

*Papers in Philosophical Logic*, by David K. Lewis. Cambridge: Cambridge University Press, 1998. Pp. 234. H/b £35.00, P/b £12.95.

This is the first of three volumes with papers by David Lewis which, but for one exception, have been previously published and which were not already contained in his *Philosophical Papers*, vol. I and II (Oxford: Oxford University Press, 1983 and 1986). Apart from the addition of some new footnotes, the papers are reprinted without changes. The present volume collects 17 diverse papers on philosophical logic. The majority is loosely organized around four themes, with 3 papers on the semantics of natural language, 2 on modal logic, 4 on the notion of relevance and its application and 3 on the foundations of mathematics (leaving a residue of 5 papers on more diverse topics).

Lewis is without doubt a central figure in modern analytic philosophy. Transcending their individual contributions, his publications have as a whole greatly influenced the conception of what modern analytic philosophy is and how it is done. His papers on philosophical logic, have become reference points (Kuhn would say, exemplars) for defining the extension and methods of this field. It is fortunate that the present series of volumes gives easy access to these papers as a whole. This review will consider some of the large scale dimensions of Lewis's work on philosophical logic. Because of Lewis's influence, this will lead us to more general reflections on the role and importance of logic in philosophy. I will end with a warning (not directed at Lewis, but at some of his followers) of an undue preoccupation with logic and a neglect of the wider mathematical vocabulary. If logic is taken to exhaust philosophy's repertoire of formal methods, it mutates from an enabler to a disabler of philosophical discourse.

*Possible worlds.* Logical methods and concepts enjoy such a high level of acceptance among analytic philosophers that their merits are not often discussed explicitly. We will therefore discuss at some length the concept of possible worlds that owes so much of its enormous popularity to Lewis. This concept is embedded in a complicated mathematical framework. Although even analytic philosophers do not normally frolic in mathematical complications, the curriculum of analytic philosophy shows a strange predisposition for logical technicalities, asking students to master notions like soundness and completeness. It is an interesting question why, historically, analytic philosophy today selects the particular class of logical methods from the wider mathematical corpus. It will be the tenor of my review that this selection is too narrow and that non-logical formal methods are as important and arguably more important than logical methods.

In two papers of this volume ('Intensional Logics without Iterative Axioms', 'Ordering Semantics and Premise Semantics for Counterfactuals'), Lewis writes on issues relating to soundness and completeness proofs. Recall what happens in such proofs: On the one hand, we have what is called a formal language, in Lewis's case a language that contains modal expressions like

‘necessarily’, ‘possibly’, or ‘If ..., then ...’. We write down a list of axioms and inference rules that characterize the logical behaviour of these expressions. Logicians call this a syntactic characterization of the logic at hand. Such languages are not entirely uninterpreted since, clearly, we have a certain understanding of expressions like ‘necessarily’ etc. in mind when we compose our list of axioms and inference rules. However, this language is as yet uninterpreted in a technical sense. To give it an interpretation in the technical sense, we build a second structure consisting, in this case, of so-called possible worlds, accessibility and similarity relations. We link both structures by defining when this second structure makes a sentence of our formal language true or false. In the technical sense, the second structure now provides the semantics for the earlier syntactic characterization of the logic at hand. One of the best-known achievements of modal logic, to which Lewis has greatly contributed (cf. his *Counterfactuals*, Oxford: Blackwell, 1973), are soundness and completeness proofs showing how the syntactic and the semantic structure are in an important sense equivalent and can be converted into each other. Instead of talking about modalities, these results licence us to talk about possible worlds, their accessibility and similarities (and vice versa). By this device, quantification over possible worlds can now take the role of modalities: Instead of saying ‘It does not necessarily rain’, we can just as well say ‘In some (accessible) possible world it does not rain’.

It is not a trivial claim that these results go beyond mere mathematical technicalities. One may view the semantic structure merely as a convenient way of describing and sorting the, at first, confusing wealth of possible (syntactic characterization of) logical systems. One may then argue that we are only presented with a technical result in which certain properties of the semantic structure (in our case, the properties of accessibility and similarity) are used to identify and parameterize different syntactic systems. This may help us, for example, in finding the non-theorems of a given syntactic system for which we know its appropriate semantic parameterization. One finds such an interpretation in Kripke’s work and it seems to be the prevalent attitude towards possible world semantics for intuitionistic logic.

In a much debated and influential move, Lewis gave these results some non-mathematical content by turning them into metaphysics and speculating about the existence of possible worlds and about what determines their accessibility and similarity. The purpose of such an investigation was not to explain, explicate, or sanitize actual people’s modal reasoning in a way that Carnap and Quine had envisaged as the function of logic. Rather, the interest was now reversed into speculation about possible worlds (and then, derivatively on this speculation, perhaps the determination of the right modal logic for a given subject matter). This approach has obvious liabilities. Since consistency is the only apparent intersubjectively acceptable constraint in this discussion, it is crucial whether we can find any principled way of choosing the right type of similarity relation among possible worlds (cf. Lewis’s *The*

*Plurality of Possible Worlds*, Oxford: Blackwell, 1986). To be sure, the metaphysics of (untranslated) modalities carries analogous liabilities that follow from the view (which you are free to contest) that modalities are features of reality and not, say, of our theories about reality. Lewis never claims that logic can alleviate these burdens. The meagre contribution of logic is to replace modalities by quantification over possible worlds. Quantification over possible worlds may fit more neatly into Quine's ontology, but the metaphysics of possible worlds is just as problematic as that of untranslated modalities.

