

## Book Review

Ronald E. Giere and Alan W. Richardson (eds), *Origins of Logical Empiricism*, Minnesota Studies in the Philosophy of Science, vol. XVI, University of Minnesota Press, Minneapolis and London 1996, vii–392 pp.

Like Elvis, logical empiricism has been officially dead for decades. But just like Elvis, it stubbornly keeps resurfacing at one juncture or another in our philosophical landscape. In fact, the more the main characters of logical empiricism recede in the distance, the more frequently they reappear, to the point that it's fair to say that we are witnessing a veritable renaissance in studies leading to the historical appraisal of the import and influence of the logical empiricist movement.

Perhaps with a bit of help from that kind of perspective and detachment that only time can bring about, we have gradually come to regard the likes of Schlick, Neurath, Hahn, Carnap, Reichenbach, and their contemporaries not as much as our (or even our teachers') interlocutors, but as historical figures whose work has set the stage and defined the issues of our own philosophical activity.

In this respect, the book under review represents a major effort to do justice to the philosophy of the logical empiricists, at the same time making clear the extent to which the very terms and issues of contemporary philosophical debate are traceable to the animated discussions of the Vienna Circle. It is time that we acknowledge our indebtedness to logical empiricism, and overcome the simplistic and caricatural representations that are all too often taken to be serious criticisms of the movement.

The book collects a number of papers, many of which were originally presented at a conference on the origins of logical empiricism held at the Minnesota Center for the Philosophy of Science. As Alan Richardson makes clear in the Introduction, the picture of logical empiricism that emerged from the conference was far more nuanced than is usually thought; especially at the beginning, and up until the diaspora of the mid-1930's, the members of the Vienna Circle and their friends in Berlin and Warsaw share little over and above a generic *wissenschaftliche Weltauffassung*. At the same time, the logical empiricist were engaged in a lively debate that needs to be set in a broader philosophical context that includes, among its privileged interlocutors, Husserl's phenomenology, Neo-Kantism (especially of the Marburg variety), and Marxism. Altogether, the book succeeds in painting a far more varied and interesting picture of logical empiricism than the "post-analytic orthodoxy" usually presents.

The book comprises the following 12 contributions, subdivided into four major areas:

### I. *The cultural and philosophical context:*

1. Peter Galison, "Constructing modernism: the cultural location of the *Aufbau*," pp. 17–44;
2. Michael Friedman, "Overcoming metaphysics: Carnap and Heidegger," pp. 45–79;
3. Nancy Cartwright and Jordi Cat, "Neurath against method," pp. 80–90;
4. Thomas Uebel, "The enlightenment ambition of epistemic utopianism: Otto Neurath's theory of science in historical perspective," pp. 91–112;

### II. *Science, philosophy, and scientific philosophy:*

5. Don Howard, "Relativity, *Eindeutigkeit*, and monomorphism: Rudolf Carnap and the development of the categoricity concept in formal semantics," pp. 115-164;
  6. Thomas A. Ryckman, "Einstein *Agonists*: Weyl and Reichenbach on geometry and the general theory of relativity," pp. 165-209;
- III. *Logic, mathematics, and philosophy*:
7. Warren Goldarb, "The philosophy of mathematics in early positivism," pp. 213-230;
  8. Thomas Ricketts, "Carnap: from logical syntax to semantics," pp. 231-250;
  9. Richard Creath, "Languages without logic," pp. 251-265;
  10. Thomas Oberdan, "Postscript to protocols: reflections on empiricism," pp. 269-291;
- IV. *Experience, empirical knowledge, and empiricism*:
11. Joia Lewis Turner, "Conceptual knowledge and intuitive experience: Schlick's dilemma," pp. 292-308;
  12. Alan W. Richardson, "From epistemology to the logic of science: Carnap's philosophy of empirical knowledge in the 1930s," pp. 309-332.

The book is supplemented by an opening piece by Alan Richardson, "Introduction: origins of logical empiricism" (pp. 1-13), and an afterword by Ronald N. Giere, "From *Wissenschaftliche Philosophie* to philosophy of science" (pp. 335-354), as well as an extensive bibliography (pp. 355-377) and contributors' profiles. In what follows, we highlight the import and intent of each contribution. It goes without saying that in so doing, the reviewer will be partial towards his own biases.

