Précis of *A Tapestry of Values: An Introduction to Values in Science*

Kevin C. Elliott*

My recent book *A Tapestry of Values* is designed to introduce the philosophical literature on science and values in a manner that makes it accessible to a wide audience, including undergraduates, scientists, and interested members of the general public. This précis provides an overview of the book in order to set the stage for responses by Heather Douglas, Janet Kourany, and Matt Brown. The overview covers the five major avenues for value influences discussed in the book, as well as two justifications for incorporating values in science and three conditions for doing so in an appropriate fashion.

Keywords

values in science • research ethics • objectivity • science policy • science communication • transparency • public engagement

Part of an author-meets-critics book symposium on A Tapestry of Values: An Introduction to Values in Science by Kevin C. Elliott (Oxford University Press, 2017), with Douglas 2018, Kourany 2018, Brown 2018, and Elliott 2018

1 Introduction

This set of articles emerged from an Author Meets Critics session devoted to my book *A Tapestry of Values: An Introduction to Values in Science*, held at the Central Division Meeting of the APA in February 2018. It was a privilege at the session to engage with Heather Douglas, Janet Kourany, and Matt Brown because they have all deeply influenced my thinking about how values influence scientific practice. In fact, I'm pretty sure that Heather was the original source for the book's organizing metaphor—the tapestry—as a way of thinking about how values influence science.

In this précis, I will provide a brief overview of my book's major themes in order to set the stage for the reflections of my three critics. My central goal in writing the book was to take the exciting philosophical scholarship on values and science over the past few decades and present it in a manner that would be accessible and interesting to undergraduates, practicing scientists, and interested members of the general public. Thus, my strategy was to describe engaging case

*Lyman Briggs College, Department of Fisheries and Wildlife, Department of Philosophy, Michigan State University, 35E Holmes Hall, 919 E. Shaw Ln., East Lansing, MI 48825 USA, kce@msu.edu

Received 17 July 2018; Accepted 29 July 2018
doi:10.3998/ptpbio.16039257.0010.007

studies that illustrated how values can influence science and how we can address those values in a responsible fashion. The core of the book is composed of five chapters, each of which describes a particular way in which values can influence science. Over the course of the book, I argue that these influences of values can be justifiable when particular conditions are met. I provide two justifications for thinking that values have legitimate roles to play in science, and I suggest three conditions for handling values responsibly. Let me describe each of these elements in turn.

2 Five Avenues for Value Influences

The five avenues for value influences highlighted in the book include (1) choices about what topics to study; (2) decisions about how to go about studying those topics; (3) choices about what aims should guide particular inquiries; (4) judgments about how to respond to scientific uncertainty; and (5) decisions about how to communicate results. These are obviously not the only ways that values can influence science. Moreover, the distinctions between these different avenues are not entirely sharp (as Heather correctly emphasizes in her reflections). Nevertheless, these five categories provide a pedagogically useful way to describe the major influences of values that philosophers typically discuss. It is also worth noting that I use the term ‘values’ throughout the book and this précis to refer to what philosophers typically call ‘non-epistemic values’ (i.e., values that do not constitute or reliably contribute to the attainment of knowledge). Although the distinction between epistemic and non-epistemic values is debatable, the book focuses on non-epistemic values because they are the values that are sometimes excluded from scientific practice.

The first avenue for value influences discussed in the book is the choice of research topics. The book discusses three case studies that illustrate how values can play this role: studies of gender- and race-based differences in cognitive abilities, debates about how to allocate public funding for science, and critical analyses of the research investments made by private companies. Although it is not particularly controversial to claim that values can influence the topics that scientists choose to investigate, I emphasize that these influences raise important ethical and policy questions. For example, even if one thinks that ethical values generally provide good reasons for avoiding research on differences in cognitive abilities, one might still think it is justifiable under some conditions for well-intentioned scholars to pursue this research as a way of challenging questionable research findings presented by less responsible scientists. Thus, more reflection is needed about how to handle research topics that have the potential to cause harm. There are also very important policy questions about how to allocate public research funds and how to respond to the economic values that determine how private companies spend their funds. For example, if pharmaceutical companies are left to their own devices, they are unlikely to place much attention on diseases that primarily afflict citizens of low-income countries. It is important to develop strategies for alleviating these sorts of injustices.

