The ideal of a pure, “disinterested” science, independent of political ideology and even religious doctrine, also began slowly to emerge. . . . With these went the new notion of a popular science, a people’s science. . . . It was the age when science began to be taught to children, and the “experimental method” became the basis of a new, secular philosophy of life, in which the infinite wonders of Creation (whether divine or not) were increasingly valued for their own sake. . . . Finally, it was the age which challenged the elite monopoly of the Royal Society. (xix)

I have quoted at length from Holmes’ introduction because he clearly outlines the relationship between Romantic and Enlightenment science and reveals incredible connections between the ideals of Romantic science and contemporary feminism, including emphases on intuition, fluidity, organic change, public access to scientific education, and the appreciation of the world itself. On the other hand, Romantic science and feminist science are not identical, and contemporary feminist science might take issue with the “genius” model, the seduction of nature narrative, and the insistence upon a disinterested science. Romantic science and feminist science need not be identical for

this revelation to be significant; Holmes' description of Romantic science makes it clear that science is – and has been for centuries – far more complex than many current perceptions of science indicate and that some goals of contemporary feminist scientists and scholars extend back hundreds of years.

In the 20th century, Barbara McClintock's work provides another instance of the complicated relationship between traditional and feminist science. However, instead of uncovering the feminist possibilities in nonfeminist science, this instance addresses the degree to which work that is often presented as feminist is actually uniquely feminist. McClintock, a Nobel Prize winning cytogeneticist, is frequently presented as a prime example of “what a ‘gender-free’ science might look like” (Keller, *Feeling for the Organism* xxv). Keller writes,

For McClintock, the *sine qua non* of good research is a feeling for the organism Respect for individual difference here invites a form of engagement and understanding not representable in conventional scientific discourse. What might look like privileged insight, and is readily misdescribed as a kind of mystical experience, is in fact a result of close, intimate attention and patient observation, maintained over days, weeks and even years. . . . McClintock's practice of science offers another possibility: it teaches us about a world in which self and other, mind and nature, survive neither in mutual alienation nor in symbiotic fusion, but in structural integrity. Her feeling for the organism need not be read either as sentimentalism or as mysticism: it is a mode of access – honoured by time and human experience if not by prevailing conceptions of science – to the

reliable knowledge of the world around us that all scientists seek. (“How Gender Matters” 49)

Here Keller highlights McClintock’s feeling for and engagement with her plants as well as her patience and nonhierarchical approach to the world, defining this in contrast to “conventional scientific discourse” or “prevailing conceptions of science.” She goes on, however, to write, “A deep reverence for nature, a capacity for union with that which is to be known—these reflect a different image of science from that of a purely rational enterprise. Yet the two images have coexisted throughout history” (*Feeling for the Organism* 201). McClintock’s scientific work argues, according to Keller, for “valid ways of knowing other than those conventionally espoused by science” (201), but not a rejection of science. Here again the relationship between traditional and feminist science becomes difficult to define.

Instead of continuing to think of science as opposed to feminism – as “static, global, obtuse, closed, objective” – and believing that it “claims to be acultural, is often resistant to skepticism and demands for tests, is covert, and is self-affirming” (Walker 158), we must begin to consider science as “dynamic, local, at times intuitive, particular, open, subjective, social, cultural, skeptical, demanding of observation, based on testing, overt, self-critiquing, and at times even revolutionary” (Walker 158) and to see that this definition of science is not at odds with feminist goals. As Ruth Bleier writes, “as a scientist and a political being, my mind lingers with pleasure when I encounter theories that allow for constant change, interaction, contradiction, ambivalence” (13). For her this connection is easily made; however, this common ground between science as it currently

exists and feminism remains difficult to find in practice for many others. Marta L. Wayne, for instance, argues that the two roles of feminist and scientist do not always coexist peacefully. She notes that “taking a step toward feminist community requires taking a step away from my scientific one” (147) and fears that her stance may cost her in the scientific arena. Similarly, Banu Subramaniam points to the cultural tensions inherent in bringing together disparate domains: “The cultural socialization—how people behave; what people talk about in labs, corridors, and over lunch—are in stark contrast. Working across the science/women’s studies divide is a profoundly schizophrenic existence” (527). The existence of these conflicts and fears illustrates the continuing necessity of bringing science and feminism together so that feminists do not reject science and so that feminist-friendly elements of science are brought to the fore.

All of this reveals that many people (feminist and nonfeminist alike) hold serious misconceptions of science that are limited and harmful but also that sorting out the tangled relationship between definitions of traditional and feminist science requires not a rejection of science as we know it, but a shift in focus. The project of creating a feminist science does not, therefore, lie solely in creating a new approach to doing science but also lies in uncovering and highlighting the feminist or feminist-friendly elements that already exist. Richard Holmes argues that “most histories of science . . . fail to illuminate science as a ‘creative human activity’ which involves the whole personality and has a broad social context” (94), and new histories and narratives of science that include this focus and context are needed.

Feminist SF can help with this project, calling attention to parts of science that

have been overlooked, providing nonhierarchical and experimental language for discussing the world, and modeling the possible ethical outcomes of scientific practice. In fact, as popular fiction with a broad audience and as a genre that is more and more thoroughly shaping the way we think about technology and the world,¹⁷ science fiction may be the ideal arena for changing the way science is popularly considered, both by affecting the expectations of future scientists and by experimenting with new narratives, connections, and scientific practices. As Robin Roberts writes, “Although feminist theorists like Harding and Keller call for a feminist re-envisioning of science, only science fiction can provide a field in which to explore—untrammelled—the ramifications of a new science” (“The Woman Scientist” 290). Similarly, Andreadis claims for SF a freedom that science itself does not have: “Science fiction may give its writers latitude to extrapolate wildly, but what makes it compelling is its capacity to make connections, to find larger relationships between domains that are kept in watertight compartments in the sciences” (“The Double Helix” 13). By using these freedoms, “intervening in and revealing the narratives, myths, and truth claims of science” (Merrick, “Modest Witnesses?” 220), feminist SF can emphasize and endorse elements of traditional science that are compatible with feminist goals while simultaneously exploring the possibility of a feminist science that does not yet fully exist.

¹⁷ China Miéville says, for instance, that “science fiction is becoming a kind of default cultural vernacular” (“China Miéville at the University of Kansas”) and István Csicsery-Ronay has written that “[i]t is from sf’s thesaurus of images that we draw many of our metaphors and models for understanding our technologized world, and it is as sf that many of our impressions of technology-aided desire and technology-riven anxiety are processed back into works of the imagination” (2-3).

5.3 Redefining Scientific Practice: Home and Garden

One element of developing a feminist science involves re-examining the history of scientific knowledge and, instead of ignoring the work done by women outside of laboratory settings, redefining the lines between science and nonscience so that these efforts are also considered.

Part of the process of developing science in its current form has been a move away from amateur science, often done at home or in the community, and toward professional science, done in laboratories and university settings, so that, “[w]ith the increasing polarization of public and domestic spheres, the family moved into the private domestic sphere, while science migrated to the public sphere of industry and university” (Schiebinger, *Has Feminism Changed Science?* 29). This professionalization brought with it a masculinization of scientific work since the excluded knowledge and practices have more often been those done by women, whether associated with stereotypically feminine tasks or taking place in the domain of the home instead of the workplace. Before this shift, however, women practiced medicine more often than men (Stanley 13), and women’s knowledge was practical and effective:

As late as 1600, women in parts of Europe commonly had access to some 200 contraceptives and abortifacients, of both a vegetable and a mechanical nature. Within Europe the decline of midwifery undermined traditional knowledge of contraception—knowledge that had typically passed along women’s networks from mother to daughter, midwife to neighbor. As a result, European women of the nineteenth century had more children than their grandmothers did and

understood less about their own bodies. (Schiebinger, *Has Feminism Changed Science?* 110)

The professionalization of science therefore not only excluded and disempowered women but also caused the loss of a great deal of information.

Reversing this movement away from women's knowledges could lead to dramatic changes in the way science is defined, both historically and currently, "from what men do to what *people* do" (Stanley 5). Muriel Lederman provides an alternate vision of the beginnings of science:

Imagine an individual in a pre-Scientific Revolution society posing herself the following questions: "Does the extract of the purple-leaved plant which grows on the hill a morning's walk toward the sun reduce the redness when applied to the wound caused by the bite of the spider? Does the liquid made by boiling the leaf stop the shivering of the fever which comes every year when the sun is low in the sky? If it stops the shivering, could the boiled leaves of the plant which grows by the river stop the shivering as well? The leaves of the plant by the river are green, but they are the same shape as the leaves of the purple plant."

For all we know, a train of thoughts similar to this may have been one of the starts of science. It contains all the components of science as we know it today; actually, it combines aspects of both experimental medicine . . . and biological classifications. (441)

The inclination to exclude this from our definitions of science both builds upon and reinforces the current vision of science as separate from the lived world, something that

one does in a sterile environment; however, the methods involved in this example and in what we consider science are essentially the same. As Harding writes, “It is unclear how one would define this term (scientific method) in such a way that highly trained scientists and junior members of research teams in physics counted as scientists, but farmers in simple societies (or mothers!) did not” (“The Method Question” 28). This revision of the history of science incorporates a far greater range of activities and knowledges, many more of which are practical developments for the home or for women’s bodies.

Furthermore, this incorporation of previously overlooked women’s contributions to science could help counter the perception of the feminist movement and feminist SF specifically as anti-science. Jane Donawerth writes, “An emphasis on a science situated in a decentralized, nonhierarchical society, and operated as a craft industry creates a special problem for recent women novelists, who seem to traditional science fiction fans to be antiscience reactionaries” (*Frankenstein’s Daughters* 29), but some of what appears to be antiscience may only seem so because of the limited vision of science that many people hold. Lisa Yaszek notes the difficulty often associated with attempting to represent women doing science in mid-century SF texts, saying,

if a woman wants to practice science on her own terms, she must leave the patriarchal workspace and strike out for new territory—whether that territory is in the kitchen or outer space. They also seem to have agreed that the most effective way to tell such stories was to refashion those cultural myths that depict science and technology as masculine activities. (181-2)

Similarly, Helen Merrick has noted that one major problem for feminist science writers

and feminist SF writers is “the fact that the contemporary model of science constructs women as the objects, not the subjects, of science” (“Modest Witnesses?” 219). Addressing this problem requires looking both “for examples of SF which fulfill the empirical goal of situating women as scientists, and those that broaden the definition of science to include areas that more easily situate women as ‘subject’” (Merrick, “Modest Witnesses?” 219). Feminist SF narratives that highlight the kinds of scientific inquiry that has been so long excluded can be read as taking part in this project; where traditional scientific processes do not often “situate women as ‘subject,’” nontraditional sciences do.

Jean Hegland’s *Into the Forest* (1996) and Molly Gloss’s “Lambing Season” (2003) provide concrete, contemporary visions of this expansion of the realm of science. Just as in Chapter 2, these writers question the traditional valuations and judgments regarding science/technology and women; however, Hegland and Gloss avoid turning to magic as a response, thereby presenting science as more comprehensive and inclusive without diminishing its power.

Jean Hegland’s *Into the Forest*, which tells the story of two teenage sisters’ survival in rural California after the collapse of civilization, illustrates a shift from traditional visions of scientific practice to more homegrown and practical scientific practices. Even before everything around them falls apart, they lived apart from most people, since the girls and their parents lived outside of town, growing their own food and generally living off the land. After civilization ends and their parents die, however, Nell and Eva must learn to fend for themselves. Eva is a dancer, planning to join a prestigious dance company; Nell, intelligent and well-read, is studying to go to Harvard.

Neither of them are prepared to take over their parents' roles as caretakers and providers. At first, Nell and Eva attempt to live on the resources that remain from their life with their parents, denying the reality of their drastically changed future. Nell keeps studying and Eva keeps dancing. However, eventually, they realize that if they are to survive, they cannot keep living in this way. They have to learn to take care of themselves with only what the land around them can offer. Nell describes her realization of this fact in this extended passage, beginning with a reflection on her encyclopedia:

After London Stock Exchange comes Londonderry. After Londonderry comes the Lone Ranger. And after Lone Ranger comes Lone Woman of the San Nicolas Island:

In 1853, an Indian woman was discovered living entirely alone on an island seventy miles off the coast of Santa Barbara. According to contemporary accounts, in 1835, while her tribe was being removed from the island on orders from the Mission of Santa Barbara, a strong wind sprang up. In the confusion, a child was left behind. When its mother discovered its absence, she swam back to the island to look for it, but while she was gone, the gale grew more threatening, and the captain gave the order to set sail without her.

Eighteen years elapsed before the Lone Woman was discovered by a crew of sea otter hunters. Although no one could speak her language, she used signs quite eloquently. She indicated she had never found her child, and feared the wild dogs had eaten it.

She returned to the mainland with the hunters, and was greatly

disappointed to learn that none of her tribe could be found. She died seven weeks later.

And so the inexorable order of the encyclopedia speaks to my life yet again, this time making me face the worst truth of all: *There will be no rescue.*

Ever since this began we have been waiting to be saved, waiting like stupid princesses for our rightful lives to be restored to us. But we have only been fooling ourselves, only playing out another fairy tale. Our story can no more have a happy ending than the Lone Woman's did. The lights will never again come on out here. The phone will never ring for us. Eva and I will live like this until we die, hoarding and cringing and finally starving—if we aren't lucky enough to get our throats slit first.

However we die, we'll die here. Alone. (147-8)

This illustrates the fears and dangers associated with lack of knowledge of one's surroundings, highlighting the necessity of a deeper understanding of the land and, more importantly, of actively engaging with the world. Like Russ in *The Female Man*, Hegland here emphasizes the necessity of being strong enough to help oneself since "there will be no rescue."