### *The cultural and philosophical context*

Peter Galison's paper is a contribution to the history of ideas: it places the notion of *Aufbau* into the broader cultural context of post-WWI Austria and Germany, explaining how, at least in the view of the progressive governments of the city-state of Vienna and, across the border, the Weimar Republic, such a notion would span fields and disciplines, coming to signify a regeneration not only of the social order, but also of architecture, literature, and, of course, philosophy. It is no secret, but also worth repeating, that Carnap had these connotations precisely in mind when he chose the title for *Die logische Aufbau der Welt*.

Michael Friedman's contribution is, in many ways, already a classic. Friedman has been arguing for the last few years in favor of a re-evaluation of the rôle and import of logical positivism. In this paper, Friedman takes up the well-known controversy between Carnap and Heidegger (respectively unfolded in Carnap's "Elimination of Metaphysics" and Heidegger's "Postscript" to *What is Metaphysics?*). Friedman's crucial observation is that Carnap and Heidegger come from the same place: they both try to provide an answer to problems arising within the context of Neo-Kantian philosophy. Both had ties with the so-called Southwest school of Neo-Kantism, which flourished in Freiburg with Wilhelm Windelband and Heinrich Rickert, and emphasized the *Geisteswissenschaften*: Heidegger studied with Rickert in Freiburg, Carnap with Bruno Bauch (himself a student of Rickert's) at Jena. Carnap, however, was also conversant with the so-called Marburg school of Hermann Cohen, Paul Nathorp, and Ernst Cassirer, which emphasized the rôle of logic, science, and mathematics.

Both schools rejected what is perhaps Kant's most obscure doctrine, i.e., the doctrine of the schematism. They were left, of course, with the problem of explaining how the pure forms of the intellect could be applied to experience. In this respect the two schools radically diverged: while the Marburg school pursued the idea of a complete "mathematization" of experience — an idea that is natural to trace all the way up to Carnap's *Aufbau* — the Southwest school struggled with the problem, found a temporary (and, for Heidegger, unsatisfactory) solution in Husserl's

Phenomenology, and eventually embraced the doctrine of the concrete subject as articulated by Heidegger in *Sein und Zeit* in the so-called “existential analytic of *Dasein*”.

It's easy to understand why this piece is already a classic: Friedman paints with quick, broad strokes a vivid picture of the philosophical debate in Germany in the crucial years of the Weimar Republic, and we come away with the gratifying feeling of finally having it explained to us what it was all about.

In “Neurath against method,” Nancy Cartwright and Jordi Cat trace the evolution of Otto Neurath's views during the pivotal debate on protocol sentences. If at the beginning of the debate Neurath was both a holist and a pluralist, at the end he would come to question the very notion of accounting for the data. At the beginning of the debate Neurath's epistemological and Marxist views stood side by side; at the end they were inextricably intertwined. The key concept throughout this parabola is the notion of a conceptual *Ballung* (congestion, concentration, cluster). For Neurath, *Ballungen* are the starting point of our scientific knowledge, and although the task of science is to refine our imprecise concepts, there always are residual *Ballungen* in our epistemological edifice. This is because, famously, for Neurath, we are like sailors who have to repair their ship in open sea, without the possibility to take it into dry-dock.

For Cartwright and Cat, *Ballungen* ground Neurath's attack on the scientific method: they undermine the very idea of scientific testing, hypothetico-deductive procedures, induction. The result is that no piece of data can falsify a hypothesis, just shake our confidence in it.

Thomas Uebel's article is concerned with the peculiarity of Otto Neurath's philosophical positions within the Vienna Circle. It is worth noting that the Vienna Circle was a particularly varied assembly. Some members of the circle, such as Carnap, came from the formal sciences (and in particular Frege's logicist program); others, such as Frank, came from the natural sciences, and brought to the Circle a perspective informed by Mach's philosophy of experience. By contrast, Neurath came from the social sciences and this can help explain his particular outlook on the scientific process, in which quite often (as witnessed by his theory of protocol statements), the observer is part and parcel with the object of investigation.

Perhaps as a consequence of this, Neurath came to hold remarkably “post-positivistic” views, and Uebel investigates how it was possible for him to develop such views while remaining in the Vienna Circle, the reputed high church of twentieth-century positivism. For Uebel, too, as for Cartwright and Cat, Neurath's socialized naturalism is best captured by the metaphor of the ship. Given the inherently anti-foundationalist thrust of what Quine called “the parable of the mariners,” Neurath's emphasis is quite clearly not on how true beliefs can be justified but on how knowledge claims come to be accepted. In this respect, protocol statements hold no privileged position, except perhaps a higher degree of entrenchment.

