*Why Beliefs Matter* is an interesting book that can be read with profit as long as one knows two things before starting. First, one should not expect to find a sustained argument in support of a thesis. Imagine instead that a professor (i.e., E. Brian Davies) has invited you to sit through his last seminar before retirement, so that he may expound freely on topics and controversies that he has encountered along his academic journey. Second, one should know the areas of expertise of the professor, which are mathematics and the history of "the mechanical philosophy." As I discuss below, he has opinions that range far and wide, which can be uneven in quality on certain topics.

Chapter one gives an insightful overview of the Scientific Revolution. Davies' knowledge of the "mechanical worldview" and the work of Isaac Newton is clearly evident. He argues that the revolution that occurred in the seventeenth century in natural knowledge cannot be a result of any single worldview or approach. Looking to the historical record, he says we see a wide variety of beliefs and methods at work. He also makes a persuasive case that technological advances often preceded theoretical ones, allowing natural philosophers to perceive the world with increasing reliability and accuracy. Despite the impressive detail of the chapter, however, I found the argument to be strangely disconnected from what was promised in the preface, where Davies says, "This book is about beliefs." Chapter one, by contrast, contains no detailed descriptions of any individual's beliefs. It is mostly about method, and the failures of the history of science to align with various methodological schemes set forth by philosophers and scientists.

The aim of the second chapter is to "present a range of arguments that together strongly suggest that a logically straightforward, reductionist account of reality cannot enable us to say everything that we want to." He makes an argument for pluralism: that our social and ethical worlds are wholly unamenable to mathematical analysis, that our concepts of causation are dependent upon context, and so forth. Along the way, he briefly discusses the concept of determinism ("a metaphysical belief that is incapable of being tested"), the problem of consciousness ("the really troublesome philosophical problem") and supports arguments for innate cognitive structures. I found the main argument disappointing because, even though I agree with his problems with reductionism, he was unwilling to tackle the question of ontological emergence. He

says, “Pluralism, as defended in this book, does not imply anything about how the world is in itself.” But, of course, reductionists and emergentists are largely agreed on this point, our cognitive faculties being what they are. The real question is whether the physical universe is ontologically reductionist. By sidestepping this issue and dealing only with epistemological reductionism, Davies portrays his chapter as more against the grain of scientific opinion than it really is.

The topic of the third chapter is the nature of mathematics. He begins with an introduction for laypersons on the differences between classical and constructivist approaches in the philosophy of mathematics. He again advocates a pluralist approach, where one can switch between different mathematical frameworks depending on the context. The rest of the long chapter is devoted to a critique of Platonism in mathematics, arguing instead for a “biologically and culturally based description of mathematics” as an alternative. The main issue, according to Davies, is whether mathematic structures exist in an independent realm about which humans may discover certain truths. This is not convincing for Davies for many reasons; the practice of mathematics evolves over time, is culturally transmitted, and can proceed without needlessly positing metaphysical realms to which humans have limited access. Davies’ advocacy of pluralism, at bottom, is motivated by the recognition that mathematics—long esteemed as a body of certain knowledge—represents the world only partially, and so will always require supplementation by other types of descriptions. Davies comes across as a reliable and levelheaded guide through these debates, though most, like myself, will not be able to properly assess his claims.

Chapter four discusses various aspects of modern physics, especially the current state of particle physics, while interjecting comments and concerns in various places. For example, he describes the standard model at length and then offers a philosophical reflection. He takes a realist approach to atoms by saying that it is unlikely that an alternative explanation for them will turn up, but is more cautious about quarks and the like. He also discusses the idea of a multiverse and is generally skeptical, saying it “embodies the tendency of theoretical physicists to endow elements of a mathematical theory with a degree of reality that is even stronger than that envisaged by Plato.” The best types of science, he says, contain a healthy mix of theory and observation. Though

he is generally skeptical about the ability to predict the future of scientific development, he is more optimistic about "machine intelligence," and says it may be indistinguishable from human intelligence in fifty years.

The final chapter is on "present-day attitudes on science and religion," and, unfortunately, is the weakest. The chapter begins by arguing "there is no such thing as the relationship between "science and religion" because the categories have different meanings in different contexts, and then, without recognizing the incongruity, proceeds to provide definitions of science (testable, natural explanations of the natural world) and religion (traditions composed of ritual practices, beliefs, and ethics). He then discusses fundamentalists, whom he accuses of having a "lack of compassion" because they believe outsiders are consigned to Hell. Next he outlines the religious beliefs of a number of famous scientists that show there is no "scientific consensus about the status of religion." The rest of the chapter is essentially a rebuttal of Christianity, where he discusses classic doctrines (e.g., virgin birth, resurrection of Jesus Christ, demonic possession) that he, as a secular humanist, find unconvincing. His conclusion is that with respect to religious belief, "different people give different answers," and "theologians seem to accept this situation without drawing the obvious conclusions about the status of their beliefs." Pluralism, it seems, is a virtue in science, but a vice in theology.

In conclusion, the book is frustrating in many respects, especially because it is scatterbrained. Nevertheless, Davies has thought long and hard about the relationship of mathematics to the physical world, which gives him an interesting and even helpful perspective on the explanatory reach of the sciences that rely upon mathematics. But as he says in the last chapter, "Famous scientists command a ready audience because of their important contributions to their own fields, but this does not mean that they have particularly deep views on other subjects." I quite agree, and think the same principle applies to mathematicians.

Josh Reeves
Postdoctoral Researcher, Heyendaal Program on Theology and Science
Radboud University, Nijmegen, The Netherlands