

*Removing Barriers: Women in Academic Science, Technology, Engineering and Mathematics*, Jill M. Bystydzienski and Sharon R. Bird, eds. Bloomington and Indianapolis: Indiana University Press, 2006, 347 pp., \$75 hardcover, \$30 paper.

*Women, Gender, and Technology*, Mary Frank Fox, Deborah G. Johnson and Sue V. Rosser, eds. Urbana and Chicago: University of Illinois Press, 2006, 204 pp., \$55 hardcover, \$20 paper.

*Science and Social Inequality: Feminist and Postcolonial Issues* by Sandra Harding. Urbana and Chicago: University of Illinois Press, 2006, 205 pp., \$40 hardcover, \$20 paper.

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Interrogating how gender, race, sexuality, and transnational issues complexly intersect with science, technology, engineering, and mathematics (STEM) is not a new project for feminists. Yet each of the recent works reviewed here offer productive, interdisciplinary additions to the intricate landscape of these intersections, presenting valuable perspectives on the mutually transformative links between gender-based inquiry and STEM issues that lie at the heart of feminist science studies.

Jill M. Bystydzienski and Sharon R. Bird's *Removing Barriers: Women in Academic Science, Technology, Engineering and Mathematics* is a particularly useful and comprehensive collection that examines the persistence and seeming intractability of the under-representation of women in academic STEM areas. What makes this collection especially effective is the careful and convincing theoretical perspective by which it is informed. At the very center of Bystydzienski and Bird's approach is the quite explicit rejection of more traditional approaches to understanding and "fixing" the problem of the underrepresentation of women in academic STEM areas. Specifically, the authors refuse to accept what they describe as "interventions that construe women as 'the problem' in need of change" and which

primarily focus on helping individual women adjust to doing science or acquiring skills they appear to lack (4). Similarly, the editors challenge the simplicity of the popular “pipeline” theory, noting that while the image of women progressively falling away from STEM careers is an apt one, the leaky pipeline model also fails to critique adequately the deeply masculinist cultural and structural barriers that are fundamentally embedded in science and engineering fields.

This clear-headed approach to the problems of women and STEM success/retention allows the seventeen essays in this collection to grapple effectively with multifaceted levels of inquiry and analysis while avoiding any of the randomness or disjuncture that often plague such distinctly ambitious projects. Bystydzienski and Bird divide the work into four sections: historical issues concerning women in STEM, institutional and cultural barriers, feminist science studies, and ideas for remedies and change. The first section features essays by Sally Gregory Kohlstedt, who analyzes historical patterns concerning gender, science, and technology in the twentieth-century United States, and Amy Sue Bix, who specifically addresses the gendered history of engineering (chapters one and two, respectively). These two essays provide a valuable framework for the work that follows—work that often returns to the historical frame the better to explain the persistent exclusion of women in STEM fields.

Section two foregrounds issues of race and the particular barriers faced by women of color. This section features Sally Hanson’s study of issues faced by African American women in science fields (chapter six) and Josephine Beoku-Betts’ discussion of issues encountered by African women who travel to “the West” (specifically the United States, Canada or Europe) to continue or complete STEM graduate work (chapter seven). Cogent analyses of the configurations and stubborn tenacity of cultural and structural barriers—lack of practical and abstract support, effective and ineffective pedagogical approaches, overt and covert discrimination, constricted access to resources, and limited opportunities for collaboration in research and grant-writing—make this section relevant to all feminist educators attempting to address the under-representation of women of color in STEM fields. Especially useful in this context is Sue V. Rosser’s “Using POWRE to ADVANCE: Institutional Barriers Identified by Women Scientists and Engineers” (chapter three) which usefully outlays the specific obstacles most frequently faced by women in STEM. Molly J. Dingle’s chapter on the effects of the gendered atmosphere of the college science classroom and its subsequent effects on the self-perceptions of both female and male students is quite illuminating, as well (chapter eight).

Section three moves the collection towards a direct engagement with “science content” in order to reveal the assumptions and biases that permeate the methodologies of doing science. Of course, feminists interested in science studies and/or STEM-related issues have been dismantling

the idea of scientific objectivity and debunking science as a “value free” enterprise for decades. This section offers excellent examples of precisely how the critique of supposed neutrality sheds light on the particular challenges faced women by in STEM. Carla Fehr, for example, points out the limitations of scientific reductionism as a constrictive methodology that may devalue the viewpoint of women and other underrepresented groups (chapter ten). And, chapter nine “The Construction of Sexual Bimorphism and Heterosexuality in the Animal Kingdom,” a particularly interesting essay by Karen Smilla Ebeling, provides the collection’s most direct commentary on the intersection of traditional science with sexual ideologies, analyzing how biological knowledge is created through the use of reductive (and often entirely inaccurate) heterosexist metaphors to describe animal reproduction.