### *Science, philosophy, and scientific philosophy*

Don Howard's paper deals with the development of Carnap's notion of *Eindeutigkeit*, a precursor to the modern notion of *categoricity*, and the rôle that Einstein's views on scientific methodology played in such a development. Carnap introduced the notion of *Eindeutigkeit* in a 1927 paper, “*Eigentliche und uneigentliche Begriffe*.” A system of axioms is *Eindeutig* (Howard quite appropriately translates this as “monomorphic”) if it has essentially one realization, in that any two of its models are isomorphic. According to Howard, Carnap was led to introduce this concept by reflecting on observations Einstein had made around 1915 in connection with the famous *Lochbetrachtung* (“hole argument”) in general relativity. In a letter to Ehrenfest (quoted by Howard), Einstein insists that a correct theory of gravitation identify the basic entities in a univocal (*eindeutige*) fashion. Reflecting on the *Lochbetrachtung*, Einstein had discovered that the points of a manifold cannot be

univocally identified by means of a coordinatization, but only as spatio-temporal points or coincidences of world-lines. Indeed, there is a peculiar reversal here in Einstein's thinking: since it is only coincidences of world-lines that have the right sort of invariance under relativistic transformations (and not the points under a coordinate map), it is the former rather than the latter that constitute the theory's true object, the reality the theory describes.

According to Howard, this is how the concept of *Eindeutigkeit* was introduced in scientifically-oriented philosophy, and in particular in the works of Schlick and Cassirer, with whom Carnap was quite familiar. By the way, this provides an alternative genealogy of the modern logical notion of categoricity, which is usually traced back to Hilbert's *Grundlagen der Geometrie* (1899).

These issues were quite present to Carnap throughout his work on the topology of space time begun with his dissertation *Der Raum* (written under Bruno Bauch), and continued until the late 1920's, but they only became explicit with his 1927 manuscript. In "*Eigentliche und uneigentliche Begriffe*," Carnap lays down the requirement of any definitional enterprise in the sciences, and in particular the necessary conditions that any constructivist program such as the one of the *Aufbau* has to meet. Such requirements amount to a rejection of implicit definitions *à la* Hilbert (which result in a failure of the resulting system to be monomorphic). In 1927 it was not clear to Carnap, or to anybody else, the extent to which first-order systems allow many non-isomorphic models. Although Carnap suspected that polymorphic systems were vastly more abundant than monomorphic ones, it was not until Gödel's 1931 incompleteness theorem that it became known that the only monomorphic first-order systems are the ones that have only models of finite (indeed, bounded) cardinality.

Thomas Ryckman's article focuses on a somewhat neglected episode in the history of 20th-century physics, namely the 1918 formulation by the mathematician Hermann Weyl, of a theory purporting to extend the general theory of relativity to encompass the electro-magnetic field, thereby unifying all (then known) physical forces, viz., gravitation and electromagnetism. Of course, the attempt was ultimately unsuccessful, and Weyl himself abandoned it with the advent of quantum mechanics in 1925–26. But Weyl's proposal played a significant rôle as a counterpoint to Reichenbach's development of a neo-conventionalist account of the metric of space-time. Weyl proposed his theory in a number of papers, culminating with his "*Eine neue Erweiterung der Relativitätstheorie*" (1919), and Reichenbach's main rejoinder is in "*Axiomatik der relativistischen Raum-Zeit-Lehre*" (1924).

The disagreement between Reichenbach and Weyl revolved around the question of whether the general theory of relativity was a completed theory, the culmination of a program initiated with the special theory of relativity, or a necessary yet incomplete step toward a geometric unification of all physics. Reichenbach sided with the first alternative, and Weyl with second; Einstein himself goes from being virtually the sole supporter of the former alternative in the early 1920's, to being the only practitioner of the latter by the end of the decade. Both Weyl and Reichenbach could thus present themselves as champions of Einsteinian orthodoxy.

Interestingly, the Weyl-Reichenbach debate was cast in terms of whether measuring devices such as rods and clocks should play an epistemologically fundamental rôle in the new theory. Whereas for Weyl rods and clocks were only data to be explained by deriving them from equations of the "total field," for Reichenbach the behaviors of rods and clocks were stipulatively primitive facts allowing the physical definition of the metrical notion of congruence. Ryckman's technically sophisticated essay traces the lines of this debate, explaining the significance of Reichenbach's early positions for the development of his mature epistemological views.