*Logic and philosophy.* In the example of possible worlds, the technical results of logic contribute little to the solution of a philosophical problem. This reflects the humble role that logical concepts and methods are allowed to play in contemporary analytic philosophy. It is clearly unreasonable to expect logic to solve all (any?) philosophical problems. Logical methods merely serve as means of articulation in those areas whose structure lends itself to these concepts and methods (while other areas might not). This attitude towards logic is very clearly illustrated in the articles on the notion of relevance ('Logic for equivocators', 'Relevant implication', 'Statements partly about observation', 'Ayer's first empiricist criterion of meaning: why does it fail?'). This group of articles is a textbook example of the use of logical concepts in the service of philosophy. Yet, it is as telling an example of the limits of both logic and analytic philosophy. At a critical point, this analysis depends on whether a statement can be 'paradoxical' in that it is both true and false (where a statement is called false exactly when it has a true negation). After denying this possibility, Lewis explains: '[This denial] may seem dogmatic. And it is: ... [Lewis's opponents] have called so much into question that I have no foothold on undisputed ground. So much the worse for the demand that philosophers always must be ready to defend their theses under the rules of debate' (p. 101). This self-aware dogmatism has become a well-acknowledged stance on philosophical method. It is fair to ask for Lewis's opponents whether the debate about 'paradoxical' possible worlds is an occasion on which philosophers are allowed to be dogmatic (I would think it is not), even though it is true that questions about the boundaries of rational argument are themselves not always amenable to rational argument.

Yet, many philosophers are sceptical of assigning even this modest role to 'formal' methods. We do not have to look far for an eloquent apology of these methods. We find it in the elegance and non-formality with which Lewis employs formal methods. Lewis applies his analysis of relevance to Ayer's attempts to articulate the relationship between theory and experience. Various versions of Ayer's idea are articulated, criticized, and ever more refined. The concepts and methods that Lewis uses grow naturally out of the subject matter that he discusses. This highlights how hopeless it would be to strive for more than a colloquial distinction between formal and non-formal

methods. Lewis relies almost entirely on natural languages with very few logical symbols. To be sure, his language is specialized, but if the translatability of specialized concepts were a criterion, it would seem that Hegel or Heidegger, rather than Lewis, wrote formal papers (because those authors found it necessary to invent new, non-translatable, languages). We also observe that logical proofs play a minor role compared to the use of the logical concepts to express ideas as an extension of natural language.

Humble as its role may be, logic is nonetheless a principal tool for philosophical analysis. In the right hands, this tool can enable a broad conception of philosophy that is not shy of contact with other disciplines. It is this use of logic and, more generally, this conception of philosophy that the impressively wide range of Lewis's work commends to us. Consider only his papers on the semantics of natural language ('Adverbs of quantification', 'Index, context, and content', and "'Whether' report')—which originally appeared in a collection edited by a linguist—or his contributions to the foundations of mathematics ('Nominalistic set theory', 'Finitude and infinitude in the atomic calculus of individuals' with W. Hodges, and 'Mathematics is megethology'). Logic is clearly suited to discuss areas like the foundations of mathematics and it has also had the potential to help generate new disciplines, such as linguistics. However, there are philosophical questions with a structure that requires concepts beyond the expressiveness of logic. If the standing of logic excludes other mathematical methods, it mutates from an enabler to a disabler of philosophical discourse.

*Beyond logic.* The success and influence of exemplary figures like Lewis can lead to a conception of philosophy centred narrowly on the spectrum of their exemplary work. Let me therefore add some cautionary remarks on the reception of Lewis's work. The concepts and methods of philosophical logic today have a firm place in the academic curriculum of analytic philosophy and Lewis's work has done much to cement this place. Most students of analytic philosophy are today familiar with the highly technical notions of soundness, completeness and possible worlds. The institutional entrenchment of this particular corpus of formal methods can lead to the perception (among students and among practitioners) that formal concepts and methods outside this corpus also fall outside philosophy. I fear this misperception and institutionalized bias is showing some effect. The specialized vocabulary of logic proves restrictive and is in danger of cutting analytic philosophy off from important intellectual developments. Many analytic philosophers, though fluent in the specialized dialect of logic, no longer grasp basic concepts of the scientific world that previous generations of philosophers helped to develop.

One of the indispensable cornerstones of modern science is the twin concepts of integral and derivative. It is impossible to grasp the basics of much of modern science without an understanding of these notions. With their devel-

opment stretching from ancient times well into the 19th century, these notions are closely bound up with the philosophy of the infinitely large and the infinitely small. In one of the greatest conceptual achievements ever, these concepts successfully resolve Zeno's paradox of Achilles and the Tortoise, to name but one example of many potential applications to philosophy. There are too many philosophical curricula in which these concepts no longer occur despite their centrality in modern intellectual life and despite plentiful opportunities for further philosophical analysis. I will give only two examples of such opportunities: First, in probability theory, the use of integrals revives questions about the infinitely small. Lewis himself has written on these problems, advocating infinitesimals as a solution (cf. the remaining volumes of this series). Secondly, in the social sciences, the use of derivatives brings with it some assumptions that may fairly be challenged in a philosophical argument, for instance, the assumption that functions describing the social world have no jumps and no kinks (*'natura non saltat'*).

While previous generations spoke and wrote Latin, the lingua franca of large parts of our intellectual world is elementary mathematics and philosophers would do well not to forget its dialect. This does not require in depth knowledge of all mathematical intricacies, but simply an understanding of the most basic mathematical concepts that is easy to muster within the philosophical curriculum.

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