The form Nell and Eva's attempt to help themselves takes differs quite a bit from that in *The Female Man*, however. Where Russ's characters turn to violence and separation, Eva and Nell turn to education about the plants in their forest and how they can use scientific knowledge and practices to survive on their own:

Tonight it came to me, as we sipped our bedtime cups of white tea—surely there

is more than just an afternoon's treat of berries in the woods. Surely the forest is filled with things to eat. The Indians who lived here survived without orchards or gardens, ate nothing but what these woods had to offer.

But I have no idea where to begin. I have studied botany. I know about plant morphology and physiology. I know how plants grow and how they reproduce. I can recognize a plant cell under the microscope, can list the chemical reactions that cause photosynthesis. But I don't know the names of the flowers we left on our father's grave. I don't know the names of the weeds we pull from the garden or even what kind of leaves we use for toilet paper.

I can recognize poison oak. I can tell a fir tree from a redwood. But all the other names—Latin or Indian or common—are lost to me. I can't even begin to guess which plants are edible or how else they might be used. *That bush*, I say, *that flower* or *those weeds*. And how can bushes or flowers or weeds feed us, clothe us, cure us?

How can I have spent my whole life here and know so little? (171-2).

In this recognition of how little she knows, Nell makes it very clear that one kind of knowledge alone is not enough. Her reading from the encyclopedia and her school science classes must be coupled with a practical, hands-on education, one that brings her into direct contact with nature. This turn to practice instead of theory calls to mind the “indigenous science” described by Londa Schiebinger as including “science traditions that do not fit the research-university model,” which “have clustered around agriculture and forest management because in many cultures women are in charge of food and food

preparation” (*Has Feminism Changed Science?* 42). Nell and Eva are now in charge of their own food and food preparation, of finding medicines for themselves, and of staying alive – not because they’re women but because they are all they have. They must create their own indigenous science, one that is not defined by professionals but by their own local and immediate needs.

As this indicates, Nell’s growing scientific understanding of the natural is shaped by contact with nature—but not just any nature. She must connect not with an idealized nature, but with the nature that surrounds her. She says,

Before, I was Nell and the forest was trees and flowers and bushes. Now, the forest is *toyon, manzanita, wax myrtle, big leafed maple, California buckeye, bay, gooseberry, flowering currant, rhododendron, wild ginger, wood rose, red thistle,* and I am just a human, another creature in its midst.

Gradually the forest I walk through is becoming mine, not because I own it, but because I’m coming to know it. I see it differently now. I’m beginning to see its variety—in the shape of leaves, the organization of petals, the million shades of green. I’m starting to understand its logic and sense its mystery. Everywhere I walk, I try to notice what’s around me—a clump of mint, a cluster of fennel, a thicket of manzanita, or a field of amaranth to gather from now or return to later, when the need is there or the season is right. (175-6)

Nell’s botanical education begins with book learning, expands to include observation, and finally also must include experimentation:

What an act of faith and luck it is to pluck and taste a little green leaf. With Eva

standing beside me and our mother's warnings buzzing in my brain, I felt as though I were re-creating the history of humankind as I bent, picked a leaf, brushed a delicate coating of dust from its surface, and took a nibble, so tentatively I think I expected it to burn my lips. But it had a cool, delicate, clean taste. It tasted sour and green, like chlorophyll, pickles, the evening air. It was a little tough, almost like lettuce that's bolted—but fresher, more alive. (174).

In her coming to relate to the forest as “just a human, another creature in its midst” as well as in her tentative tasting of the leaf, Nell moves from passive to active engagement with the natural world. She also gains an extensive knowledge and collection of useful plants:

This morning I went into the pantry—just to stand there, surrounded on all sides by our half-year's collaboration with soil and water and sunshine. In that close, windowless room, I looked at the food we had canned, at the pumpkins and potatoes piled on the floor, the strings of dried fruit and beans hanging from the ceiling, the bundles and jars of roots and leaves and barks and flowers I had gathered, all labeled with notes about where I found them, about what they might ease or cause or cure. I thought of the bags of seeds out in the workshop, all dried and sorted and waiting for spring, and of the barrels in the stump, heavy with acorns and berries and sow jerky, and I felt as though I had passed the Achievement Tests, after all. (207)

This collection, the result of her active engagement with the world, begins to resemble an informal laboratory itself in the focus on labels, organization, and purpose, and Nell

identifies this accomplishment of education and collection as equivalent in value to a formal test of knowledge. This test will provide more tangible benefits than simply abstract knowledge, however.

Furthermore, the emphasis here on “collaboration with soil and water and sunshine” is significant – this methodology is not about control, domination, or ownership. Instead, it incorporates an acceptance of the beauty and value of what is already present, which differs from what Nell is used to. Nell recalls the flowers that her mother used to plant around the house, asking,

Why did we ever buy flowers—great, gross, hulking things in plastic containers from the Buy-n-Save parking lot—that we watered, fertilized, fenced, and sprayed, and that still finished the summer ragged from slugs and snails and grasshoppers? Why didn’t we let the flowers grow where they would, healthy and strong and in their own time?

I wish my mother were alive so I could tell her that we didn’t need those Buy-n-Save petunias, didn’t need even her ring of tulips. *Clarkia*. *Columbine*. *Red Clintonia*. *Blue-Eyed Grass*. *Woolly Paint Brush*. *Red Thistle*. *Owl's Clover*. *Calypso Orchid*. *Golden Fairy Lantern*. *Globe Lily*. *California Poppy*. *Miner's Dogwood*. *Buttercup*. *Windflower*. *Solomon's Seal*. *Lupine*. *Vetch*. *Mountain Iris*. *Ceanothus*. *Fireweed*. *Shooting Star*.

We were surrounded by flowers all the time. (175-6)

Instead of dominating or showing ownership of the land through creating a landscape to match humans’ aesthetic values, Nell respects the natural world as it exists without her

influence. This is a common component of women's or indigenous sciences, which are built upon this closeness to and concrete understanding of the land, though this closeness and understanding does not mean that the land is seen as pure or untouchable, as Nell's dependence on and use of plants illustrates. Furthermore, Nell's process of learning to understand what is around her mirrors the process of developing a feminist science; just as Nell and her mother overlooked the flowers that grew there in favor of the storebought flowers, so do we overlook the science that goes on around us all the time when we privilege only professional science. We have been surrounded by science all the time, even when we did not recognize it as such.

Finally, Hegland's novel presents scientific practice not just as something hands-on, even visceral, but as something that can be emotionally satisfying. In doing so, Hegland counters the common narrative of science as cold and unemotional without changing its basic structure of experimentation. This emotional satisfaction emerges in the emphasis on beauty above, but it goes well beyond this. Nell's scientific practice ultimately leads her to a fuller experience of her life. She says,

I'm just a core, a kernel, a coal tucked in a bit of breathing flesh, listening to the rain. My life fills this place, no longer meager, no longer lost or stolen or waiting to begin.

I drink rain and it quenches an ancient thirst.

This is no interlude, no fugue state.

The moon wanes to the barest crescent. I grow content. (228)

Over the course of the book, Nell's relationship with the land, with her sister, and

with herself all change significantly. Her contentment and optimism are built on her growing confidence in her own ability to learn and to work with the world. Experimentation is not something separate from her life or merely abstract and theoretical, but something intimate and pragmatic. In one striking instance of this mindset, Nell describes the birthing of Eva's baby and healing of Eva as "the experiment I am conducting" (222). Their lives are experiments because they are learning all the time and have no idea what the end result will be.

As a result of the changes Nell goes through, she looks forward to a future with Eva and Burl, Eva's son, in which, she says, "Perhaps we could create new stories; perhaps we could discover a new knowledge that would sustain us. In the meantime, I would take the *Index* for memory's sake, so I could remember—and could show Burl—the map of all we'd had to leave behind" (Hegland 239). This future includes her development of a sustainable science (both environmentally sustainable and emotionally sustaining) built on an intimate understanding of the world as opposed to the old, abstract knowledge that came, for her and for many others, only through books. Nell does not abandon formal knowledge altogether – she does take the *Index* – but her choice to take only the *Index* is motivated not just by its relatively small size but by the fact that the encyclopedia is no longer a guide with all the answers. It is a map to the past, not the future.

Molly Gloss's "Lambing Season" further challenges the divide between scientific and nonscientific knowledge. This story centers on the experiences of Delia, a shepherd, while spending months of quiet time on the mountains with just the sheep and the sheep

dogs until an alien begins to periodically land on a nearby hill. The alien does not speak, nor does Delia speak to the alien, but whenever he returns to his landing place, she goes to quietly keep him company until he flies away again. This continues until on one attempted landing, he crashes and dies soon after while Delia keeps him company. This story is not primarily about science, but it does illustrate key values espoused by feminist scientists and traditional scientists alike: patience, carefulness, open-mindedness. In Delia's relationship with the land, sheep, dogs, and the alien, in which she watches carefully and learns from that observation, she has what is called in McClintock's case "a feeling for the organism." She is a successful shepherd because "[s]he studied the sheep for the language of their bodies, and tried to handle them just as close to their nature as possible" (136), and she understands the animals well enough to be able to effectively communicate nonverbally with them through her body language. This is the kind of understanding scientists hope to gain of their subjects and the kind of understanding that indigenous science has long built upon.

The story also blurs the line between scientific practice and mundane tasks like shepherding when Delia turns to astronomy after the death of the alien. The same qualities that served her well as a shepherd apply to astronomy, too:

She was indifferent to most discomforts, could sit quietly in one position for hours at a time, teeth rattling with the cold, staring into the immense vault of the sky until she became numb and stiff, barely able to stand and walk back home. Astronomy, she discovered, was a work of patience, but the sheep had taught her patience, or it was already in her nature before she ever took up with them. (144)

Gloss does not claim Delia's knowledge of the sheep and dogs as itself a science, but Delia's observation of the sheep and the stars side by side visually helps establish this connection:

she stood with both hands pressed to her tired back, looking out at the sheep, the mottled pattern of their whiteness almost opalescent across the black landscape, and the stars thick and bright above the faint outline of the rock ridges, stood there a moment before turning toward the trailer, toward bed, and afterward, she would think how the coyote and the sorrowing ewe and the dark of the July moon and the kink in her back, how all of that came together. (138)

The sheep and the stars are part of the same system, both white points of interest against blackness, both needing to be understood, to be explored. John Herschel, in *A Preliminary Discourse on the Study of Natural Philosophy* (1830), writes, "To the natural philosopher there is no natural object unimportant or trifling . . . a soap bubble . . . an apple . . . a pebble . . . He walks in the midst of wonders" (qtd. in Holmes xiii). Delia, too, walks in the midst of wonders – whether sheep or aliens.

Hegland and Gloss draw on the history of women's science as well as elements of traditional science to combine careful observation, experimentation, and education with experience, emotion, and personal connection and thereby counter commonly held beliefs about science as separate from the lived world. The focus in these texts on the connections between scientific knowledge and everyday life also provides a model for overcoming common fears about science, helping to open the sciences to women and the layperson. Barr and Birke's study of adult women students' responses to science reveal

that there is, for many people, a sharp divide between science and common knowledge: “Knowledge that is useful to them in their everyday lives is likely to become named as common sense, while ‘science’ is something unreal, divorced from reality” and they are likely to hold “the notion that science is the prerogative of ‘special’ people, that it is far removed from everyday lives” (36) and that it “is owned by other people” (64). As a result of this divide, Barr and Birke conclude, “Promoting a ‘gee, ain’t science wonderful’ response without encouraging people to feel that they, too, can be part of it is likely only to perpetuate the boundaries between those who have, or have not, got what it takes to be a scientist” (37).

However, education can change these ideas. The women in Barr and Birke’s study were engaged in science education programs, but SF is also a source of many people’s science education. One woman in the Barr and Birke’s study says, “Science is about life but before Inside Science I’d have said it’s about labs, bunsen burners, test tubes, that sort of thing. Now I feel it’s something that affects us all” (49). When Hegland’s Nell and Gloss’s Delia make personal connections with scientific knowledge, they illustrate the way that “[t]he arcane world of the laboratory bench is replaced with ‘the world around us’” (Barr and Birke 49) and help to establish conceptions of science as everyday. One woman says,

We are all part of science. We all take part in discoveries; we help one another find out why a tree is dying or what’s wrong with us without going to an expert. And at home we figure out how to mend things. But our views aren’t respected. Science is something everyone should know. It shouldn’t be segregated. We’d

be more confident if it wasn't left to the white coats. (Barr and Birke 66-7)

SF can most definitely provide a vision of science that is not “left to the white coats” but put in the hands of ordinary people, for whom this knowledge is practically and emotionally vital. It can also be a way of bringing women into science by “encouraging them to label knowledge they already have as scientific and, as such, subject to empirical check like any other scientific knowledge” (Barr and Birke 132). As seen in both *Into the Forest* and “Lambing Season,” this is not a move away from science but, since scientific methodologies and values are still accepted, an argument for science’s value and presence in multiple realms.

5.4 Challenging Hierarchy and Dichotomy

Reconsidering what counts as science challenges (without eliminating) the fundamental boundaries that have grown up between science and nonscience, but a full-fledged feminist science must go beyond this. It is not enough to simply include a broader range of activities under the umbrella of science; other dichotomies and hierarchies – for instance, between internal and external, self and other, nature and culture, rational and emotional, male and female – must also be addressed. Nicola Griffith’s *Ammonite* (1992) and Joan Slonczewski’s *A Door Into Ocean* (1986) model this process and build on this definition of science provided by Barr and Birke: “To move beyond boundaries: that is truly engaging in the process of making science” (140).