A second avenue for value influences is the choice of how to study a particular topic. I distinguish this form of value influences from the previous one because I think it is important to recognize that one can study the same topic in very different ways because one holds different values. As illustrations, the book considers research on agriculture, pollution, and depression. Building on the work of Hugh Lacey (1999), I show how agricultural research can support different values depending on whether it is directed at developing patentable seed varieties or whether it is focused on developing “agroecological” growing strategies. Similarly, I point out that research on environmental pollution typically incorporates a wide range of assumptions about how to integrate different forms of evidence and how to extrapolate beyond the available evidence. This provides an opportunity to discuss Helen Longino’s (1990) argument that sci-

entists are forced to make value-laden decisions about what background assumptions to adopt. Finally, I return to the economic values that influence the pharmaceutical industry and show that they can influence not only the topics studied but also the ways those topics are investigated. In the case of depression, for example, there is much more financial incentive to develop patentable drug treatments than to explore other biological or social strategies for addressing it.

The third avenue for value influences involves the choice of research aims. This is a somewhat more subtle role for values than the first two, but it is exceedingly important. For example, regulators and policy makers may need scientists who work with them to focus more on speed and efficiency and less on accuracy than they ordinarily would when developing methods and models (Elliott and McKaughan 2014). Similarly, Kristen Intemann (2015) has emphasized that values can play very important but often implicit roles when climate modelers are setting their aims. For example, the decision to optimize a model for predicting changes in precipitation across a particular region might make it less helpful at predicting other phenomena, such as extreme weather events. Integrated assessment models (IAMs) that study the future economic costs of climate change are particularly subject to these sorts of value influences insofar as modelers must decide which sorts of costs to study and how to aggregate them across different groups of people (Tuana 2010). In my view, this is an important way in which values influence central aspects of scientific reasoning, such as the assessment of models and hypotheses (Elliott 2013).

The fourth avenue for value influences, deciding how to respond to scientific uncertainty, has received a great deal of attention in recent years thanks to the work of Heather Douglas (2009). Using her own case study of research on the carcinogenic effects of dioxin, the book shows how values have a role to play in deciding how much evidence is sufficient in order to accept a hypothesis. It also shows how this role for values can affect how scientists interpret data, make assumptions, and weigh evidence. In addition to discussing this argument from inductive risk (Elliott and Richards 2017), the book discusses the broader decisions that scientists have to make about how boldly to present uncertain results. It shows how environmental scientists frequently face value-laden decisions about whether it is better to present results more cautiously (thereby preventing people from becoming overly alarmed about potential threats) or more aggressively (thereby making it more likely that potential threats can be averted).

The fifth avenue for value influences involves the language that scientists use for communicating their findings. This can include the frames that scientists employ, the terms or metaphors that they use, and the categories with which they describe phenomena. For example, the book discusses research on genetic factors that influence the mating behavior of small rodents called voles. Depending on how scientists frame their findings, they can influence the conclusions members of the public draw about how these results might apply to people. I also discuss Brendon Larson's account of the metaphors that permeate the environmental sciences and the ways those metaphors influence people's responses to environmental problems (Larson 2011). Finally, the book highlights the value-laden character of the decision to employ racial categories in biomedical research, insofar as those categories can sometimes help to uncover useful information but can also perpetuate misunderstandings and stereotypes (Katikireddi and Valles 2015).

