Book Review

Sandra C. Greer: *Elements of Ethics for Physical Scientists*,
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by Janet D. Stemwedel

There are certain elements of scientific training that students and the scientists training them recognize as important: mastering experimental techniques, learning how best to analyze data, sorting out how to draw conclusions that don't overstep what the findings would warrant. There are others, like what is involved in being an *ethical* scientist, that are not always seen as central to what trainees are getting or their trainers are offering. In part, this may be due to institutional decisions to address ethics as a minor detail, giving it as little time and attention as a basic lab safety lecture. In part, lack of attention to ethical issues in scientific training may flow from a dearth of training materials that approach ethics with a clear understanding of the research environments in which scientists and scientific trainees might need to make ethical decisions.

Sandra C. Greer offers *Elements of Ethics for Physical Scientists* as both a textbook for graduate students in the physical sciences and as an ethics resource for researchers in physical science and engineering fields. Organized in six main chapters, the book takes a very reasonable approach in motivating its intended audience to care about ethics, exploring in detail the ethical considerations that flow variously from the project of trying to build reliable knowledge about the world (in Chapter 3, 'The Scientist and Truth: Dealing with Nature'); from the scientist's interactions with other members of the scientific community (in Chapter 4, 'The Scientist and Justice: Dealing with Other Scientists'); and from the scientist's interactions with the wider world (in Chapter 6, 'The Scientist and Society'). Discussing the ethics of scientific practice in this way is a refreshing departure from responsible conduct of research training that frequently starts and ends with the importance of avoiding scientific misconduct. As well, this book includes some elements that are long overdue in serious discussions of the ethical duties of scientists individually and collectively, such as the situation of members of underrepresented groups in scientific communities and the costs a lack of diversity and

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inclusion can have for these communities and for their knowledge-building projects. At the end of each chapter, Greer presents discussion questions, case studies, and 'inquiry questions' that invite the reader to do some additional research to explore a topic in more depth. These questions will be especially useful to instructors teaching from *Elements of Ethics for Physical Scientists*, but they will also be engaging to the general reader.

Perhaps the strongest feature of this book is its cataloging of many of the material conditions in which scientists operate, conditions that act as constraints on both their knowledge-building activities and the scorekeeping that drives rewards like employment, research funding, and awards. For the graduate student who is shifting from learning the facts and theories constructed by others to becoming a practitioner who will be discovering new facts and formulating new theories, details about where research funding comes from, how findings get reported in journals, and what one should be able to expect from one's mentor are hugely useful. As it happens, these are also subjects about which it can be difficult to get matter-of-fact information from one's mentor (whether because they are busy writing grant proposals or feeling defensive at being asked about what good mentoring looks like), which makes a book like this a valuable reference for the trainee or early career scientist.

Greer's accounts of ethics (in Chapter 1) and philosophy of science (in Chapter 2) are less successful due to shortcomings that might have been avoided if someone with the relevant expertise in ethical theory and the philosophy of science had been a collaborator in writing them. In Chapter 1, Greer describes ethical issues as arising when multiple values cannot be satisfied simultaneously, which in effect collapses ethical issues to ethical dilemmas. She identifies two key ethical theories, utilitarian ethics and Kantian ethics, but offers a very odd presentation of what she takes to be the commitments of a utilitarian or of a Kantian. (For example, rather than discussing the Categorical Imperative or the role of *duty* in Kant's system of ethics, she asserts without further explanation "three universal rules" in a Kantian system. In describing how a utilitarian might evaluate a particular situation where downstream consequences might matter quite a lot, she claims of her hypothetical utilitarian: "Their philosophy would not motivate them to seek other solutions" (p. 2). Ignoring other ethical frameworks (like virtue ethics), Greer then proposes a seven-step process for ethical decision-making in science, a process that is not especially easy to use nor especially well motivated. Possibly the proposed strategy is meant to mirror the kind of thinking students practice in process oriented guided inquiry learning (POGIL), but it is not clear that this was a wheel in need of reinvention. The presentation of ethics in Chapter 1 is sufficiently weak that any instructor using this book in a class on ethics in science will want to provide additional readings on ethics

and on strategies for applying ethical frameworks to real-world decision-making.

The treatment of the philosophy of science in Chapter 2 provides a similarly odd account that is only minimally connected to mid-20th-century discussions of the role of inductive and deductive logic in scientific reasoning or of strategies for adjudicating between competing theories, and that seems in places to conflate truth and consistency. As well, the discussion of scientific knowledge-building largely ignores important recent work in philosophy of science from scholars like Helen Longino and Carl Craver. Teaching from Chapter 2 would leave students with a mistaken impression of philosophy of science, but it is not clear that most science faculty would have the expertise to recognize this fact.

The book touches on some recent real-world cases of scientists behaving well and of scientists behaving badly, but it does not engage deeply with these examples. This superficial treatment means that the reader's focus stays on behavior of obvious wrongdoers rather than on more complex questions about responsibility. In the case of the lab accident that killed research assistant Sheri Sangji (mentioned but not named), Greer asserts that "the professor's [Patrick Harran's] career was derailed" (p. 83) but does not consider the ethics of Harran's strategy to avoid taking responsibility for safety conditions in his own lab. Discussing the 1990 'Baltimore case' in which immunologist Thereza Imanishi-Kari, a collaborator of David Baltimore, was accused by her postdoc of having fabricated data in an article she coauthored with Baltimore, Greer draws the obvious lessons about data management but does not take up the ethical defensibility of Baltimore's strong public statements that were widely seen as attacking the whistleblower. Identifying sexual harassment as an ethical issue in scientific research environments, Greer mentions disgraced UC-Berkeley astronomer Geoff Marcy (who she mistakenly describes as a Nobel Prize winner), but she does not consider the institutional contexts that allow harassing behavior to persist. Unpacking more of the complexities of these cases might have conveyed to the reader the ways in which ethical analysis, like scientific research, is far from cut-and-dried.

Even the presentation of details about the sorts of conditions that shape how science is done (including peer review, granting, intellectual property, *etc.*) – arguably some of the strongest components of this book – are limited in important ways. First, though it is never stated explicitly, these details are somewhat peculiar to the ways scientific research and training are structured in the United States. This means they will be of limited use in ethics training for students or practitioners of science that structure research environments and systems of rewards differently. Moreover, these details are not only culturally particular but also temporally particular, reflecting the ways resources are distributed and score is kept *right now*. Though it may be hard to imagine,

especially for those training science students with the aim of helping them to flourish, these conditions might well change. Indeed, one might argue that the scientific community has an *ethical obligation* to change them, which is not something this book addresses.

It is encouraging that Greer, herself a chemist, sees ethical decision-making as important enough in the practice of science to warrant a textbook. Despite the significant shortcomings of this book, Greer's treatment of ethics as integral to sound scientific practice, and her attention to the ways that the features of scientific institutions and research environments shape the kinds of ethical decisions one might face, should make this book useful to a significant population of science students and early career scientists.

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