Ammonite is set on a relatively newly discovered world—Jeep—that is being explored for commercial purposes; attempts at colonization are, however, inhibited by the

presence of people on Jeep, some of whom are earlier settlers from Earth. The attempts to colonize the world are complicated by the presence of a virus on Jeep that kills men but not most women. The settlers must take a medicine called FN-17 regularly to keep from being contaminated by this virus and are severely restricted in their movements as a result of this necessity since, even though women may survive the virus, it is a dangerous and painful illness and many do not survive. So when Marghe, the protagonist, goes to the surface of Jeep and is separated from the outpost, Port Central, and the medication she needs, she must learn to live with the women of Jeep and hope that she can survive the virus.

The inhabitants of Jeep who survived the virus have developed a culture of their own that is in some ways very familiar to Marghe and in other ways entirely foreign. They have built upon traditional Earth science in some ways: “From test results, she knew that the first colonists had been adept bioengineers: genetic material from Earth flora and fauna was present in indigenous species, and vice versa. The colonists had created viable crops and livestock” (36). However, their ways of knowing are not limited to laboratory-approved techniques and knowledge. Marghe reflects, “This was something new. She knew these people had evolved cultures resting on bases very different from those of any Earth people; she did not know whether that made these women human or something entirely Other” (49). One example of this otherness can be found in the way that some of them have shaped the landscape to make room for themselves to coexist with it by “selecting a tree, bending it, pruning it judiciously as babies were born, girls grew, and old women died” (49) so that its shape would match

that of their community. They would then live within and alongside the tree. Marghe, thinking as an anthropologist, determines that “[t]he use of such building materials must be indicative of the social temperament of these people: patient, planning for the long term. Also willing to experiment” (49). These practices are built upon traits conducive to scientific learning and experimentation but go well beyond traditional conceptions of science; they grow out of a deeper understanding of the physical world and their place in it. This sense of the natural world as not just a tool but as something to be cared for and maintained presents the possibility of a more fluid and ethical relationship between self and world.

This observation is made while Marghe still lives at Port Central and has full access to the vaccine; her understanding of the Jeep natives changes far more dramatically once she lives among them and becomes one herself. She must change the way she sees the women as she loses her ability – and eventually her desire – to separate herself from them and starts to see them as people like her. When first living amongst them, she realizes that “this was no longer an exercise in anthropology and that she was no longer studying in the field, she *was* the field” (89). She reflects, too, that “Here she was in Ollfoss, the place she had been traveling toward for two years in order to . . . *study the people like shells found on a beach*. She was not sure she wanted to do that anymore” (178-9). This process is an important part of the feminist science that Griffith models in *Ammonite*. Instead of objectively observing the subject of analysis from afar, Marghe becomes a part of it. She goes in instead of pulling back; she embraces rather than dissects. It is frightening for her to “take a step into the unknown” (185) and “step out

from behind her professional persona and be naked, vulnerable. Herself” (186). However, it is also rewarding. In taking this step, she breaks down the hierarchical model of objectification and distance and replaces it with an experiential model of learning based on respect and mutuality.

This experiential model also takes place within Marghe’s own body. She learns, post-virus, to trigger a trance during which she can visualize and control her physical responses and development:

Her electrical rhythms, her brain activity, began to cycle hugely and slowly, like an enormous skipping rope. Behind her eyelids, she imagined her blood as a thick red river full of amoeba-like creatures: T cells, lymphocytes, phagocytes, doughnut-shaped hemoglobin, tumbling over and over, rushing past. . . . (225-6)

She visualizes “glandular production, the lymph system, her gut” (226), moving on to look at an individual cell, which was “like an enormous helium balloon in which she floated, swimming through cytoplasm and around mitochondria, bumping gently against the nucleic mass where DNA writhed like a nest of snakes” (226). Presented in both detailed medical language (lymphocytes, phagocytes, cytoplasm, mitochondria, etc.) and poetic imagery (“where DNA writhed like a nest of snakes”), this combination of science and poetry helps Griffith create an intimate scientific experience for Marghe and the reader. This is not detached science, working on impersonal cells or other people; this is as personal as the work can be. It is virtually a religious experience in its intensity, but it remains firmly grounded in materiality.

Furthermore, the kind of inner awareness and knowledge that Marghe exhibits

post-virus had already been available to her in a limited way through biofeedback techniques and meditative practices. She describes how she “learned to listen more to the beat that underlay her whole life: how it speeded up when she was tense or tired; how it was smooth and confident when she exercised regularly; how she could make it change if she breathed fast and hard, or slow and easy” (59). She extends her knowledge further by “[taking] up yoga, then chi kung and tai chi, until she could increase blood flow to various parts of her body at will” (59). Later in her life, Marghe is sent to an experimental psychology department where

[w]ith different words, they helped her relearn that her body was an intricate mechanism made of interconnecting parts, a homeostatic system: change this, and this alters, which changes this. And she relearned: with breath and exercise, music and self-hypnosis, until now she could cut blood supply from a hand or a foot, channel pain, slow or speed her metabolism at will, and more. (60)

Although biofeedback might be included within the realm of traditional science, yoga, chi kung, and tai chi would certainly not be. This elision of the distinction between science and nonscience creates a connection between Marghe’s deep post-virus knowledge of her own body and scientific knowledge, arguing that the inner awareness of the virus, which seems so far from most humans’ experience of the world and their own bodies, is but an extension of what is already possible. Even the ability to guide others in a trance, which seems so nonscientific and even magical, is seen as related to mass hypnosis and biofeedback and “a matter of training, that’s all” (210).

Finally, the virus allows Marghe to not only better understand her own body but

to connect with others as well:

It turns out that every cell in the human body—in every other body, too, plant and animal—and every molecule and atom in that cell, is in a constant state of vibration. . . . We're in constant communication with each other and with the outside world. Patterns of these waves explore everything close by, so all the time we're with other people we're unconsciously probing them. (343)

Individuals, this says, are not isolated or even truly separate and individual; instead, we are part of a larger system, always connected, always communicating, always part of something larger. Elizabeth A. Wilson writes about a similar interconnection in *Psychosomatic: Feminism and the Neurological Body* when she discusses the phenomenon of blushing, which is caused not by a physiological event or even by a psychological event that is limited to the blusher him or herself; instead, “it is what is in the mind of another person” that causes a blush. This seriously complicates the relationship between biology and culture. As Wilson writes,

the stuff of evolution is radically heterogeneous; certainly it is biological, but it is also psychological, cultural, geological, oceanic, and meteorological. We have been encouraged to think of the relations among these evolutionary forces as somewhat unilateral (the effects of the geological on the cultural), yet a closer examination of Darwin's work reveals a reciprocally configured system. (69)

Blushing is biological, psychological, cultural; it is “an event in which the very nature of muscles, nerves, and blood cannot be separated from the thoughts and actions of another” (76). Marghe's connection to others via cellular excitation and trance functions in the

same way to illustrate the interpenetration of self and other.

This connection occurs not just between people, either, but between people and the virus. “All life connects” (217), Marghe realizes, and the connection is beneficial for all involved:

Symbiosis, Marghe thought. Like allowing spiders to spin their webs in a house so that the flies and mosquitoes were kept to a minimum. Like the *E. coli* that flourished in her gut and helped her digest proteins and process fibers, the result of some bacterial infection in a million-years-ago-distant ancestor. (220)

With these connections and shifts away from unilateral relations to symbiotic relations, *Ammonite* blurs the lines between internal and external, self and other, and as such it directly engages nature as “not a thing-in-itself, a gene, for instance, or an ecosystem, from which we can separate ourselves, our cultures, or our politics” (Kuletz 321) but as “an intersubjective process of relation” (Kuletz 321).

Joan Slonczewski’s *A Door Into Ocean* also works to undermine dichotomies and hierarchies while expanding conceptions of scientific practice. In *A Door Into Ocean*, two very different cultures exist on neighboring planets: on Valedon, a culture much like our own, hierarchical, militaristic, capitalistic; on Shora, a culture consisting entirely of women who have adapted both biologically and socially to their ocean world. Valan culture is built on stone both symbolically and literally (city names highlight this: Chrysoport, Pyrrhopolis, Dolomoth, Iridis) and has a history of removing groups that get in the way of progress (e.g., trolls, “Valedon’s extinct native race of anthropoids” (17)). Shorans, or Sharers, on the other hand, have adapted to the demands of a watery world,

both physically, with inner eyelids for seeing underwater and webbed fingers to make swimming easier, and culturally. They live on rafts on the vast and constantly changing ocean and have no safe places to retreat to when the ocean becomes dangerous, so, in order to survive, they must adapt to the world's ecosystem, learn its patterns, and work to provide for themselves while avoiding major disruptions of those patterns. The primary tension of this novel regards the interaction between these two worlds. While the Sharers would gladly live peaceably as neighbors, Valans see Shora as nothing more than a resource: "The mineral potential of Shora's untapped seabed was one reason for a new interest in that moon. Besides that, of course, there were the medicines and perfumes, and above all the fine seasilk that the councilors and courtiers wore. . . . Seasilk and minerals—that was what Shora meant" (26-7). As these tensions rise, individuals from Shora and Valedon visit each others' worlds, the Sharers attempting to share understanding with the Valans and the Valans attempting to get past the Sharers' defenses and gain access to the resources they want.

Although at first glance, *A Door Into Ocean* seems analogous to the separatist worlds created by Gearhart, Russ, Sargent, and Tepper, Slonczewski uses the conceit of the separatist all-female world to break down gender binaries. The two worlds are built upon very different values that might be read as representing fundamental gender differences (militaristic versus peaceful, hierarchical versus communal); however, Fitting argues that "[a]lthough Slonczewski's vision distinguishes between male and female values, this is not ultimately tied to biological sex. There is no essential difference between men and women" ("Reconsiderations" 40). The majority of Valans and Sharers

stay true to the broad strokes described above, but there are certainly significant exceptions. As Slonczewski notes in her study guide to the book, “the story does not conclude, for example, that female is superior to male; when characters express such views, they are shown to be mistaken. The course of events is initiated, driven, and largely resolved through Merwen’s quest to adopt a male Valan and prove that he is equally human to Sharers.” Merwen succeeds in this quest with Spinel, a Valan boy, who, by the end of the book, learns the Sharers’ techniques and chooses to live there even with no hope of returning to his home on Valedon. Even Realgar, the military leader who fights the Sharers throughout the book, is eventually changed by the Sharers’ ideas. Although he is still a Valan and will never be a Sharer, he comes to see the world differently – “Somehow, he would never see a glass again, or look into the eyes of a cornered bear, without knowing that the wildest thing he ever hunted still swam beyond his grasp (365) – and is ultimately unable to betray the Sharers. He even tells his leader, that “[i]f every planet in the Patriarchy refused to be ruled, *we all would be free*” (363), which is a very Shoran response and one that leads his leader to express serious disappointment in him as someone who “listened to *them* for too long” (363). On the other hand, some female characters are more at home with Valan values. Jade, for example, who belongs to the Valan military, proves herself to be hard, cruel, and heartless; her femaleness is far less important to her character than her Valan-ness.

Despite these exceptions, most characters remain true to the original dichotomy between the planets, not because of their gender but because they are so strongly shaped by the technologies of their worlds. Fitting writes,

Nor does the juxtaposition of male and female values repeat the essentialist rejection of technology as male (as it did in Gearhart's *Wanderground*). The crucial distinction is rather between a machine and what might be called an "organic" technology. ("Reconsiderations" 41)

The machine works through binaries (on/off) while the organic works through symbiosis; the machine is hard while the organic is, if not soft, adaptable. The characters follow these models – Realgar and Jade see things as either right or wrong and are unyielding and forceful while Merwen and the other Sharers emphasize the interconnectedness between themselves and others (both Sharer and not-Sharer) and practice passive resistance.

Furthermore, *A Door Into Ocean* contributes to the project of imagining a feminist science by presenting a scientific practice that is built upon scientific principles and values of experimentation and rationality but that also, in its emphasis on the organic, recognizes the importance of the natural world and places the scientist within that world rather than above or outside it. Donawerth writes that "Slonczewski does not romanticize feminists' political goals by assigning those goals to nature and masculine goals to Science; she acknowledges that an alternative society would need an alternative way of exercising power in relation to the natural world" (*Frankenstein's Daughters* 97). This alternative way brings together lived experience and laboratory science:

In making women the subject of science, Slonczewski finds that science must be redefined and its boundaries redrawn: the result is a utopian science that puts science in the home, that reconceives the home as organically related to the

natural environment, and that thus is controlled by an ethic very different from our current science—a sharing ethic. (Donawerth, *Frankenstein's Daughters* 12)

Redefining science in this way challenges the negative ideas about science that were found in Barr and Birke's study by placing it in a familiar and friendly setting. Barr and Birke find that

[m]etaphors of control and manipulation abound, almost half of the returns (46 percent) referring explicitly to science's and scientists' isolated, "separate," and abstract(ed) qualities—its/their "dissociation from reality," in the words of one woman. One respondent clearly sees laboratories as *removed* from nature when she writes: "works in a lab far away from nature." (123)

In the case of the Sharers, this removal is itself removed. For them, the lab is not just a workspace, but home and nature, too.

A science that brings together laboratory, home, and nature does not require isolation, separation, or dissociation from reality; in fact, it demands just the opposite. Similar to the way that some of the inhabitants of Jeep in *Ammonite* make their homes by shaping trees and living within them, "Sharers dwell upon giant raft trees, building silkhouses upon them and tunneling into them where they conduct 'lifeshaping' science" (Slonczewski, "*A Door Into Ocean*: Study Guide"). In both cases, the people and the trees grow together. And because of the multi-functional nature of their raft homes, protection of their rafts also amounts to protection of their scientific knowledge: "Sharers maintained libraries of genes for many species, from edible fish and weeds to seaswallowers and shockwraiths. . . . The ultimate library was kept within raftwood:

every living cell of every raft held a library within its genes, millions of units within a cell too small to see” (249). Furthermore, this library is not simply for abstract knowledge but is part of their responsibility “to share care for all the lesser sharers as for themselves” (249). Thus, caring for their work means caring for themselves and for the larger world. The Valans do not understand this relationship, however, and are therefore at a significant disadvantage as the Sharers’ combination of home and laboratory “enables them to successfully thwart the plans of the invading male army that hopes to control this planet of women by destroying their scientific bases precisely because it never occurs to the invaders that anyone might practice science at home” (Yaszek 206). Shoran science breaks down the boundaries between self and other, home and work, human and nature. By bringing the lab into the home, uniting science and nature, Slonczewski does not simply reverse the terms associated with science and gender but changes them. She writes not of a dichotomy between science and life, lab and home, nature and culture, but of relationships, of “the continuum of flesh” (219).

