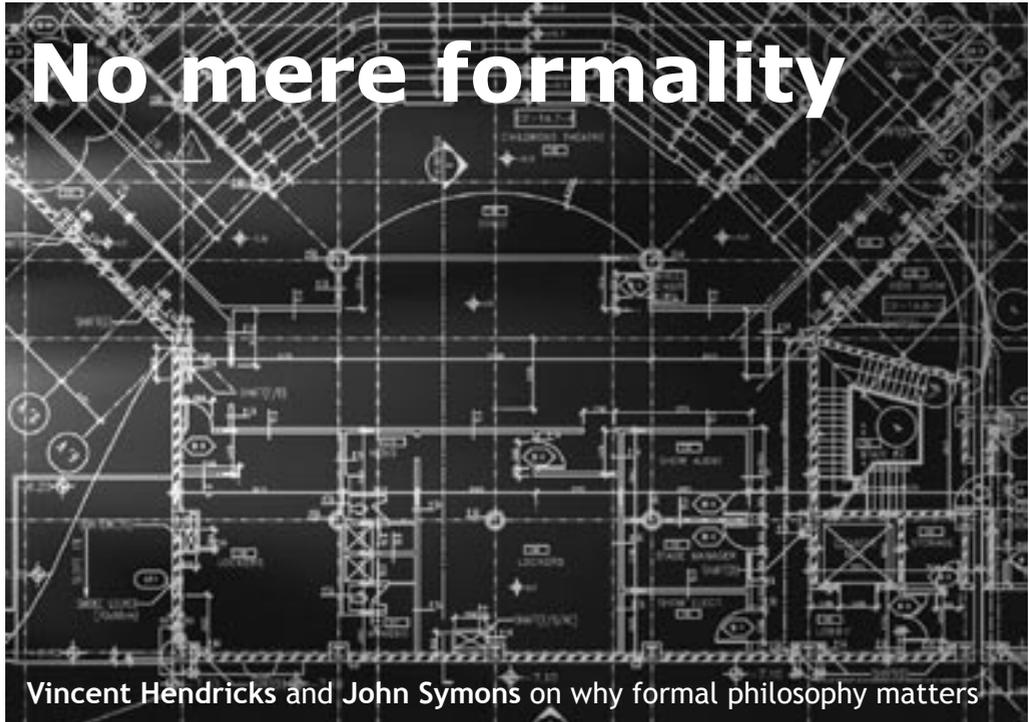# No mere formality

**Vincent Hendricks** and **John Symons** on why formal philosophy matters

**P**hilosophers have always tended to harbour some uncertainty about the goals, methods and achievements of the philosophical enterprise. This is as it should be. Dogmatism is not a hallmark of good philosophy and philosophers, as a rule, are a pretty self-critical bunch. It is good for us to realise how horribly wrong we could be or that philosophy might be a waste of time – or worse. Thinking about philosophy keeps (or should keep) philosophers honest.

However, while it might have some salutary function, the most interesting work in philosophy is rarely conducted at the meta-philosophical level. Occasional navel-gazing may be good for the sake of cleanliness, but excessive navel gazing is pathological. Consequently, most philosophers in the so-called analytic tradition have eschewed the kind of public metaphilosophical reflection that was very popular in certain quarters in recent decades. Casual browsers in the

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philosophy section of your local bookstore in the 1990s might have got the impression that we have entered an era of post-analytic philosophy or that philosophy had died. And why didn't we hear any response from the hordes of analytic philosophers busily working away in academic departments around the world? Frankly, because most of us are more interested in doing philosophy than in criticising it or defending its legitimacy. This does not mean that philosophers are oblivious to the metaphilosophical brouhaha in the bookshelves. When pressed, or after a few drinks, most will have a great deal to say about the state of philosophy.

In the spring of 2005 we began to collaborate on problems related to the application of logic and elements from formal learning theory to traditional questions in the theory of knowledge. Given the nature of this topic, our conversations regularly turned to the more general question of the relationship between formal methods and philosophical investigation. We realised that some of the philosophers whose work we most admire had never explicitly articulated their views on these questions, and it occurred to us that it might be worth asking them.

We decided to pose five relatively open and

broad questions to some of the best philosophers who make formal methods a centrepiece of their work. Our questions were designed to solicit their view of the nature of formal philosophy in a relatively informal manner. We could not quite get them to the level of a conversation over dinner but at the same time we wanted to avoid the restrictions of a standard academic article. We asked questions like: why were you initially drawn to formal methods? What examples from your own work illustrates the use that formal methods can play in philosophy? What is the proper role of philosophy in relation to other disciplines? Our goal was to avoid channelling the responses in one direction or another, and as a result we got a really diverse and fascinating set of replies, collected into the book *Formal Philosophy*.

