BOOK REVIEWS

Vincent F. Hendricks and John Symons (eds.), ***Formal Philosophy: Aim, Scope, Direction***. Copenhagen: Automatic Press (2005), 264 pp., $40.00 (cloth).

Formal Philosophy is a collection of interviews with 21 leading figures in the field. Vincent Hendricks and John Symons invited Johan van Benthem, Brian Chellas, Anne Fagot-Largeault, Melvin Fitting, Dagfin Føllesdal, Haim Gaifman, Clark Glymour, Adolf Grünbaum, Susan Haack, Sven Oven Hansson, Jaakko Hintikka, H. Jerome Keisler, Isaac Levi, Ruth Barcan Marcus, Rohit Parikh, Jeff Paris, Gabriel Sandu, Krister Segerberg, Wolfgang Spohn, Patrick Suppes, and Timonthy Williamson to answer the following five questions:

1. Why were you initially drawn to formal methods?
2. What examples from your work illustrate the role formal methods can play in philosophy?
3. What is the proper role of philosophy in relation to other disciplines?
4. What do you consider the most neglected topics and/or contributions in the late twentieth century?
5. What are the most important open problems in philosophy and what are the prospects for progress?

The breezy style and unconventional format of this collection make for delightful reading. There are fascinating conjectures, career recaps, diatribes, pointers to overlooked work, and racy memoirs, including Clark Glymour's revelation that he attended high school with Evel Knievel. *Evel Knievel!*

But there is also a thread of sound methodological advice running through this book that might be missed for the lighthearted fun. In several of these interviews there are answers to questions that we've all faced—the value of the philosophy of science, whether any philosophical problem worth worrying over cannot simply be handled with common sense and a smidgen of logic, what distinguishes insightful use of formal methods from tedium, and how to judge the fit between a formal model of a subject and the subject itself. There is remarkable agreement over how to address these core concerns, which is heartening: while there is disagreement over when to cry foul, which is human, there is nevertheless consensus over the rules of the game. This consensus means that within the pages of

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Formal Philosophy are the foundations for a discipline, even though there is some disagreement over what to call it and where to house it. I highlight here three themes.

The philosophy of science should work to advance the sciences. Clark Glymour endorses this sensible proposal, citing a passage of Michael Friedman's *The Dynamics of Reason*, which pictures philosophy as an incubator of new ideas for the sciences. But by this standard, Glymour argues, the recent philosophy of science has not performed very well. Real mathematical work with philosophical motivations is largely ignored, and a consequence is that many of what should be core concerns within contemporary philosophy of science have moved out of philosophy proper and into statistics and machine learning.

One result from this outsourcing of philosophy to other disciplines is addressed in Mel Fitting's essay. Logics and formal frameworks that were once pure philosophical logics are now rapidly moving into engineering applications and the special sciences—notably artificial intelligence, psychology, and economics. To keep these practitioners honest, Fitting argues, they must be reminded that there are philosophical positions embedded in these frameworks that bear directly upon their model building. Another way to put this is to observe that as the barrier between philosophical logics and applied logics breaks down, applied logicians, mathematical psychologists, and decision theorists must have one foot in philosophy and the other in their particular special science.

The broader point raised by Fitting and Glymour, and also addressed in Rohit Parikh's essay, is that much of philosophy of science is now occurring outside of the professional boundaries of philosophy. This development presents a direct challenge to a view held in some quarters that philosophers are all-purpose concept custodians, standing on-call to clean up the muddleheaded notions found in the sciences. But it is of little surprise that the results of these generalists often are of little interest to scientists. For ignoring the details of a science is often in effect to ignore the priorities that will constrain an attractive solution, which leads to results that only a philosopher could love. A clear example is the current disconnect between how mainstream philosophy of science treats uncertainty and the rapid development of imprecise probabilities and bounded-rationality carried on almost entirely outside of the field. It is a dumbfounding development to see the philosophical center of gravity of this field move out of philosophy and into the special sciences. Recent remarks by Cristina Bicchieri (2006) offer additional insights on this point.