The final section of this valuable collection of essays is exceptionally useful because it provides a wide array of possible mechanisms through which the barriers affecting women in STEM might be directly and productively addressed. Including a wide range of perspectives, this last section does what is often hoped for but infrequently accomplished by collections such as this one: it shares strategies for change and provides in-depth examinations of potential means for remedy. In terms of the graduate experience of women in the sciences, Anne J. MacLachlan focuses on the importance of orientation for new students, recommending formal introductions of incoming students to faculty and facilities, as well as break out sessions for female students and students from other traditionally underrepresented groups. She additionally emphasizes the importance of connecting female graduate students to professional organizations committed to the success of women in the field, making mentors available to women students and students of color, and developing highly structured seminars focused on both successful teaching and professional development. Abbe H. Herzig’s work on women of color on graduate mathematics additionally recommends that graduate schools more actively encourage participation in professional organizations and research conferences, create flexible and responsive support for graduate students who experience issues of work-family balance, and recognize the value of interdisciplinary study to graduate work in the STEM fields. Finally, Anna M. Martinson examines the importance of the critical role that gender issues play in computer games, arguing that a “gender-sensitive” approach to computer games may positively influence how women experience (and perhaps even come to develop an interest in) technology.

The final section of this collection effectively builds on the preceding chapters to move the feminist framework on science studies and STEM inclusivity briskly forward. *Removing Barriers* is a well-structured, inclusive, sophisticated collection relevant to scholars at various levels, including the advanced undergraduate and graduate levels.

*Women, Gender, and Technology* is the inaugural volume in a University of Illinois Press series of the same name (which will also be under the general editorship of Mary Frank Fox, Deborah G. Johnson, and Sue V. Rosser). This interdisciplinary collection explicitly understands gender and technology as mutually constitutive and hence, as Johnson notes in her introduction, the chapters in this book “aim, in one way or another, to understand the co-creation of gender and technology” (5). But, given the immense (and speedily growing) number of cultural and social phenomena that explicitly bind gender and technology together to mutual effect, this unifying vision is almost too general. As a result, the nine essays in this volume hang quite loosely together, ultimately working as a broad feminist introduction to issues of gender and technology but largely covering what is fast becoming familiar territory.

The collection begins with Rosser’s tour of schools of feminist theory in the context of how such various theoretical models may (or may not) advance feminist inquiry and action relative to technology issues. Somewhat constrictingly, Rosser employs an analytical template comprised of three categories deemed central for thinking about technology (workforce, use, and design) and runs each theoretical approach through these lenses. The result is a rigidly compressed but nonetheless useful overview of how specific schools of feminist thought can (or cannot) advance the larger projects in which the book is engaged. Although it is not explicitly structured as such, the book then unfolds along three general axes: issues of gender and the participation of women in technical fields, the intersection of gender issues and the information/digital age, and technologies of reproduction and genetics.

In chapter two, “Women, Men and Engineering,” Mary Frank Fox sketches out the field of engineering along the lines of gender with relatively grim but unsurprising results. Similarly, the well-known “chilly climate” is carefully delineated by Mara H. Washburn and Susan G. Miller in chapter three, re-illustrating gendered trends in the context of female participation in technical fields. Both chapters effectively “map the terrain,” using only moderately current data to detail a familiar and recognizable picture.

Two chapters on the digital age lie at the center of the collection, and each engages with issues that are particularly critical to understanding important intersections of gender and technology. Chapter four, Judy Wajcman’s “The Feminization of Work in the Information Age,” which is one of the strongest essays in this collection, provides an excellent analysis of how issues of economic mobility and sex segregation by job appear squarely at the intersection of women, work and digital technology. Wajcman argues for a more careful look at the somewhat dubious “expanded opportunities” offered women by information technology and offers a cogent critique of how these opportunities may in fact limit female advancement. In chapter five, Cheryl B. Leggon tracks the “digital divide,”

as well as efforts made to close it, in terms of internet and computer use by non-whites, particularly African Americans and Hispanics. While largely illustrative in nature, this essay provides useful and interesting data, bringing to this collection a badly-needed direct interrogation of race and ethnicity relative to the issues at hand.

Three essays that address genetic and reproductive technologies come next. In chapter six, "Genetic Technology and Women," by Barbara Katz Rothman examines genetic science relative to public discourses on reproductive technologies and the "breast cancer" gene. Her insights as to how technological "advances" in medical care are rhetorically mobilized through hierarchized social power relations and in turn come to reinforce them are not entirely new, but they offer a useful look at some genetic technologies in terms of women's roles as consumers and patients. Chapters seven and eight, by Linda L. Layne and Carol Colatrella respectively, focus on the complex interplay of empowerment and disempowerment through technology and issues of reproduction. Layne's piece investigates how a host of relatively new pre-natal technologies impacts the experience of pregnancy loss. She calls for greater attention to how changes in the experience of pregnancy caused by technological "advancements" may impact the trajectory of grief in the event of pregnancy loss, as well as the experience of pregnancy generally. Colatrella examines radical rethinkings of the intersection of women and technology through feminist narratives, specifically the films *Eve of Destruction* and *Making Mr. Right*.