3 Evaluating Value Influences

My book not only describes the ways in which values influence science but also provides tools for thinking about whether particular value influences are acceptable or not. In order to keep the text as accessible as possible, however, I try to let these discussions bubble up from the case studies rather than providing extended philosophical arguments about when values are legitimate or not. In the introduction, I provide two general justifications for thinking that

values can have appropriate roles to play in the five avenues discussed throughout the book. First, I appeal to the fact that scientists are forced to make choices (about what to study, how to study it, what aims to prioritize, how to describe the results, and so on) that are not settled by the available evidence. Given that research frequently ends up serving some social values over others depending on how scientists make these choices (even if the choices are not intentional), I argue that there are ethical reasons for scientists to take the ramifications of these decisions into account. My second justification for incorporating values in science is that values frequently help to achieve legitimate goals that are part of scientific practice. These include solving important social problems, effectively informing policy makers, and communicating new information to the public in a responsible manner. Without taking values into account, scientists cannot reliably fulfill these goals.

The book moves beyond these two general justifications, however, and considers additional conditions that can help determine when particular value influences are legitimate. This is important, because even if one acknowledges that values should, in principle, be allowed to influence science in some cases, one still has to determine which values are appropriate in specific cases. Throughout the book, I highlight three conditions that consistently emerge when evaluating the legitimacy of value influences. First, it is typically important for values to be as *transparent* as possible. When research is influenced by values but those influences are kept secret, it prevents stakeholders who disagree with those values from being able to discount the scientific results. A second condition is that value influences should be *representative* of major ethical and social priorities. It is problematic when the values that influence scientific practice do not reflect important ethical principles (such as when research investments neglect the needs of those in low-income countries). Third, I argue that value influences are typically more legitimate when they are generated through *engagement* between scientists and other stakeholders with diverse perspectives.

In order to introduce my readers to the wide variety of ways in which engagement can occur, I devote a chapter to presenting case studies that illustrate four major forms of engagement. First, I use the term “bottom-up” engagement to describe cases where citizens take steps to push research in directions that matter to them. As an illustration, the book recounts how AIDS activists in the 1980s influenced study designs and policies at federal agencies like the National Institutes of Health and the Food and Drug Administration (Epstein 1996). Second, the category of “top-down” engagement involves exercises that academics or policy makers employ to elicit public views about new areas of research such as nanotechnology or genetically engineered organisms. Third, the category of “diverse, interdisciplinary” engagement occurs when scholars with a wide range of personal backgrounds and disciplinary perspectives provide input into scientific research and development. I discuss the work of Kristin Shrader-Frechette and Nancy Tuana as examples of how scholars from the humanities and social sciences can help scientists to reflect more carefully about their work (see e.g., Shrader-Frechette 2014; Tuana 2010). I also point out that scientists can gain critical perspectives by incorporating more members of historically underrepresented groups into their disciplines. The chapter’s fourth category covers engagement with laws, institutions, and policies. This category overlaps with the other three, but I thought it was important to emphasize that effective engagement must include not only interaction between different stakeholders but also efforts to influence the institutional structures that guide how scientific research is done. The chapter discusses examples associated with patent policies, regulations, and the activities of federal funding agencies.

4 Conclusion

The book's concluding chapter clarifies the significance of the tapestry metaphor and explores some of the lessons of the book for those interested in public policy. The tapestry metaphor suggests that one can think of scientific research as being composed of many different kinds of activities or "threads." Some of these threads, such as the use of logical principles or mathematical techniques, are relatively free of values. Other threads, such as the choice of study designs, statistical methods, terminology, or background assumptions, are value-laden. All these activities or threads are intertwined in practice, but it can be helpful to analyze them separately for the purposes of critically evaluating how they influence scientific practice.