Another way that *A Door Into Ocean* addresses these issues is in its attention to language and the way that language affects thought, social constructs, and ethics. The Valans use language in much the same way we do. It’s more oriented toward stone, but the structure is the same and there are few unfamiliar words or phrases; Sharer language, on the other hand, is fundamentally different from ours. As their name indicates, the Sharers’ language – and mode of thought – is built upon sharing. Linguistically, “The deconstruction of polarities is mediated in part by the unique language of the Sharers which conflates subject and object” (Slonczewski, “*A Door Into Ocean*: Study Guide”).

Merwen, visiting Valedon early in the book, describes the concept of “wordsharing” to Spinel by reminding him that “[e]ach force has an equal and opposite force” (34). Their language highlights this action and reaction by using “share-forms” like “learnsharing, worksharing, lovesharing” (34). Spinel finds this concept difficult and tests it against Merwen’s patient responses:

“Do you say ‘hitsharing,’ too? If I hit a rock with a chisel, does the rock hit me?”

“I would think so. Don’t you feel it in your arm?”

He frowned and sought a better example; it was so obvious, it was impossible to explain. “I’ve got it: if Beryl bears a child, does the child bear Beryl? That’s ridiculous.”

“A mother is born when her child comes.”

“Or if I swim in the sea, does the sea swim in me?”

“Does it not?”

Helplessly, he thought, She can’t be that crazy. “Please, you do know the difference, don’t you?”

“Of course. What does it matter?” (34)

Where Spinel finds this way of thinking ridiculous and crazy, Merwen thinks it ridiculous and crazy to think otherwise, noting that these distinctions do not matter. This emphasis on sharing begins but does not end with language; it affects the way they see the world. If all is shared, if all action is both given and received at one and the same time, then the Sharers’ responsibility to their world is even more foundational to who they are. It is not

something they have had to work out but something that comes as readily to them as fighting for self-preservation does for the Valans. For them, as their language highlights, preservation of Shora is also preservation of themselves. They share preservation. This also means that this care is not a sort of stewardship but a relationship of equals, among equals. After all, as Merwen notes, to rule over others is to be ruled: “who rules without being ruled?” (34). By highlighting the interconnectedness of self and other, the Sharers’ use of language demonstrates how important language and metaphor are to constructing fair and ethical practices, including within the sciences.

The Sharers’ nonhierarchical language thus responds to Bonnie Spanier’s discussion of gendered language within the sciences. A feminist intervention in contemporary science, she argues, must involve changing how we talk about science because the way scientists think about and represent the world is inextricable from issues of who is encouraged to do science and what political goals scientific research supports. Donna Haraway writes that “myth and tool mutually constitute each other” (“Manifesto” 23) and so the myths we choose, the stories we tell, the language we use, all contribute to the development of the tools at hand. Spanier writes,

While it may be argued that metaphors are not the actual science, it has become increasingly obvious that metaphors and other relational aspects of language usage are the means by which data are shaped into scientific concepts (keep in mind that “data” include descriptions as well as quantitative measurements). This awareness brings into sharper focus the layers of mediation between what we call nature and what we call the science of nature: perceptions, descriptions of those

perceptions, choices shaped by beliefs and efforts to make contextual meanings, interpretations, and the language used for all of these. (23)

In the Sharers' language, there is still metaphor, still mediation, but the very different focus of these metaphors changes the practice of science itself. Not only are the objects of study not unnecessarily gendered, but they are not even really simply *objects* of study, for that conception would run counter to the mutuality inherent in their language and mindset. Perhaps the changed scientific language that we need would not be identical to that of the Sharers, but some new language is necessary and Slonczewski clearly illustrates both this necessity and the potential consequences of such a change.

Both Griffith and Slonczewski envision ways of doing science that build upon but also stretch the limits of traditional science. Self and other, nature and culture, male and female – these are all intertwined in ways that are far more complex than traditional science (or at least the popular understanding of traditional science) allows for. Even if the literal and physical connections and boundary-crossings described here are not all possible, the principles they build upon are valuable. Would we theorize differently about the world in which we live if we truly saw ourselves as part of it? If we were committed to nonviolence and to nonhierarchical language, would we conceive of different projects? And if we used different language, language that developed connections between self and other rather than reinforcing gender divisions, would our sciences be more equitable? These novels argue that we would think differently as a result of such changes, but also that this change in philosophy and language would not also require a rejection of science. Nicola Griffith writes, in *Ammonite*,

Human was not just family dinners, human was also the Inquisitions of Philip, the extermination of the Mayans, the terrible Reconstruction of the Community. Human meant cruelty as well as love, human was protecting one's own at the expense of others. Human also meant having the capacity to change. (99-100)

This description of being human applies to science as well. Science has brought great knowledge and the ability to do wonderful and fantastic things; it has also helped create more and more horrible ways of destroying the earth and killing other humans. Most importantly, however, science has within it the possibility for change. Just because it has been biased or harmful in the past does not mean that it must continue to be that way in the future. And, as Slonczewski writes, "You are as responsible for what you let happen as for the actions you share" (*A Door Into Ocean* 239). If we allow science to remain biased, harmful, or misunderstood, we are responsible for the results of those choices. The communities on Jeep and Shora model ways to embrace both science and interconnection in order to create more positive uses of science that we can gladly take responsibility for.

5.5 Considering the Consequences: *Woman on the Edge of Time*

Finally, I turn to the ethics of a feminist science. In *A Door Into Ocean*, the Sharers' science is built on an ethic of care for others and for the self, which highlights the value of an ethically grounded science and worldview. Slonczewski's vision of an ethical, feminist science is particularly significant because *A Door Into Ocean*, unlike presented in *The Female Man*, *The Shore of Women*, and *The Gate to Women's Country*,

is consistently allied with nonviolence, not as a way of reinforcing gender divisions by implying that the Sharers are nonviolent simply because they are women, but as an active and continually renewing process. For instance, the Sharers use their technique of whitetrance, a deep meditative state, to conduct sit-ins at the Valans' rafts. They gather at the edge, enter whitetrance, and refuse to leave. On some occasions, the Valan soldiers push them into the water while they are in this state, but they never respond with violence or anger toward the Valans. Some of the women have to work to maintain a nonviolent posture, wishing to fight back and feeling tempted to use violence. The Shoran leaders, however, know that this is unwise and dissuade the angry and frightened Sharers from deserting their nonviolent principles. In the one case where violence is used on their behalf, when Nisi attacks the Valan base, this action prompts some of the most direct violence from the Valans, showing the lesser effectiveness of violent resistance. Realgar, the Valan leader, believes that Nisi must have been supported by other Sharers because "Sharers never act alone. All decide for one, and one for all" (307). He is wrong about this, but it does not stop him from using this as an excuse to institute a new policy: "From now on, the slightest infraction of Valan orders will be met with execution on the spot. To demonstrate our intent, the Protector and four of her Councillors shall be put to death" (308). Despite this complication, however, the Sharers' nonviolence works. Through the use of nonviolent techniques, the Sharers are able to fend off the Valan invaders. It may be temporary, but it is a concrete victory. This consistent rejection of violence in the creation and defense of Shora and its success, especially when seen in contrast to the violent foundations of Whileaway and the troubling goals of the women's

science in Tepper and Sargent's worlds and when read in conversation with real-life nonviolent techniques, provides a clear endorsement of the Sharers' approach, both indicating that science without domination is possible and connecting that possibility to feminist and nonhierarchical values.

Marge Piercy's *Woman on the Edge of Time* (1976) provides an even more thorough vision of how an ethical science might be conducted that focuses specifically on science as a site for and source of ethical behavior. Piercy accomplishes this through the story of Connie Ramos, a poor Chicana woman of the 1970s who is able to communicate with the future, thus juxtaposing the contemporary science of the U.S. in the 1970s with the future science of Mattapoissett in 2137. In the present, Connie's experiences with science are painful and abusive. This is made clear in a passage early on when Connie is taken to a psychiatric hospital:

she left the world and entered the underland where all who were not desired, who caught like rough teeth in the cogwheels, who had no place or fit crosswise the one they were hammered into, were carted to repent of their contrariness or to pursue their mad vision down to the pit of terror. Into the asylum that offered none, the broken-sprunged bus roughly galloped. Over the old buildings the rain blew in long gray ropy strands cascading down the brick walls. As she was beckoned out with rough speed, she was surprised to see gulls wheeling above, far inland, as over other refuse grounds. Little was recycled here. She was human garbage carried to the dump. (24)

Because she is not judged to be normal, she is also not judged to be worth caring for and,

as a result, she has no rights. Her forced and unnecessary hysterectomy, done “because the residents wanted practice” (37), illustrates this, as does the doctors’ tendency to see her as less than human: “How that Dr. Redding stared at her, not like she’d look at a person, but the way she might look at a tree, a painting, a tiger in the zoo” (84). Other patients are treated similarly: “they had given hepatitis . . . to a whole lot of little kids in Willowbrook, a state institution. Some doctor had injected little kids who hadn’t done anything wrong except to be born dim-witted, and got a big reward for it” (80).

These abuses represent the scientists and doctors as dangerous (“It was the staff she must watch out for” (51), she learns), not just because they see her as less than human, but also because they have far more power than she:

All those experts lined up against her in a jury dressed in medical white and judicial black—social workers, case workers, child guidance counselors, psychiatrists, doctors, nurses, clinical psychologists, probation officers—all those cool knowing faces had caught her and bound her in their nets of jargon hung all with tiny barbed hooks that stuck in her flesh and leaked a slow weakening poison. (52)

In this world, “[t]he mad are invisible” (135), voiceless, and at the mercy of the doctors. The final chapter of the book, consisting of excerpts from psychiatric reports on Connie Ramos, further highlights this invisibility and lack of power. In the reports, Connie is diagnosed as paranoid schizophrenic and her symptoms are clinically enumerated, but the narrative provided here does not match the narrative we have experienced through Connie’s perspective. Rather than, as the doctors might argue, revealing how dissociated

Connie is from reality, this serves to undermine the authority of the psychiatric institutions themselves since Connie's story carries more weight for the reader and since the notes contradict themselves in places and cannot manage to describe her accurately (e.g., at times in the notes she is Puerto Rican and at other times Mexican American). This shows how little the doctors and scientists know of Connie's life and how little they care to know. This representation of science reinforces all of the negative associations that are popularly held – that scientists are cold, cruel, and calculating, that they do not care for their patients, that they are distanced from the real world.¹⁸ In these ways, Piercy emphasizes the power that scientists and medical professionals can have over those who come to them for help.

Mattapoissett, a utopian society that is far from abusive but that still has a well-developed scientific foundation, provides a counterpoint to this representation of science. However, some critics, in discussing the contrast between the two, misrepresent the science of Mattapoissett. For instance, Robin Roberts argues,

As it is in other female utopias, soft science is explicitly contrasted to the negative hard science exemplified by Connie's mistreatment by the doctors who will not hear her message. . . . Piercy completes the dissection of male science through Connie's retelling of the true story of male doctors playing with female lives

¹⁸ Tellingly, even though Luciente is a plant geneticist, Connie says, "It's so hard for me to think of you as a scientist! . . . I mean, the only scientist I know is Dr. Redding.... I guess we're his experiments. But I'd hardly ever meet a scientist, I mean, in East Harlem. Not that I'd want to..." (268). Luciente's self-presentation and practice of science (as someone who treats Connie humanely and with respect) is so different from that of Connie's doctor back at the institution that she has difficulty placing them in the same category.

through placebo birth control substitutes. . . . Piercy's *Woman on the Edge of Time* interweaves scientific reports with Connie's story to shock and alienate the reader from hard science. (*A New Species* 85)

While Piercy definitely presents a harsh critique of contemporary science in Connie's experiences with doctors and institutions, Roberts' reading of Mattapoisett is problematic. She contrasts contemporary science and Mattapoisett's science by dividing them into hard and soft sciences. Regarding Mattapoisett's science, this is not entirely incorrect, as it is generally oriented toward social relations and biology¹⁹, but the medical science of Connie's present is also oriented toward social relations and biology. Without this more traditional division in place, what, then, is this distinction between hard and soft built upon? Roberts' definition of hard science seems to be much more about the negative values associated with it than about the science itself (explicitly described as "negative hard science"), and she claims that, in Mattapoisett, "magical powers are nurtured into a soft science" (274). This blurring of categorical distinctions implies that actual hard sciences (e.g., physics, chemistry, geology) cannot coexist with the values held in Mattapoisett. Despite the emphasis on Mattapoisett on nature, art, and family, though, there is evidence of other, harder, technologies as well. The best example of this is the kenner, which is a wrist computer that all Mattapoisett residents wear to help them communicate with other people and to store memory and information. Connie also discovers a screen set into the wall of Luciente's space that appears to be simultaneously

¹⁹ Biology remains in a liminal position between hard and soft sciences – it has traditionally been considered a soft science (and SF based on biology, soft SF), but its position may be changing as we learn more and more about genetics and the internal workings of the body.

television, computer, and communicator. In these instances, Piercy does not “shock and alienate the reader from hard science” but brings hard science into Mattapoisett and reveals its possibilities for connection with and better understanding of others.