The project was motivated by our curiosity but also by our discontent with the prominent histories of analytic philosophy currently on the market. We believe that the discussion of general methodology of philosophy is in a pretty bad state. One of the most significant faults we see with such recent work is its failure to recognise and tackle the central place of formal methods. Shop-worn narratives about the failures of logical positivism, the decline of formal methods in philosophy, and the rise of intuitions-based conceptual analysis, are neither entirely true nor particularly helpful. In any case, such talk has been overwhelmed by the ongoing buzz of interesting work from philosophers who look much more like Russell and Carnap than Rorty or Cavell. We hoped that our project could serve, in some small way, as an optimistic and progressive counterweight to the more popular surveys of the philosophical landscape now on the market.

However, our intention was not so much to promote the use of formal methods in philosophy. For one thing, it is not necessary for us to do so. Formal philosophy is thriving without any advertising or hype.

Clearly, logical and mathematical methods by themselves are not a panacea for all that might ail the philosopher. However, it is just as clear that there is something peculiarly fertile in the interplay between formalism and philosophical inquiry. Even those who reject analytic traditions in philosophy recognise that many of the most important developments in philosophy and its broader intellectual environment have arisen out of engagement with mathematics, logic, computer science, decision theory, physics and the other natural sciences. While there are limits to what formal methods can contribute, formal insights have sharpened, radicalised and extended philosophical investigation. Many whole regions of philosophical investigation would never have seen the light of day without the aid of formal methods.

Just as importantly, insights from mathematics and logic have also definitively buried some untenable philosophical programs. One relatively famous example of an advance in logic burying a philosophical project was Kurt Gödel's 1931 paper "On Formally Undecidable Propositions of *Principia Mathematica* and Related Systems". In this short paper, Gödel showed that the axiomatic method – the method of deriving true conclusions by logic from some set of basic assumptions or axioms – has important limits. The proof shows that any axiom system of elementary arithmetic will be deductively incomplete, which means that there will always be some true sentences of arithmetic which cannot be deduced from the set of initial assumptions that constitute the axioms of your system. No matter how you build your axiom system this will be the case. The upshot of Gödel's work is that we will not be able to find the kind of systematisation of many important areas of mathematics that many philosophers and mathematicians had hoped for in the late 19th and early 20th century. He proves that it is simply not possible to find a system that cranks out all the truths in a particular field of mathematical inquiry like arithmetic. Arithmetic is capable of producing truths that "go beyond" any system we build. While philosophers have drawn all kinds of conclusions from Gödel's proof, one thing is clear: Gödel demonstrated that many of the hopes that were precisely articulated by Bertrand Russell and Alfred North Whitehead in their *Principia Mathematica* would forever go unrealised.

Gödel's work is deservedly famous and it decisively squelched what had been an important line of research in both mathematics and philosophy. However, sometimes the connections between formal work in logic and the pertinent philosophical questions go unnoticed. This has been the case for instance with Richard Montague's work. Here we find an example of how logical insights should have crushed a particular philosophical dream, but didn't.

Montague is a fascinating and undeservedly neglected figure whose work should have been critically important for the work of Donald Davidson. Alas, Davidson does not seem to have paid much attention to Montague's work. If he had, he would have recognised that one of his central preoccupations – the attempt to construct a theory of truth with a finite number of axioms – was futile. Davidson is one of the most famous American philosophers in recent decades, whose philosophical program in the 1960s and 1970s involved providing an account of truth and meaning along the lines proposed by the great Polish logician and philosopher Alfred Tarski.

To put it technically, the idea of simply using a Tarski style truth-predicate for natural language and then insisting on finite axiomatisability at the same time for natural language is a dead end. To put it plainly, the Davidsonian program fails. Montague shows that Davidson wants the impossible in an article, "Syntactical treatment of modality, with corollaries on reflections principles and finite axiomatizability", which pre-dates Davidson's program by about four years. Many gallons of ink could have been saved, had Montague's result been properly understood.

These two examples – and many others like them, including for instance Putnam's much neglected early-learning theoretical result from the 1960's that Carnapian confirmation theory is everything but en route to the truth – are characteristic of the limitative role of formal work in philosophy. Logic can tell us when a certain line of inquiry is hopeless or impossible. More often than not though, logical and mathematical reflection has tended to broaden the philosophical imagination rather than restrain or correct it. This has been the case particularly in two areas of philosophy, metaphysics and epistemology.