To the extent that values permeate scientific research, I argue that policy makers need to abandon approaches to science policy that assume scientists can go about their work without receiving guidance from stakeholders. Thus, my book coheres with the critical perspective that other science studies scholars have recently taken toward concepts like the "linear model," the "deficit model," and the "social contract" (see e.g., Guston 2000; Pielke 2007; Sarewitz 1996). As an alternative to these concepts, I return to my three conditions of transparency, representativeness, and engagement. Scientists and policy makers should find ways to make important value judgments as explicit as possible, they should try to make them in ways that cohere with ethical principles and social priorities, and they should pursue innovative forms of engagement that help bring critical reflection to bear on these judgments. Value judgments cannot—and should not—be removed from science, but we need to explore ways to make these judgments as responsibly as possible.

Literature cited

- Brown, Matthew J. 2018. "Weaving Value Judgment into the Tapestry of Science." *Philosophy, Theory, and Practice in Biology* 10 (10). <https://doi.org/10.3998/ptpbio.16039257.0010.010>.
- Douglas, Heather. 2009. *Science, Policy, and the Value-Free Ideal*. Pittsburgh: University of Pittsburgh Press.
- Douglas, Heather. 2018. "From Tapestry to Loom: Broadening the Perspective on Values in Science." *Philosophy, Theory, and Practice in Biology* 10 (8). <https://doi.org/10.3998/ptpbio.16039257.0010.008>.
- Elliott, Kevin. 2013. "Douglas on Values: From Indirect Roles to Multiple Goals." *Studies in History and Philosophy of Science* 44: 375–383.
- Elliott, Kevin, and Daniel McKaughan. 2014. "Non-Epistemic Values and the Multiple Goals of Science." *Philosophy of Science* 81: 1–21.
- Elliott, Kevin. 2017. *A Tapestry of Values: An Introduction to Values in Science*. New York: Oxford University Press.
- Elliott, Kevin C. 2018. "A Tapestry of Values: Response to My Critics." *Philosophy, Theory, and Practice in Biology* 10 (11). <https://doi.org/10.3998/ptpbio.16039257.0010.011>.
- Epstein, Steven. 1996. *Impure Science: AIDS, Activism, and the Politics of Knowledge*. Berkeley: University of California Press.
- Guston, David. 2000. *Between Politics and Science: Assuring the Integrity and Productivity of Research*. Cambridge: Cambridge University Press.

- Intemann, Kristen. 2017. "Feminism, Values, and the Bias Paradox: Why Value Management Is Not Sufficient." In *Current Controversies in Values and Science*, edited by Kevin Elliott and Daniel Steel, 130–144. New York: Routledge.
- Katikireddi, S. V., and Sean Valles. 2015. "Coupled Ethical-Epistemic Analysis of Public Health Research and Practice: Categorizing Variables to Improve Population Health and Equity." *American Journal of Public Health* 105: e36–e42.
- Kourany, Janet A. 2018. "Adding to the Tapestry." *Philosophy, Theory, and Practice in Biology* 10 (9). <https://doi.org/10.3998/ptpbio.16039257.0010.009>.
- Lacey, Hugh. 1999. *Is Science Value-Free?* London: Routledge.
- Larson, Brendon. 2011. *Metaphors for Environmental Sustainability: Redefining our Relationships with Nature*. New Haven, CT: Yale University Press.
- Longino, Helen. 1990. *Science as Social Knowledge*. Princeton: Princeton University Press.
- Pielke, Roger. 2007. *The Honest Broker: Making Sense of Science in Policy and Politics*. Cambridge: University of Cambridge Press.
- Sarewitz, Daniel. 1996. *Frontiers of Illusion: Science, Technology, and the Politics of Progress*. Philadelphia: Temple University Press.
- Shrader-Frechette, Kristin. 2014. *Tainted: How Philosophy of Science Can Expose Bad Science*. New York: Oxford University Press.
- Tuana, Nancy. 2010. "Leading with Ethics, Aiming for Policy: New Opportunities for Philosophy of Science." *Synthese* 177: 471–492.

© 2018 Author(s)

This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International license, which permits anyone to download, copy, distribute, or display the full text without asking for permission, provided that the creator(s) are given full credit, no derivative works are created, and the work is not used for commercial purposes.

ISSN 2475-3025