Similarly, M. Keith Booker has argued that Mattapoisett is somewhat antitechnological. He writes that “Piercy's Mattapoisett is actually quite high-tech, but its technology is decidedly kinder, gentler, and more biodegradable than that of the Western patriarchal tradition” and that “the contrast between the utopian and dystopian futures of *Woman on the Edge of Time* comes dangerously close to being a version of the opposition between nature and technological culture that has informed a number of feminist arguments in recent years” (343). Again, this implies a disconnect between Mattapoisett’s values and its level of technology. But the high-tech nature of Mattapoisett’s society is not made less high-tech by its “kinder, gentler, and more biodegradable” nature or by the fact that it has “[n]o skyscrapers, no spaceports, no traffic jam in the sky” (60). Nor is Mattapoisett more “natural” than technological; it is both natural *and* technological.

The distinction to be made between Mattapoisett and the present is not in the types of science they have but the uses to which they put these sciences. Mattapoisett science can be seen to improve individuals’ lives, the community, and the larger world by creating and helping to support gender equality and ecologically sound practices. As Patrocínio Schweickart notes, “the utopian character of Mattapoisett depends on certain technological innovations” and, thanks to these innovations, they have “succeeded in eliminating the basis for the sexual division of labor” (205). The development of genetic

science and technologies like the brooders where babies are grown and born make it possible for men and women to take a more equal share in mothering and to gain greater freedom from biological processes. Luciente explains,

It was part of women's long revolution. When we were breaking all the old hierarchies. Finally there was that one thing we had to give up too, the only power we ever had, in return for no more power for anyone. The original production: the power to give birth. Cause as long as we were biologically enchained, we'd never be equal. And males never would be humanized to be loving and tender. So we all became mothers. (97)

As a result, women are not expected to bear and care for children, but they may choose to do so; conversely, men are not expected to meet arbitrary standards of masculinity. Instead, male and female roles are brought together, so that all are basically human, with the same potential choices and responsibilities. The idea of men mothering is not simply symbolic, either, nor is the removal of "the power to give birth" a naïve rejection of embodiment, for men can breastfeed.²⁰ Eliminating gender inequities in this way – not by eliminating one gender, as in Russ, Sargent, and Tepper – but by using technology to eliminate the structural incentives to inequity makes the science of Mattapoisett truly feminist.

²⁰ It is not simply about making men more like women, however, for "women as well as men defend Mattapoisett's values in the ongoing war against 'the enemy' who would eradicate them" (Rosinsky 101). Connie's misrecognition of Luciente's gender, thinking her a man because of her "brisk unself-conscious authority" and Luciente's physical behaviors – she "sat down, taking more space than women ever did. She squatted, she sprawled, she strolled, never thinking about how her body was displayed" (59) – provides another example of the masculinization (according to familiar gender stereotypes) of women.

Piercy's concern for the uses of technology is not limited to gender roles and women's interests alone; she also models a feminist environmentalism (which is not identical to ecofeminism) by focusing Mattapoissett's utopian science on ecologically sound technologies as well as those that support gender equality. They compost and recycle, keep gardens, bicycle around the community, make what they can themselves, and rely on solar energy and local food. Even their entertainment is environmentally sound. Luciente describes what they wear for parties and festivals: "A flimsy is a once-garment for festivals. Made out of algae, natural dyes. We throw them in the compost afterward" (163). These examples illustrate the way that "[i]n Piercy's utopia, science and technology are not informed by a master/slave relationship with nature. Nature is not an Other which must be obeyed to be commanded, but a partner in existence" (Schweickart 206). Luciente describes them as being "partners with water, air, birds, fish, trees" (117), and this partnership leads them to make decisions based upon this relation rather than in spite of it. For instance, they have the power to affect the weather, but because they recognize that it is probably not wise to do so, "[b]ecause of the danger" (89) and the unpredictability of tampering with biosystems, they do not. Their choices are guided not by what is easiest, fastest, or most technologically advanced, but by the effects they might have on the world. As Jackrabbit says, "We learned a lot from societies that people used to call primitive. Primitive technically. But socially sophisticated" (117). This thoroughgoing commitment to equality and partnership, both between humans and with the environment, is what marks this as feminist environmentalism rather than ecofeminism (with its concern for the environment but

tendency toward gender essentialism) or a more limited environmentalism (which might have little concern for gender as an issue).

In general, the people of Mattapoisett are guided in their scientific and technological decisions by a strong sense of ethics; they attempt to do what is best for the earth and the animals they coexist with and they work together to determine the best course of action regarding scientific decisions. Their decision to set aside research on extending human lifespans, for instance, was arrived at in “[t]he councils. The town meetings. That's how general questions of direction of science get answered” (271). They talked it through and came to an agreement of what was best for the community and the natural world. They recognize that science cannot be done in a vacuum, without these considerations, and their understanding of people’s desires to raise children and of their place in the world shaped their decision: “we have to give back. We have to die. . . . We’re part of the web of nature” (272). Science is here responsible to the community, not used to control, as is the science of Connie's present.

Advanced technology is not simply idealized in the novel, however. In the future, Mattapoisett (along with other small communities like theirs) is at war with an even more highly technological culture, which is presented as an illustration not of the evils of technology but of the evils of technology without conscience or responsibility. In this future, Connie meets a woman, Gildina 547-921-45-822-KBJ, who is a “contracty”; with a two-year contract and no ability to leave and take care of herself, she exists somewhere between the roles of wife, prostitute, and prisoner. She has been modified to meet feminine standards of beauty:

her body seemed a cartoon of femininity, with a tiny waist, enormous sharp breasts that stuck out like the brassieres Connie herself had worn in the fifties—but the woman was not wearing a brassiere. Her stomach was flat but her hips and buttocks were oversized and audaciously curved. She looked as if she could hardly walk for the extravagance of her breasts and buttocks, her thighs that collided as she shuffled a few steps. (281-2)

Instead of minimizing gender difference and simultaneously minimizing inequality between men and women, this society uses their technologies to maximize gender differences and further entrench these inequalities. There are also significant class divides in this world, with the rich living up on space platforms, with access to not only the best living space but also to longer lives. Gildina's mother died at forty-three and Gildina says of this, "Only the richies live longer; it's in their genes" (284), explaining that they can live to be approximately two hundred years old, depending "on what they can afford—you know, the medicos, the organs" (285). The rich people (e.g., "the Rockemellons, the Morganfords, the Duke-Ponts" (291)) also have access to real food while the poor live on "coal and algae and wood by-products" (290) that cause them health problems. Finally, this future society valorizes purity and ideal bodies, not the messy interrelationships between people and nature or the complex ethical web of being that characterize Mattapoisett, as this commentary from Gildina's cyborg guard indicates:

we don't need many of you useless cunts, now-on. Nothing inessential. Pure, functional, reliable. We embody the ideal. We can be destroyed—not by you duds—but never verted, never deflected, never distracted. None of us has ever

been disloyal to the multi that owns us. (293)

This is the end result of the contemporary science that Piercy critiques. There is no consideration of balance, justice, or others' needs; there is only loyalty to the master multi. This is a warning, both for Connie and the reader, of what technology can do, but, in the context of utopian Mattapoissett, it is not a sign that this is what technology must do.

Woman on the Edge of Time, ultimately, is a useful model for feminist science because Piercy highlights, over and over again, the role that we as individuals and as a culture have to play in creating a world in which this kind of science can exist. Luciente tells Connie, "Those of your time who fought hard for change, often they had myths that a revolution was inevitable. But nothing is! All things interlock. We are only one possible future" (169). This possible future can be created or destroyed by the choices we make now. One Mattapoissettian comments on 20th century scientists: "Your scientists were so . . . childish? Carefully brought up through a course of study entered on early never to ask consequences, never to consider a broad range of effects, never to ask on whose behalf" (188). Continuing down the path laid by those scientists, Piercy argues, may prevent such a future from arriving. And although "[n]obody can *make* things come out right. . . . No one is helpless. No one controls" (188). We do not carry all of this weight as individuals, but we do all share this weight of creating a better science and a better world.

5.6 Conclusion: Bearing Witness & Reconstituting the World

As seen here, feminist SF provides multiple fictional models of a feminist science that can help us envision and then create the real thing. Jean Barr and Lynda Birke write, it is not enough to tack on a bit of history . . . to existing curricula. For adult women—who have already become outsiders to science—that approach simply reinforces the perception that science is done by experts and has “nothing to do with me.” “Girl friendly” science, as this has been encouraged in the school curriculum, is often similarly inappropriate and patronizing. . . . a more discursive, consciousness-raising approach is needed. (135)

Education via SF both about the place of women and feminism in science and about the possibilities of feminist science might provide one way to accomplish this “discursive, consciousness-raising approach.” Fortunately, the feminist science seen in these novels is not completely separated from the science we have to work with now, despite Piercy’s condemnation of contemporary science. As noted earlier in this chapter, many of these goals and values are already present in some parts of science, though they may need to be highlighted and encouraged. As science begins to look not only more female but also more feminist, more women (and more feminist men) may be drawn to study and to do science and then to affect the future direction of the sciences. As with the harmful narratives regarding gender and science and those narratives’ consequences, this is a self-perpetuating system.

Creating these changes requires action, though not violence, and strength, but also gentleness. Adrienne Rich describes this process in “Natural Resources,” which draws

together environmentalist and feminist values. She writes,

But gentleness is active
gentleness swabs the crusted stump

invents more merciful instruments
to touch the wound beyond the wound

does not faint with disgust
will not be driven off

keeps bearing witness calmly
against the predator, the parasite (83-90)

Slonczewski's Sharers demonstrate this active gentleness and mercy as they "[bear] witness calmly / against the predator, the parasite" that Valan violence and greed represent. Those who are invested in the creation of a feminist science can learn from their example of peaceful, but persistent, creation.

This process also requires, as Jean Hegland's *Into the Forest* reveals, a taking seriously of practices and values previously written off as unscientific or too feminine:

In this cold barn we dream

a universe of humble things—
and without these, no memory

no faithfulness, no purpose for the future

no honor to the past (138-142)

This “universe of humble things” makes possible a better future built upon a reconsideration of the past and present. Without the humble things – like flowers, for instance – there is nothing worth remembering or worth struggling for.

Finally, Rich highlights the pain and perseverance involved with the process of creating change:

My heart is moved by all I cannot save:

so much has been destroyed

I have to cast in my lot with those

who age after age, perversely,

with no extraordinary power,

reconstitute the world. (171-176)

Although the people of Mattapoisett are fighting a war that they may not be able to win and although Mattapoisett represents a future that may never happen, Piercy and the Mattapoisettians insist upon creation rather than either apathy or destruction. So much, in their world and in ours, has been destroyed, but, despite these losses, there is hope for a better future – if we are willing to “cast in [our] lot with those” who continue to, “age after age, perversely” work for that future. Science fiction writers have an important role

to play in this project, for although they have “no extraordinary power” beyond the stories they tell, as storytellers and shapers of our visions of the future, they do have the power and the opportunity to “reconstitute the world.”

CHAPTER 6

NOT JUST FOR WOMEN:

EXPANDING THE RANGE OF FEMINIST SCIENCE AND SF

Science fiction is the dress rehearsal for directing social change.
—Nancy Kress, “Ethics, Science, and Science Fiction”

Science fiction writers are limited only by human potential, not human actualities. SF
can serve to show women, and men, how large that potential can be.
—Pamela Sargent

Nothing in our human culture is more adult than science. It doubts and tests our lies, half
truths, fond hopes, and unsorted dreams by testing its hypotheses. Science could be
working hand in hand with fiction to deliver the greatest possible literature.
—Geoff Ryman

*Science fiction writers and readers excavate the boundaries separating this 'what is' from
'what is not' and construct the 'what might be' for our consideration...in so doing, they
help all women (indeed, they help all readers) to dream the impossible into
possibility...and to act upon those dreams.*
—Suzanne Damarin

6.1 Beyond Identity Politics

Athena Andreadis notes that the definition of women’s magic (or, I would add, women’s science) “as holistic, non-hierarchical, egalitarian, context-sensitive and lacking the ‘will to power’ that disturbs balance and harmony in nature and society” is damaging because “[t]hese are all admirable (indeed, crucial) attributes, but they are not confined to women. If we truly believe – and act on the belief – that men have no innate capacity for such behavior, we might as well revoke women’s hard-won rights right now, and save

ourselves wear and tear” (“As Weak As Women’s Magic”). If the responsibility for creating a feminist world and a feminist science rests solely on the shoulders of women, if men are exempted from or incapable of this work, then the goal is truly unreachable – at least it cannot be reached without turning to the kinds of violence seen in Russ’s *The Female Man*, Sargent’s *The Shore of Women*, and Tepper’s *The Gate to Women’s Country*. Just as it is harmful to claim such values as solely belonging to women, it is also harmful to claim them as uniquely feminist. It is more productive to look for these values in a broader range of places and encourage them anytime they are found.

If this is so, feminist science requires a broadening of scope based on an acknowledgement of the distinction between women and feminists and a willingness to think of feminism not just as defined by identity politics and female bodies but as defined by a set of shared goals. Although I began this work with a willingness to read women’s SF as equivalent to feminist SF, at some point this elision is no longer productive, such as when pretending that feminist work equals women’s work means that feminism excludes men and their contributions. Writing about the place of men in introductory women’s studies courses, Glyn Hughes reinforces this point, saying that

calls for “women’s space,” when they occur in denial of the differences among women, also obscure *connections* between men and women at the register of privilege. That is, the exclusion of men often (though by no means always) also enacts more general mechanisms for repressing the effects of privilege by scapegoating men as the unique embodiments of it. (76)

He cites Chela Sandoval's statement that "hegemonic feminist classifications operate 'as sets of imaginary spaces, socially constructed to severely delimit what is possible' (1991: 5–6)" (76), and the same appears to be true for feminist SF; limiting feminist SF's usefulness to representations of women or even to writing by women may "severely delimit what is possible." This is not, of course, to say that representations of women doing science are not crucial as a response to the lack of women working in the sciences, nor is it to say that paying attention to whose work is valued, accepted, and promoted, especially in a genre and in a set of fields in which women have historically been left out, is not important – these things remain important. But perhaps they are not worth valuing at the exclusion of men; perhaps developing allies will be more productive in the long run than creating scapegoats and enemies in the name of "women's space," women's SF, or women's science.