Formal methods offer both training for problem solving and the tools to solve problems. This point is mentioned explicitly by Dagfinn Føllesdal in his essay and is a theme of several others. Føllesdal reminds us that one benefit from studying mathematics is that it gives you a large rep-

ertoire of structures, training in how to take them apart and combine them, and instruction on how to apply them. This is common knowledge to those who have some mathematical training, but it is a point that is sometimes missed by those who don't, some of whom dismiss formal methods as little more than technicians' work. Certainly not all philosophical problems yield to formal methods and there are good and bad practitioners. Both of these points are stressed repeatedly throughout this collection. But at the core of several philosophical problems one often finds a clash between imagined properties of a subject and the bad behavior of those properties within some structure. The habit of contemporary philosophy of limiting the menu of structures to first-order logic, basic modal logic, and classical probability is akin to institutionally tying philosophers' hands behind their backs.

Following this observation is a point Krister Segerberg credits to Rich Thomason. Thomason, commenting on philosophers who view formal methods as distractions to real philosophical advancement, remarked that the only real advantages that we have on the greatest philosophers of past ages are the new tools that we have at our disposal. It is hard to imagine improving upon Aristotle without resorting to methods that simply weren't available to him. Segerberg captures this point in a slogan: "To go beyond a great philosopher, go beyond his methods!"

Abstraction cuts problems down to size. Haim Gaifman remarks on the blessings of abstraction, which offers a license to ignore information. For instance, artificial intelligence (AI) represents an ingenious approach to the problem of cognition: avoid getting bogged down in the philosophy of mind! In attempting to do this, researchers use a wide variety of formal methods to discover basic mechanisms that are thought to be operative in how we think or communicate, or to at least effect this type of behavior. And by shuttling between the behavior of the model and our own, we sometimes are able to penetrate deeply into the subject of cognition and, indirectly, the workings of the mind.

But are these mechanisms *really* representative of psychological processes? And do the formal frameworks have an agreed upon semantics? Often the answer to both questions is, No. The field is a lovely mess that way. Nevertheless, to paraphrase Rohit Parikh's reply, So what? It is a credit that AI struggles with models of human reasoning and communication for which we often have neither a convincing semantics, nor a compelling psychological model for actual thinking or talking. And it is a credit to AI that it does not limit itself to a few choice formal methods, but will try almost anything as a modeling language, and study those languages *qua* languages to understand how to apply them and when. This is precisely the territory that philosophy once occupied.

These three points hardly exhaust the riches of this eclectic little book,

but they are some of the most important themes it addresses. It is for this reason that *Formal Philosophy* is a terrific book. Hendricks and Symons struck upon an ingenious method for getting giants in the field to talk freely about why formal philosophy is important, and how it should be done.

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REFERENCE

Bicchieri, C. (2006), "Philosophy: What Is to Be Done?", *Topoi* 25: 21–23.

Stathis Psillos, ***Philosophy of Science A–Z***. Edinburgh: Edinburgh University Press (2007), 280 pp., $70.00 (cloth).

This is a dictionary of the philosophy of science. Its primary audience is likely to be undergraduate students coming to grips with the philosophy of science, though more advanced students in other areas of philosophy will find the book useful as well. It could well complement a standard text or anthology in a survey course in the philosophy of science. Philosophers who do not work in the philosophy of science, as well as academics in the sciences and social sciences, and members of the educated public may find the book of benefit as well. I can imagine it serving as a useful resource for a philosopher of science seeking guidance outside their customary patch. I picked up a few tidbits that were new to me. It will certainly find a place on my bookshelf.

The specialized vocabulary of the discipline can be daunting for the newcomer to the philosophy of science. So a dictionary is welcome. But to say that the book is a dictionary is to downplay it somewhat. Though Psillos does describe it as such, it is more than a mere dictionary. Some of the entries are definitions of key terms. But many of the entries contain more sustained discussion. As a whole, they provide coverage of a comprehensive range of topics in the philosophy of science. Most of the entries include references to works in the literature where the interested reader may turn for further enlightenment on a given topic. There are entries for classic authors as well as senior living figures in the field of the philosophy of science, which briefly describe their contribution and provide references to seminal works. Entries for central figures in the history of science such as Copernicus, Newton, Darwin and Einstein are also included. The book concludes with a fine bibliography of key works in the philosophy of science.