In recent years, metaphysics has seen a tremendous revival because, in part, of our capacity to formalise our deliberations concerning necessity and possibility – the philosophy of "modality". Some of the deepest and wildest philosophy being done today is the product of developments in modal logic. Similarly, the logic of knowledge, also known as epistemic logic, has extended our capacity to do epistemology – theory of knowledge – in important ways. Epistemic logic gets its start with the recognition that expressions like "knows that" or "believes that" have systematic properties that are amenable to formal study. In addition to its obvious relevance for traditional philosophical problems, epistemic logic has many applications in computer science and economics. Examples range from robotics, network security and cryptography applications, to the study of social and coalitional interactions of various kinds. Modern treatments of the logic of knowledge and belief grow out of the work of a number of philosophers and logicians

writing from 1948 through the 1950s. Rudolf Carnap, Jerzy Los, Arthur Prior, Nicholas Rescher, GH von Wright and others recognised that our discourse concerning knowledge and belief exhibits features that admit of an axiomatic-deductive treatment. Von Wright's work is widely recognised as having initiated the formal study of epistemic logic as we know it today, and his insights have been extended by Jaakko Hintikka in his 1962 book *Knowledge and Belief*. Current work in epistemic logic takes our reasoning about knowledge in directions that would not have been possible without the use of formal techniques.

Contemporary epistemic logic may appear quite technical and removed from traditional epistemological reflections. However, it takes as its starting point some features of the logical behaviour of epistemic concepts that are completely obvious. For instance, claiming to know *p* and *q* implies that you know *q*. Furthermore, most systems of epistemic logic begin with an assumption similar to GE Moore's intuitively obvious observation that one cannot coherently assert "*p* but I do not believe (know) *p*". Additional assumptions that serve as the basis for most epistemic logics include the recognition that knowledge implies veracity. If I truly know *p* then *p* must be the case. So certain commonsense observations concerning the behaviour of the term "knows that" have served as the starting point for later technical developments.

Additionally, epistemic logic has proved important in answering the skeptical challenges as well as serving as a model for how beliefs should change in the light of new information. These two concerns may be summed up in the overall philosophical ambition of accounting for what is meant by rational scientific inquiry, which is a central philosophical ambition whether you buy into formal methods in philosophy or not.

Of course, it would be foolish to suggest that philosophy is a purely technical enterprise. Clever manipulations of symbols and formal apparatuses by themselves are not enough to solve or to deepen the understanding of philosophical problems. Philosophical questions and problems are related to our more ordinary technical problems and questions, but they are not identical with them. They differ in at least two important ways: philosophical questions take a somewhat more general form than ordinary questions, and they also seem to demand more than a simple statement of fact or a simple "yes" or "no" answer. Philosophical questions seem to demand a theoretically rich answer, by which we mean that philosophers are looking for answers that fit within a satisfying network of connected ideas and principles, not just isolated "facts". This is why the answer to the meaning of life in Douglas Adams's *The Hitchhikers Guide to the Galaxy* is so funny: "42" does not provide a philosophically satisfying answer.

Philosophers must not only achieve some result, but must also judge that it is relevant to some philosophical problem or line of investigation. It must be determined when the application of formal methods is appropriate and when something like common-sense, intuition and conceptual analysis legitimately come into play. When one encounters cases where scientific results lead to conclusions that seem to run counter to common sense, how does one adjudicate? Is there a general set of principles that determine when a given problem can be solved using formal methods? These and related questions arise naturally at the intersection of formal methods and philosophical investigation.

Many of the philosophers we most admire simply avoid taking sides on these methodological questions in their written work. Rather than speaking in broad terms about the nature of the philosophical enterprise, they simply do philosophy. Rather than worrying over the ends or the death of philosophy, they are doing wonderful and important work. Our purpose in this project was not to articulate any specific agenda or definition but rather to begin to open the discussion of how formal philosophers understand their enterprise. Part of this project involves understanding why these philosophers chose to make formal methods central to their work. Of course, the decision to pursue this kind of work is, at least in part, a matter of taste. However, in and beyond intellectual biography, these responses provide some very illuminating and erudite examples of how philosophers make – formal as well as informal – methodological decisions. **P**ᴍ

### Suggested reading

*Formal Philosophy* is edited by Vincent F Hendricks and John Symons and published by Automatic Press/VIP. Excerpts from the interviews may be read freely online at www.formalphilosophy.com.