Furthermore, an exclusionary attitude toward feminist science risks reinforcing the same problems that have limited women's access in the past while also obscuring the possibility of collaboration across gender lines. Helen Longino argues that many female scientists reject conceptions of a specifically feminist science because it can too easily seem like a call for a feminine or women's science, which to them appears as "new clothing for the old idea that women can't do science" (217), reinforcing the idea that women cannot compete alongside the men or that fundamental differences between men and women do exist. In reality, however, collaboration between male and female, feminist and nonfeminist, scientists does occur and is productive:

feminists have worked side by side with non-feminist scientist [sic], often using their tools or offering improvements on those tools and methods, collaborating with them in the service of “good science” rather than social change. . . . Gilbert and Rader inform us that feminist critiques of research in sex determination and early brain development also include the work of men (of which Scott Gilbert, a biologist, would be an example), and that this feminist, co-educational work yields a more scientifically congruent view of the world. . . . Gilbert and Rader seem to be saying, we are all in it together: a universal “we” telling a more accurate universal history of “us.” (Grebowicz, “Consensus” 993)

This sense of “a universal ‘we’” can also help counter the effects of stereotype threat on girls and women. It can do this, first, by contributing to efforts to “teach women that there is no scientific basis for the belief that men’s math skills are superior to women’s” (Schmader, Johns, and Barquissau 847), and, second, by influencing the attitudes of boys and men. As Schmader, Johns, and Barquissau reveal,

It is possible that even though an individual fully rejects the validity of a stereotype, the awareness that others are applying the stereotype to them might also inhibit their ability to perform well. For example, in other work that shows stereotype threat effects among members of different stigmatized groups, such as African Americans (e.g., Steele & Aronson, 1995), participants were not selected on the basis of their stereotype beliefs, and, in fact, it seems unlikely that many African American students at Stanford, for example, would believe that racial stereotypes are legitimate. Thus, these past studies have demonstrated a concern

over confirming the stereotype in the eyes of others, rather than in one's own eyes. (848)

And so men must be included in this re-education and in the development of a feminist science, too. As long as the "awareness that others are applying the stereotype" causes negative results, the burden cannot be simply on those who are stereotyped to overcome it.

Therefore, a feminist science, in order to truly work, must be built upon the principle of inclusion, not exclusion, and must avoid the assumption that feminist equals woman (or vice versa). Londa Schiebinger writes, "The goal is not to create a feminist science, if that means (as it does for many critics) a special or separate science for women or feminists. Science is a human endeavor; it must serve us all, including women and feminists" (*Has Feminism Changed Science?* 184). She notes elsewhere, too, that "[t]he task of making science less masculine is also the task of making it more completely human" (*The Mind Has No Sex?* 332). This means building feminist science "less on the introduction of a specifically female culture into science than on the rethinking of sexual polarities and the abandonment of a sexual division of intellectual labor altogether" (Keller, "Women, Science, and Popular Mythology" 143) and inviting men to take part in this project as well.

Some of the feminist SF discussed earlier helps to illustrate this point about the place of men in feminist SF. In Jean Hegland's *Into the Forest*, for instance, although the book largely focuses on just Nell and Eva, there are male characters who play important roles, most important among them the girls' father and Eva's son Burl, who, together,

outline a trajectory from the lost world of the past to the potential of the future and its practical and embodied approach to science. A shallow reading of the book might easily prompt a reading of Nell and Eva's move into the forest as a rejection of the masculine associations with science, technology, and civilization and an embrace of Mother Nature (other feminist SF writers might, after all, have framed this move in just this way); however, their decision to leave is neither so simple nor so simply gendered. In the end, when Nell must choose what she can take with her into the forest, she considers burning all of the books since "no book had prepared [her] to save [her] father's life" (238); however, she says, "Then I remembered how my father had loved books, how much faith he had in them, and it seemed that to leave empty-handed would be as much a desecration as leaving his unburied body for the pigs" (238). And as she and Eva watch their house burn before walking into the forest together, Nell writes, "I know I should toss this story, too, on those flames. But I am still too much a storyteller—or at least a storykeeper—still too much my father's daughter to burn these pages" (241). In this way, Nell embraces the legacy of her father and their past and avoids rejecting all of that past, even while destroying and abandoning much of it.

More significantly, their future is also figured as male. Initially Nell envisioned this future as a line of women, imagining Eva's unborn child as a daughter:

Eva would teach her to dance, I thought, and I would teach her to read and write, and as I clutched the oak and planned my niece's future, it seemed I could feel generations of women receding behind us and stretching out ahead. I felt a

connection with both my foremothers and with the future, and I knew—despite all odds—the bone-deep satisfaction of continuance. (201)

However, once Burl is born, this foundation of womanhood is no longer possible or necessary; Nell sees that these connections can occur across gender lines. He will be someone they can teach and who can build upon their knowledge, both the knowledge retained from the past as well as the knowledge that they will build themselves out of their lived experiences.

Joan Slonczewski's *A Door Into Ocean* also looks toward a future that brings men and women together. Despite the initial gender divide between Shora and Valedon, Slonczewski explicitly emphasizes the possibility and *necessity* of including men – though not traditional masculinity – in her utopia. Jane Donawerth writes, “At the same time as Slonczewski renders ambiguous the notion of a lesbian utopia, she also ‘corrects’ 1980s ‘misreadings’ (especially by Sargent and Tepper) of lesbian utopias as mainly intended to exclude men” (*Frankenstein's Daughters* 98), indicating that Slonczewski does not build her utopia on “an innate biological difference between lesbians and heterosexuals: each could learn their worldview from the other” (99). Donawerth continues, saying,

Thus *A Door Into Ocean* also treats the issue that many critiques of the lesbian utopia focus on: what will we do with our sons whom we love in a lesbian utopia—throw them out? The answer in *A Door Into Ocean* is to teach them how to become lesbians, people without a desire to intervene violently in the world. (100)

Despite the fact that Donawerth's conflation of "people without a desire to intervene violently in the world" and lesbians risks reinstating the very essentialism she seems to argue against by reiterating the idea that peacefulness is a particularly female trait, her emphasis on teaching and learning as a central message of the book is important. In *A Door Into Ocean*, Slonczewski solves the problem of sons not by making Spinel a lesbian but by making him a Sharer, thereby expanding his beliefs as well as those of the Sharers. Many Sharers were initially skeptical of Spinel, as a Valan and a "malefreak," but ultimately they come to see that Spinel can be both male and Sharer, that Shoran does not only equal woman. Nor is his transformation incidental to the book's trajectory; instead, it is the ultimate illustration of the power of the Shoran utopia, which is that their ideas about nonviolence, environmentalism, and interconnectedness are transmissible.

Marge Piercy's *Woman on the Edge of Time* incorporates men even more fully into the development of a feminist science and a feminist future. Peter Fitting argues that the peaceful and egalitarian coexistence of men and women in Mattapoisett is actually counterproductive, saying,

The difficulty with Piercy's strategy of showing men and women together in a utopian, gender-free future, is that it conflates the socio-political with the personal, allowing the male reader to assume that the real changes to be made are external, and that men have very little to change *as men* in their own behavior and attitudes. ("For Men Only" 103)

I would argue, on the other hand, that Mattapoisett illustrates the changes required on all fronts – structural change, change by women, and change by men. The men in Piercy's

novel are, too, quite unlike contemporary men and contribute in many practical and physical ways to the creation and maintenance of Mattapoisett society. This is illustrated most dramatically in men's ability to breastfeed, not just for the change this reveals in men themselves but also for the change this reveals in gender relations. Connie is upset by seeing a man breastfeed a child precisely because she perceives it as "the last refuge of women" (126), the last power and pleasure that women had but that men did not have. As Luciente explains, giving up such powers as breastfeeding and giving birth is part of what makes them truly equal. In the process of challenging the old sexist hierarchies, this decision prevents a simple reversal based on biological differences. Therefore, Mattapoisett's utopian nature is defined by the lack of domination or oppression of either gender by the other. Unlike Connie's present or the dystopian future she visits, women are not oppressed; unlike other utopias by feminist writers (e.g., Charlotte Perkins Gilman's *Herland*, Sally Miller Gearhart's *The Wanderground*, Joanna Russ's *The Female Man*, Suzy McKee Charnas's *Motherlines*), men are not excluded.

Jean Hegland's hopeful future with Burl, Joan Slonczewski's conversion of Spinel to Shoran life, and Marge Piercy's egalitarian utopia in Mattapoisett illustrate some of the possibilities inherent in seeing man, in the words of Adrienne Rich, as "merely a fellow-creature / with natural resources equal to our own" (61-2), as opposed to an enemy or obstacle to feminist progress.

6.2 The Male Hero as Feminist Figure

Ursula K. Le Guin's *The Dispossessed* extends this logic still further as Le Guin not only makes space for male characters but centers the novel on a male scientist: Shevek, a physicist. The representation of the central scientist as male may seem at first to work against the feminist models described in Chapter Three and to portray Shevek as yet another in a long line of associations of science with masculinity. Tom Moylan argues, for instance, that Le Guin's choice of a Shevek as protagonist reinforces white male privilege:

In making her protagonist a male, a father and husband, a scholar and leader, tall and handsome, articulate and well liked, she draws on traditional qualities of the male hero in western culture to mark his activity. With this choice of protagonist, however, other types of people and other forms of activity—for example, women or racial minorities, Third World peoples who act collectively and perhaps violently in a world less amenable to negotiation and détente—are kept at the periphery and thus rendered less important. The privileged place that the male protagonist holds in the minds of many readers overwhelmingly valorizes what Shevek represents and overshadows the other options. (106)

And Susan Stone-Blackburn similarly argues that this choice “is a shortcoming from a feminist perspective when our literature is already filled with male protagonists and marked deficient in portrayals of active women” (170).

However, Le Guin's choice of a male protagonist is more complex than this. Despite Moylan's concerns, he also notes that

LeGuin makes particular efforts to portray a non-sexist utopia. Children are given randomly selected, six-letter names which have no gender associations. There is no division of labor by gender: the Defence “foreman” at the spaceport is a woman, and one of the few armed members of society. Shevek’s mother, Rulag, who chose work over mothering, is in a leadership position in the society. Takver, Shevek’s wife, a biologist, often can find work in her field when Shevek cannot. Child care is universal and available on a twenty-four hour basis; after age 2, children are encouraged to live in dormitories and are cared for without gender discrimination. (99)

In the context of these challenges to traditional gender roles, Shevek’s maleness is an eloquent argument for the abandonment of identity politics. Patrocino Schweickart also takes up the issue of the male protagonist in *The Dispossessed*, asking whether “[b]y anchoring the utopian perspective on a male character, doesn’t Le Guin play into the customary conception of man as the paradigmatic human being and woman as the Other?” (209). He concludes, however, that

the risk of reinforcing androcentricity is diminished if we see the novel in the context of other feminist utopias. . . . In this context, *The Dispossessed* performs a very important function. It portrays a man who has no need to dominate women; whose identity is no longer dependent on the relegation of women to the role of the Other. In Bryant’s, Gearhart’s, and Piercy’s utopias, sexual polarity is eliminated—in the Wanderground by the exclusion of men, in Ata and Mattapoisett by the elimination of masculinity. Le Guin, however, preserves

sexual polarity, the sexual tension between male and female. By so doing, she suggests that difference need not imply reciprocal alienation. . . . Shevek not only values the female perspective; he cultivates it in himself. (209)

In this way, Shevek's maleness shows that feminist goals are not gender-specific but potentially productive for all. In fact, the very presence of a male hero who is willing to act as a feminist and to engage with feminist concerns (as he does in particular during his visit to Urras) provides a different sort of feminist model from those featuring women scientists: a feminist man.

Furthermore, Shevek's role as hero must be seen in the context of the book as a whole: the type of science Shevek practices is itself amenable to feminism, his wife is also a scientist, and they both practice science within a culture that actively works against gendered hierarchy. Returning to the elements of feminist science discussed in the previous chapter – inclusion of women's contributions to science, challenges to dichotomous and hierarchical thought, and a concern with the ethics of scientific practice – it becomes clear that, no matter who the protagonist is, *The Dispossessed* contributes to this vision.

Challenges to dichotomous and hierarchical thought permeate the novel, illustrated by the fact that “[t]he central motif of the novel is the breaking down of walls—not a simple handshake over a mended fence but the smashing of boundaries which divide and isolate” (Moylan 93). The driving force of the novel, what pushes Shevek to travel from Anarres to Urras and to try to share knowledge between the two worlds, is that, as he says, “I want the walls down. I want solidarity, human solidarity. I

want free exchange between Urras and Anarres” (138). He sees that “[w]e’ve made laws, laws of conventional behavior, built walls all around ourselves, and we can’t see them, because they’re part of our thinking” (331), and he wants to remove the walls so that the people of both worlds can be free. This “wish to unbuild walls” (75) is illustrated in Shevek himself, in his willingness to freely share his scientific breakthroughs for the good of all—“For Shevek, science has nothing to do with domination, either of fellow humans or of nature” (Schweickart 208)—as well as in the language and culture of Anarres. Similar to the language of Slonczewski’s Sharers, the language of Anarres avoids possession and hierarchy:

The singular forms of the possessive pronoun in Pravic were used mostly for emphasis; idiom avoided them. Little children might say “my mother,” but very soon they learned to say “the mother.” Instead of “my hand hurts,” it was “the hand hurts me,” and so on; to say “this one is mine and that’s yours” in Pravic, one said, “I use this one and you use that.” Mitis’s statement, “You will be *his man*,” had a strange sound to it. (58)

The language used to describe sex provides another concrete example of this tendency, one that also highlights the connection of the language to feminist theories:

The language Shevek spoke, the only one he knew, lacked any proprietary idioms for the sexual act. In Pravic it made no sense for a man to say that he had “had” a woman. The word which came closest in meaning to “fuck,” and had a similar secondary usage as a curse, was specific: it meant rape. The usual verb, taking

only a plural subject, can be translated only by a neutral word like copulate. It meant something two people did, not something one person did, or had. (53)

If there is no way to talk about domination, it is far less likely that domination will be a part of the culture.