Chapter nine, "High-Tech Worship: Gender Politics and the Appropriation of Multimedia Technology for Christian Worship" (chapter nine), a quite fascinating piece by James Fenimore, brings the book to a close. This essay perhaps best illustrates the kinds of innovative and unexpected insights that new approaches to the mutually constitutive elements of gender and technology will produce in the future. Fenimore's work illustrates how the use of multimedia technology by some Christian churches is strongly embedded in rhetorics and images of gender, which inform—and are in turn reformulated through—the gendered context in which they are employed.

*Women, Gender, and Technology* is by no means groundbreaking, with many of the contributions being summarative rather than bringing new insights to the field. However, the essays included provide broadly useful information, serving as a general introduction to issues of gender and technology, perhaps most effectively at the undergraduate level.

Readers and thinkers familiar with work on feminist philosophies of science and feminist epistemology are likely to expect Sandra Harding's new collection of essays to be particularly insightful and illuminating. *Science and Social Inequality: Feminist and Postcolonial Issues* does not disappoint. The volume is almost entirely an assemblage of retooled, revised, or expanded work previously published by Harding, which renders it an extremely practical and useful collection of her recent thinking. This

gathering up of various materials into one volume also means, of course, that at moments the book is welded together in slightly awkward ways. While it is clear that great care has been taken to forge smooth connections between multiple pieces that were all previously published (in some form) in separate venues, *Science and Social Inequality* does occasionally seem disjointed and somewhat self-referential across chapters.

That being said, this collection teems with the kinds of astute, rigorous and perceptive critiques we have come to expect from Harding. The essays speak vigorously and complexly to the critical question of how feminist science studies can counter the “normative” discursive practices of modern Western sciences that support (however inadvertently) global dynamics that are hegemonic, racist, misogynist, and profoundly destructive in their effects. Harding’s overarching concern is to illuminate “contemporary shifts in the production of knowledge and in political and economic relations” so as to bring the overt and covert ideological underpinnings of Western science in better and more generative conversation with issues of social justice (13). Harding divides the book into two parts “The Social World of Scientific Research” and “Truth, Relativism, and Science’s Political Unconscious.” The first section is comprised of six related articles that interrogate how we might best critique and dismantle the conceptual resources traditionally employed by Western thinkers and scientists that have shored up and masked the material and social control practiced by the West on the rest of the world. Using a post-Kuhnian approach, in which science and knowledge are contextually situated, Harding’s antiracist, postcolonial, feminist perspective works towards unpacking complex questions of how the embedded assumptions of Western science have articulated as natural the profiteering of the West at the expense of other peoples. Underlying the entire book is an explicit skepticism of the assumed relationship between science and progress—and of the benignity of Western “democratic” impulses as seen in global interventions, a pointed critique that comes even more strongly to the fore in the second half of the book.

The essays in the first section specifically address the assumptions of Western science and the paucity of robust and effective analytical frameworks that critically engage with the assumptions that have too long granted Western science a kind of global *carte blanche* and freedom from both self-analysis and accountability to others. Topics in this section include an interrogation of how even “good science” has made abiding contributions to racist and postcolonial projects. For instance, in chapter three, “With Both Eyes Open: A World of Sciences,” Harding presents a particularly powerful critique of the unity-of-science idea (a critique to which she returns in the book’s second half). Part one also includes a fine overview of the new options and critical perspectives presented through Western feminist science and technology studies, and seeks to move

standpoint theory forward as an effective means for more broadly and completely critiquing the underpinnings of scientific practice and generating productive epistemic self-interrogations.

The second part of *Science and Social Inequality* begins with the supposition that Western, Euro-centric (or, to use Harding's sometime phraseology, "Northern") sciences have a "ambivalent political unconscious" which at once is both "prodemocratic," interested in issues of social justice, and also simultaneously authoritarian and exploitative (113–14). Harding critiques Western science's seemingly democratic impulses, noting that they are in actuality likely to have their strongest roots in an unbridled enthusiasm for "making the world safe for capitalist projects" (118).

Moving from her critique of democracy via Euro-centric science, Harding returns to an analysis of the dangers of the "unity of science" model. In a move that nicely draws the two halves of the book together, she illuminates the ways in which a positivist version of science devalues other knowledges, reinforces the European as the standard for rationality, and heralds authoritarianism as a desirable social idea through the rigid endorsement of a monolithic and inflexible perspective (123). Scholars of feminist science studies interested in debunking the mythologies of a unified ideal of science and wishing to argue for the inherently multicultural nature of science itself need look no further than the latter half of this book for support.

Finally, Harding engages with the relativism debates, ending the collection with a dazzling analysis of how feminist philosophers and scholars of feminist science might best deal with issues of objectivity. Aligning herself with fellow scholars such as Donna Haraway and Evelyn Fox Keller, Harding declares herself a proponent of a perspective that "insist[s] on the importance of understanding how sciences are always constituted within culturally distinctive conceptual schemes and practices, but also on the importance of strengthening both the existing ideal and procedures for achieving objectivity" (147).

*Science and Social Inequality*, a collection of foundational and innovative work from a leading thinker in feminist science studies, is valuable in many ways: as a reference work, as an historical overview of crucial debates in feminist science studies, and as a powerful contribution to current efforts to push those debates forward into new and vital territories.

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