Another way that *The Dispossessed* challenges hierarchy is in its emphasis on decentralization and diversity. Anarres' politics are based on "the ideal of complex organicism" (95), which means that "[t]he special resources and products of each region were interchanged continually with those of others, in an intricate process of balance: that balance of diversity which is the characteristic of life, of natural and social ecology" (96). This emphasis on balance works against centralization and hierarchy and places value on each region. This ideal of balance and interconnectedness is seen in relations with the natural world as well and is presented most clearly in Takver, Shevek's wife, who "had always known that all lives are in common, rejoicing in her kinship to the fish in the tanks of her laboratories, seeking the experience of existences outside the human boundary" (22). As a fish geneticist, Takver loves her work:

it combined two things she valued: accurate, factual research and a specific goal of increase or betterment. . . . Her concern with landscapes and living creatures was passionate. This concern, feebly called "love of nature," seemed to Shevek to be something much broader than love. There are souls, he thought, whose umbilicus has never been cut. They never got weaned from the universe. They do not understand death as an enemy; they look forward to rotting and turning

into humus. It was strange to see Takver take a leaf into her hand, or even a rock.

She became an extension of it, it of her. (185)

Takver's connection with the natural world is both passionate and practical, built upon a sense of connection that does not romanticize the Other but sees it as equal, as part of the self. The sense of the natural world as an extension of her self and her attitude toward death counteract anthropocentric interactions with nature and the associated hierarchies between human and nonhuman. Although Shevek also values connectedness and the sense of the whole, he depends on distance to provide a sense of that whole: "The way to see how beautiful the earth is, is to see it as the moon. The way to see how beautiful life is, is from the vantage point of death" (190). Takver, on the other hand, wants to exist alongside and within that whole. She says, "I'm not going to stand up on a gravestone and look down on life and say, 'O lovely!' I want to see it whole right in the middle of it, here, now. I don't give a hoot for eternity" (190). Both attitudes value connection, but Takver's approach in particular illustrates a way of doing science and of living in the world that eliminates distance and that places human and nonhuman on equal footing.

The Dispossessed also emphasizes the importance of ethical considerations in scientific work since the scientific work that Shevek does is inextricable from the society in which he lives and from interactions between that society and others. As E. E. Nunan and David Homer write,

Shevek is aware that society and science are inseparable, and that social change cannot be affected by people possessed of scientific knowledge and repute who merely want to act "from the outside." By juxtaposing accounts of Shevek's life

on Anarres and on Urras, Le Guin clearly exhibits scientific work to be integral to socio-historical evolution, and the technology dependent on science to be subject to the same socio-historical forces. Methodology emerges as a social process, a product not only of knowledge but also of ideology and social constraints. . . . By narrating the novel from his point of view, Le Guin keeps the reader aware that what Shevek does as a scientist is affected by a number of different but interrelated factors in his social and individual existence(s). (326)

One of these factors is closely tied to the “complex organicism” already mentioned: “the principle of organic economy was too essential to the functioning of the society not to affect ethics and aesthetics profoundly” (98). The people on Anarres must depend on one another to survive and this social structure, as well as the ethical system it encourages, deeply influences the choices Shevek must make as a scientist. Since “[t]o hurt a person there is the same as to hurt a person here. . . . if she tells me to hurt another person, I hurt myself” (219); this ethics of causality applies to science as well. Although the citizens of Anarres have absolute freedom to do what they will, to turn down work they do not wish to do, and to go where they want, they are tied to one another in such a way that they would not wish to do anything to hurt another individual or the society as a whole; this means that any scientific project that could hurt individuals or Anarres as a whole might be abandoned by choice and that any scientific project that could help others is privileged.

Shevek’s individual work and choices illustrate this principle at work. Schweickart writes that “Shevek is also free of another principle of contemporary

science—the fact/value distinction. He makes no effort to separate his moral and philosophical concerns from his scientific interests” (209). This combination of moral, philosophical, and scientific concerns marks Shevek as representative of an approach to science that could be considered feminist. Even though Shevek is a physicist, far removed from the intimate, organic connections that Takver experiences regularly in her work, he still sees his work as ethical. He says,

chronosophy does involve ethics. Because our sense of time involves our ability to separate cause and effect, means and end. The baby, again, the animal, they don't see the difference between what they do now and what will happen because of it. They can't make a pulley, or a promise. We can. Seeing the difference between *now* and *not now*, we can make the connection. And there morality enters in. Responsibility. To say that a good end will follow from a bad means is just like saying that if I pull a rope on this pulley it will lift the weight on that one. To break a promise is to deny the reality of the past; therefore it is to deny the hope of a real future. If time and reason are functions of each other, if we are creatures of time, then we had better know it, and try to make the best of it. To act responsibly. . . . Maybe you prefer to throw rocks without thinking about it, no choice. I prefer to make things difficult, and choose both. (225)

Shevek's work presents an argument that means and ends cannot be separated, that we are responsible for our actions, and that this ethical engagement with the world is an ongoing one. Once again recalling the logic of the Sharers in *A Door Into Ocean*, Shevek argues that “[t]he means are the end. . . . Only peace brings peace, only just acts bring

justice!” (296). Here there is no room for apolitical science or for knowledge for knowledge’s sake; all acts are political and all knowledge must be considered in its broader context.

Despite these challenges to hierarchy and this ethical approach to science, however, some find that *The Dispossessed* falls short of feminist goals: “LeGuin pushes against the barriers, but in the final analysis she remains ambiguously within present boundaries of the status quo” (Moylan 120). Moylan acknowledges that “LeGuin’s utopia expresses a libertarian and feminist value system” but goes on to argue that “the gaps and contradictions in her text betray a privileging of male and heterosexual superiority and of the nuclear, monogamous family” (102) and that “LeGuin foregrounds a type of commitment that revolves around a single redeemer, a vanguard intellectual, and a dominant male” (109).

These critiques are important to consider, but I would argue that they fall short on two counts. First, they devalue the context within which Shevek operates as protagonist. The promise of Anarres (and of the revolutions under way on Urras) is that all individuals have this potential within them. The idea is that Shevek is *not* “a single redeemer, a vanguard intellectual, and a dominant male” (and I have difficulty seeing him as a dominant male in particular, given his equitable relationship with Takver and his concern for women’s rights on Urras), but he is one of many who could act in similar ways and, hopefully, will go on to do so. Second, it is worth considering the historical context of the book’s initial publication as it compares to that of contemporary readers. We have now the benefit of the work in the feminist movement and SF studies since 1974 and

perhaps more would be gained at this point by re-reading the book on contemporary terms in addition to considering what it had to contribute at the time. In doing this, what could potentially be read then as a continuation of traditions that put men at the center of narratives and marginalized women can now be read as a way of including men in feminist SF and activism. Even at the time, the focus on a male protagonist helped Le Guin “attract a wide male readership, and . . . doubtless nudged some of her many readers in the direction of a better world” (Stone-Blackburn 170), and now it continues to make readers rethink the question of identity in assessing a text’s feminist value.

6.3 The Promise of Feminist SF by Male Writers

This question of identity must apply not only to characters but also to writers. The feminist SF written by women that has been discussed thus far visualizes a future in which a feminist science is possible, but it is not just women writers who visualize this kind of future. Robert Charles Wilson’s *Blind Lake* (2003), although not generally identified as feminist, addresses some of the same concepts addressed by Hegland, Slonczewski, Piercy, and Le Guin and makes a strong argument for the centrality of narrative in developing an ethical stance toward the world. In other words, he argues, the stories we tell matter. These stories, both science fictional and scientific, have consequences. This same assumption underlies the study of feminist SF and of feminist science studies, both of which are attempts to tell different, hopefully better, stories about science and about women.

Although Wilson does not position his novel as explicitly feminist, he does nonetheless touch on feminist issues in his representation of women. First, he matter-of-factly includes strong female characters, including women scientists. Set at a scientific installation where, thanks to technology no one quite understands, they are able to observe an alien creature on a distant planet, *Blind Lake* features as one its central characters Marguerite, the head of the Observation and Interpretation departments in the Blind Lake installation. She is ambitious and passionate about her job while also being humanized by her complex relationships with her ex-husband, her daughter, and a developing romantic interest. Furthermore, of three journalists arriving at the beginning of the book to report on Blind Lake and its research, Elaine, the only woman, is associated with “rigorous science” (12) while the men are weaker, seen as outcasts in the field of science reporting, whether because of dalliances with spirituality and fuzzy science or because of political missteps in their previous work. This ready association of Elaine and Marguerite with science and professional success counters the familiar stereotypes of women and science seen elsewhere and can be read in the same light as the texts discussed in Chapter Three.

Wilson does not simply provide the reader with strong and interesting female characters, though, which might not ring true given the continuing gender inequities within the sciences; he also represents some of the challenges that women in the sciences face. Marguerite, for instance, illustrates the difficulty of being married to another scientist while trying to maintain one’s own career *and* a marriage. After Marguerite married Ray, an older man and an established scientist himself, she followed him to a

research facility that was less than advantageous for her career and turned down offers to move elsewhere in order to keep the marriage together. Tellingly, her husband showed no such concern for her career or for protecting their marriage. Eventually, she did file for divorce and moved to the new facility, Blind Lake. Ray moved to the same place, however, actually arriving before her, and their ongoing relationship features serious (and very gendered) abuses of power as he proceeds to undermine her – personally, in her relationship with her daughter, and professionally, at the lab – whenever he gets the chance. This kind of imbalance and even abuse isn't limited to female scientists (it happens to other women as well), but the particular forms represented here are specific to women trying to succeed in a traditionally masculine field.

Beyond the representation of women in science, *Blind Lake* also engages with several concepts that are compatible with feminist science. One of the key elements of *Blind Lake* is its emphasis on observation. Given the scientific project of the Blind Lake facility, observing an alien creature, this is to be expected, but observation takes on a much greater significance over the course of the novel and can be linked to efforts both to break down hierarchies and dichotomies and to pay attention to the consequences of research and development, the same feminist goals seen throughout the texts discussed thus far.

The importance of close observation is first noted in the behavior of Marguerite's daughter Tessa (sometimes called Tess). Eleven years old, Tessa has a gift for observation, but it is not appreciated:

Tess stood silently watching. If her father were here, he would have called her inside by now. Tess knew that she sometimes stared at things too long. At clouds or hills or, when she was in school, out the spotless window to the soccer field where white goalposts clocked the hours with their shadows. *Wake up, Tessa! Pay attention!* As if she had been asleep. As if she had *not* been paying attention.

Times like this, with the wind moving the grass and curling around her like a huge cool hand, Tess felt the world as a second presence, as another person, as if the wind and the grass had voices of their own and she could hear them talking. (23)

Others do not understand, believing that “there was something different about Tessa. Not something *wrong*—Marguerite would not accede to that judgmental word” (48) and that this is a problem. As Tess’s teacher tells Marguerite,

She comes to class, but there are days when she’s, I don’t know how to describe it—emotionally absent. She stares out the window. Sometimes I call her name and she doesn’t respond. She whispers to herself. That doesn’t make her unique, much less disturbed, but it does make her difficult to teach. (79)

But this close observation, though it makes her unusual, also gives her a special understanding of the world. The kind of attention she describes in which she “felt the world as a second presence, as another person, as if the wind and the grass had voices of their own and she could hear them talking” is the same kind of attention that Evelyn Fox Keller valorizes in her analysis of Barbara McClintock’s work, which she says “is readily

misdescribed as a kind of mystical experience, [but] is in fact a result of close, intimate attention and patient observation, maintained over days, weeks and even years” (“How Gender Matters” 49). It is also the same kind of connection to the natural world displayed and affirmed by figures in other SF texts, including Takver in *The Dispossessed*, the Sharers in *A Door Into Ocean*, and Delia in “Lambing Season.” Tess is ultimately revealed to have a unique understanding of and relationship to what is happening at Blind Lake; this revelation privileges her observation and attention to the world rather than dismissing it as different, wrong, or a problem.

Another take on this theme is provided through Marguerite, whose job as astrozoologist involves a great deal of close observation. She spends hours each day watching the Subject, as they call the alien, and trying to understand it. This is described quite differently from Tessa’s observation, however: “Marguerite’s own work—though she loved it and had fought hard to get it—sometimes made her feel like a voyeur. A paid, dispassionate voyeur; but a voyeur nonetheless” (51). Instead of feeling connected to the object of observation, Marguerite feels disconnected from it. Because of her negative feelings about the way she observes the Subject, she tries to increase this sense of disconnection: “She reminded herself that these events happened half a century ago. It lessened her sense of invasion. She would never speak to this creature, never interact with him in any way” (54). Over time, though, Marguerite changes her approach to observation. As the Subject changes his patterns, which had previously been quite repetitive, and leaves the city, he shifts from “the sacred circle, eternal return” of his previous life to a “*story* . . . with a beginning and an end” (161). Similarly, Marguerite

chooses to stop distancing herself from the Subject and attempts to understand his life through narrative. Marguerite knows that this is something she could never publish and that “[s]he’d be violating the protocols of objectivity, indulging all kinds of conscious and unconscious anthropocentrism,” but she wants to do it anyway, “for her own satisfaction . . . and because she believed the Subject deserved it. After all, this was a real life they had invaded. In the privacy of her writing she could give him back his stolen dignity” (162). Marguerite’s observation, therefore, turns into a conscious act of connection, of eliminating false barriers between herself and her subject. It becomes an act of engaging emotionally, of practicing “the black art of empathy” (162), rather than submitting to the protocols of enforced objectivity. She finds that “she was tired of objectivity,” tired of avoiding “put[ting] herself in the Subject’s place” and engaging in “an imaginative act so commonplace as to be invisible” (166), and she begins to challenge the very foundation of traditional science:

when we look at the aboriginals, Marguerite thought, we’re supposed to pretend to indifference. To an aloofness almost Puritanical in its austerity. Am I tainted if I admit I care whether the Subject lives or dies?

Most of her colleagues would say yes. Marguerite entertained the heretical idea that they might be wrong. (166-7)

In this way, Wilson’s emphasis on observation becomes more than a reinforcement of one of traditional science’s central tenets; it becomes a challenge to that vision of science and a move toward a feminist science that engages the subject in meaningful ways.

This turn toward subjectivity and narrative and away from objectivity brings with it an emphasis on language that parallels the critiques of Emily Martin, Bonnie Spanier, and Lisa Weasel, all of whom note the omnipresence of metaphor and narrative in our discussions of science. This emphasis on language is introduced in small ways, for instance when Elaine objects to the practice of calling the alien creatures lobsters, saying that the people doing so are “[c]ashing in on ignorance.” She continues, “I really don’t get this whole lobster thing. They don’t look anything at all like lobsters. They don’t have an exoskeleton and God knows they don’t have an ocean to swim around in. . . . People may have to call them something, but do they have to paint them onto neckties?” (14). Similarly, at the end of the book, Marguerite hears her father call another artifact “starfish”: “Marguerite winced at that popular name of the O/BEC-generated structures. Like ‘Lobsters,’ it was a gross misnomer. Why must every unfamiliar thing be compared to something washed up on a beach?” (388). Making them equivalent to “something washed up on a beach” diminishes their reality and their difference. The way we use language to diminish Otherness is underscored when, near the end of the book, Marguerite is able to physically interact with the Subject. She finds that he is very much not comparable to a lobster or to any other familiar entity:

The Subject was half-again taller than Marguerite. None of her observation had prepared her for the sheer animal bulk of him. She had felt the same the first time she went to a petting zoo back in eighth grade. Animals that had looked innocent on television had turned out to be larger, dirtier, smellier, and far more

unpredictable than she had imagined. They had been so disconcertingly *themselves*, so indifferent to her preconceptions.

The Subject was very much himself. Apart from his erect bipedal stance, there was nothing human about him. Nor did he resemble an insect or a crustacean, despite the ridiculous “lobster” tag that had been foisted on him. (340)

These small and familiar names for great and unfamiliar things, both Elaine and Marguerite know, affect the way that people think about them and how they value them; they can also obscure the truth if misapplied. Although pure objectivity is a limited and false way of engaging with the world, this encounter illustrates that the ignorant misapplication of narrative is equally deceptive.

This warning does not argue against the use of narrative, however; just against its blind use. The most significant commentary on language comes in Marguerite’s speech about the necessity of incorporating storytelling into a scientific understanding of the Subject. In this lengthy speech, Marguerite makes many points about the intersection between narrative and science that could come straight from any one of a number of feminist science studies scholars:

The question I want to pose today is, have we been deceived by our own rigorously deconstructive approach to the observed peoples of UMa47/E? . . . This is deliberately provocative language—the observed *peoples*. From the beginning, the Crossbank and Blind Lake projects have sought to purge themselves of anthropocentrism: the tendency to invest other species with human characteristics. . . . the long and creditable history of science has taught us, if

nothing else, to look carefully before we judge—to judge, if we must, based on what we see, not what we would prefer to believe.

And so, we tell ourselves, the subjects of our study at 47 Ursa Majoris should be called “creatures” or “organisms,” not “peoples.” We must presume nothing about them. We must not bring to the analytical table our fears or our desires, our hopes or our dreams, our linguistic prejudices, our bourgeois metanarratives, or our cultural baggage of imagined aliens. Check Mr. Spock at the door, please, and leave H. G. Wells in the library. If we see a city we must not call it a city, or call it that only provisionally, because the word “city” implies Carthage and Rome and Berlin and Los Angeles, products of human biology, human ingenuity, and thousands of years of accumulated human expertise. We remind ourselves that the observed city may not be a city at all; it may be more analogous to an anthill, a termite tower, or a coral reef.

[...]

We say the Subject travels here, performs this or that action, is relatively slow or relatively fast, turns left or right, eats such-and-such, at least if we don't balk at the word “eats” as creeping anthropocentrism; maybe “ingests” is better. It means the same thing, but it looks better in the written report. “Subject ingested a bolus of vegetable materials.” Actually, he ate a plant—you know it and I know it, but a peer reviewer at *Nature* would never let it pass.

[...]

We patrol the connotation of every word we speak with the censorious instinct of a Bowdler. All in the name of science, and often for very good reasons.

But I wonder if we aren't blinding ourselves at the same time.

What is missing from our discourse about the peoples of UMa47/E, I would suggest, is narrative.

The natives of UMa47/E are not human, but we are, and human beings interpret the world by constructing narratives to explain it. The fact that some of our narratives are naïve, or wishful, or simply wrong, hardly invalidates the process. Science, after all, is at heart a narrative. (258-60)

Science, she contends, is a story we tell ourselves; the material world is there to be observed, of course, and it is not all narrative, but nothing about that material world can be understood without it first being expressed through language, which is never free of metaphor, narrative, imagery, interpretation. As Marguerite says, "I promise you we will not understand them until we begin to tell ourselves stories about them" (261). Given the choice between the risks of anthropomorphism and the risks of objectification, the risks of connection and those of disconnection, Marguerite argues eloquently for reaching out to the world, implying that our understanding of Otherness will be fuller, even if not always precisely right, if we allow ourselves to tell stories.

Marguerite does not overlook the ethical consequences of such a risk, however. She turns from this emphasis on narrative in understanding the world to the results of doing so. Not only would we (as humans and as scientists) understand the rest of the world better, she says, but we would also have to learn to understand ourselves better:

“We will have to arrive at a new definition of a ‘sentient species,’ and that definition must include ourselves *and* the natives” (262). In learning to understand ourselves better and in practicing seeing ourselves as related to rather than separate from what we study, our decisions about how to study subjects, conduct experiments, and implement the knowledge gained may all be affected. If our subjects are like us, it becomes more difficult to behave cruelly or indifferently toward them. This may force a rethinking of scientific practice and challenge our sense of ourselves as the center of the universe, but, Marguerite says,

we’re scientists, and we aren’t supposed to shy away from these matters. As a scientist it is my cherished belief—I’m tempted to say, my faith—that understanding is better than ignorance. Ignorance, unlike life, unlike narrative, is static. Understanding implies a forward motion, thus the possibility of change. (263)

This premise – that understanding and progress are better than ignorance and stasis – backs both feminist science and the feminist project more broadly.

The power of storytelling is underscored once more in the final scene of the book. Tess asks Marguerite to tell her a story about the Subject and Marguerite begins her story in this way:

“First of all,” Marguerite said, “you have to understand that he was a person. Not exactly like you and me, but not completely different. He lived in a city he loved very much, on a dry plain under a dusty sky, on a world not quite as big as this one” (399).

This story leaves the reader with a clear reminder not only that our understanding is shaped by narrative but also that the process of storytelling has an ethical component. The story that Marguerite tells has ramifications for the way she and Tess see the Subject and themselves. Her story highlights connections between themselves and the Subject, defining him as a person, emphasizing similarity (while not eliding difference), giving him emotions, and even connecting him to them through comparisons between his world and their own. Despite its anthropomorphism, Wilson implies, this story has a truth to it that all of the objective descriptions – “Subject ingested a bolus of vegetable materials” (259) – will never have.

Finally, *Blind Lake* focuses on the possibilities, for better or for worse, of interconnectedness. By the end of the novel, Earth has been connected to a community that is much, much larger than its own planetary limits. Star structures, built by a highly intelligent and nearly impossible to comprehend species, have appeared in various places on the planet and they cannot be removed. These structures provide the possibility of connection with the rest of the universe, but at a cost: those who enter disappear and do not return. It is presumed that they reappear somewhere else in the universe, but there is no way to know if this is true. This is interconnectedness on a level previously unheard of, far greater than Marguerite’s connection with the Subject or Tess’s connection with the wind. But its consequences are unclear: “Was this contamination or procreation? Infection or reproduction?” (390). As Marguerite says,

Civilizations that give birth to star structures are never quite the same. (*Yes, that means us, too: I don’t know how much we’ll be changed, Tess, only that we’ll*

never be what we were before this century.) When we first began to look at UMa47/E, the star structures were aware of us. . . . *(Have they taught you the Uncertainty Principle in school yet, Tess? Sometimes just observing a thing changes its nature. We can never look at a thing unlooked-at or see a thing unseen. Do you understand?)* (361)

Just as the stories we tell have an effect, changing how we know and what we know, even observation itself has an effect. What that effect might be cannot always be predicted. But, as Elaine writes, humans are not without choice in this:

Perhaps we are being offered a choice. Perhaps a species that pursues a genuine understanding of the starfish can reach that goal only by becoming something other than itself. Perhaps, to truly understand the mystery, we will have to embrace it and become it. Wasn't it Heisenberg who observed that the seer and the seen become inextricably interlinked? (393)

This observation applies to the creation of a feminist science as well. We have a choice. We can pursue understanding of each other and of our world and, in the process, become something other than ourselves as we currently exist. We can take a leap of faith – of sorts – that such a future is possible, embracing it even without knowing exactly what its effects or requirements will be.

While *Blind Lake* may not be regularly read alongside other feminist SF texts, it is compatible with feminist goals and with the creation of a feminist science, which is worthwhile, a sign that feminist science is perhaps not so far removed from the mainstream of science and SF. It is worth asking, however, whether the elements

discussed in this book would already have been read as feminist SF if the author had been a woman. Primed by the name Ursula K. Le Guin or Marge Piercy, would readers see Wilson's ideas about interconnectedness and observation as feminist SF in a way that they do not now? The fact that *Blind Lake* is not regarded as feminist SF means either that we – as feminists, feminist SF critics, and feminist science studies scholars – should rejoice that the values of feminism and of feminist science have become so widespread that they are taken for granted and already incorporated in mainstream SF by male writers or that we should expand the range of feminist SF to look for male writers as well as female writers of feminist SF in order to call attention to these ideas and further feminist goals by highlighting their presence outside the subgenre of explicitly feminist SF. Given the culture in which we live, which includes a continuing backlash against feminism, misperceptions regarding the relationship between women and science, and gender imbalances in the sciences, I would argue that the latter is the more productive course.

6.4 Conclusion

As noted in Chapter Five, feminist science is not entirely opposed to traditional science; its tenets already have a place in the history and practice of science. Here, too, feminist ideas already exist in mainstream SF. In both cases, making these ideas commonplace and persuasive requires highlighting those connections and broadening feminism's range.

And so I want to challenge the common boundaries of feminist SF because focusing solely on female characters and writers can only work for so long. Bill Nye says,

We all have a tendency, in skepticism and to a degree in science education, to find ourselves, dare I say, preaching to the choir. (Did I lose you with that reference? I know many of you have never seen this, but in church, they have a preacher and...) Incidentally, we may assume that the choir is already converted, but we don't really know that. The choir might just be there singing because they like to sing, but the hope is that they'll go along. So let's just say that we have great success in preaching to the choir and it makes us feel good, but we have to do more. We have to reach out.

Feminists much reach out as well – in SF and in science, to men and to nonfeminists. We cannot simply preach to the choir but must attempt to convert the unconverted by looking for feminist elements embodied in male characters, written by male writers, and embedded in otherwise nonfeminist texts or arenas, by showing that these feminist goals are already out there and that they are not scary, by working toward familiarization rather than defamiliarization. Londa Schiebinger writes that “[n]either changing women to fit science nor changing science to incorporate conventional feminine ideals will be sufficient: feminist goals based on either traditional divisions of labor or conventional gender representations are set in shifting sand” (“Creating Sustainable Science” 477). A feminist science created only for women is also insufficient.

Working toward a feminist science means changing our stories of ourselves in multiple ways, including rejecting narratives of science that marginalize women, subjectivity, and ethics and also rejecting narratives of science that rely on gender difference. It means thinking in terms of inclusion and creation, too, rather than only in terms of exclusion and critique. It means embracing the good and not simply rejecting the bad. Feminist SF, by both women and men, contributes to this process:

A science fiction story not only excites us about the world, it excites us about ourselves: how we fit within the systems that govern our universe and, paradoxically, about our potential to change the world. The best SF is, in a sense, about love: loving the world and our place within it so much that we make the effort to make a difference. But science fiction changes more than the world, more than our place in the world, it changes us. . . . The more we change our story of ourselves, the more we change. (Griffith, "Identity and SF" 142-3)

The stories we tell can excite us, motivate us, and change us; the science we develop as a result gives us the power to make these changes concrete.

I ended the introduction to this project with a statement from Geoff Ryman saying that "[i]f there is an estrangement between science and science fiction, then it should be possible to do something about it. It can only be fruitful." Ending this estrangement is indeed fruitful, insofar as it helps create a future in which men and women work together to tell more empowering stories, to understand our world and ourselves more fully, and to behave more ethically. In this fruitful juncture between science and science fiction, and specifically between feminist science and feminist science fiction, concepts from feminist

science studies lead to new readings and definitions of feminist SF and feminist SF can help readers to visualize and, ultimately, realize a feminist science.

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