*Logic, mathematics, and philosophy*

Warren Goldfarb's article on the philosophy of mathematics in early positivism surveys the development of Carnap's views on the topic, at the same time aiming to dispel the myth that the logical empiricists share a single doctrine on the nature of logic and mathematics. There are three main periods in the development of the views of the Vienna Circle on the philosophy of mathematics: (i) Protoperitivism, up until 1928 or so; (ii) the assimilation of Wittgenstein's views, taking place around 1930; and (iii) Carnap's position in the *Logical Syntax of Language*. Quite rightly, Goldfarb regards the last as a major development in the philosophy of mathematics, and one that, at least in the reviewer's opinion, is too often underestimated.

The first phase is characterized by Schlick's gradual moving away from vaguely neo-Kantian positions not too far from the ones of Henri Poincaré, towards the view, fully developed in the 1918 *Allgemeine Erkenntnislehre*, that concepts are to be defined implicitly by giving axiom systems constraining the possible interpretations of the corresponding terms. When looked at in this way, the main question is that of the *consistency* of such axiom systems, a fact that fully reveals the influence of Hilbert's thought (especially the *Grundlagen der Geometrie*).

Carnap criticizes Schlick's position in the already cited "*Eigentliche und uneigentliche Begriffe*", noting that implicitly defined concepts tend to be indeterminate, in that one cannot say of any given object whether it falls under the concept or not (with the ensuing failure of excluded middle). As Goldfarb points out, this is exactly the position that Frege had taken, twenty years earlier, with respect to Hilbert's work in the *Grundlagen*.

In 1926–27 the Vienna Circle carefully read Wittgenstein's *Tractatus*, eventually espousing the view that the propositions of logic are tautologous. The Circle, however, combined this view with the Frege-Russell reduction of arithmetic (and hence all of mathematics) to logic, and in particular to the theory of types. Of course, this was a move that Wittgenstein could have hardly gone along with. The problem, as Goldfarb points out, is to make the argument that some version of the theory of types, strong enough to carry out the reduction, is tautologous. In "*Die alte und neue Logik*" Carnap makes exactly this claim, summarily dismissing any worries (voiced, among others, by Ramsey) concerning impredicative definitions.

The shift comes, at least for Carnap, in 1934, with the publication of the *Logical Syntax of Language*. The truths of logic are no longer characterized as 'tautologous' (an absolute notion) but as 'analytic' (a notion that is relative to a linguistic framework). For Goldfarb, Carnap is here moved, among other things, by the lesson of Gödel's theorem that made it clear that no transparent notion of 'tautology' would capture mathematical truth. In this respect, this is a rejoinder to a view, held by some, that Carnap failed to heed (or even understand) Gödel results. On the contrary, Goldfarb makes it clear how some of the deepest turns in Carnap's thought — as well as in the history of twentieth-century analytic philosophy — were spurred precisely by a profound appreciation of the import of Gödel's work. Goldfarb does an excellent job explaining just how far Carnap has come, in the *Logical Syntax*, from traditional foundational issues, and how his famous Principle of Tolerance ("In logic there are no morals") shields him from the charge leveled by Gödel himself — that he has failed to provide a successful epistemological reduction of mathematics to (finitary) syntax and linguistic convention.

Thomas Ricketts' paper tells the end of the story. In the mid-1930's Carnap gave up the purely syntactic treatment outlined in the *Logical Syntax* enthusiastically to adopt Tarski's semantic approach. The standard view of the shift is that it represents a major turning point in the development of Carnap's philosophy: Ricketts, in agreement with Richard Creath, denies that it does, especially in light of Carnap's very liberal views as to what properly constitutes 'syntax.'

In *Logical Syntax* Carnap introduces two distinct languages: Language I is a language for primi-

tive recursive arithmetic, which counts among its rules the infinitary  $\omega$ -rule; Language II is a version of the simple theory of types with the axiom of choice, whose notion of validity uses the same resources as a truth-definition *à la* Tarski. Beside the somewhat implausible claim that Language I realizes the constraints of constructivism, Ricketts points out the Carnapian requirement that the sentences of either language be *determinate*, i.e., either valid or contra-valid. This is precisely what distinguishes mathematical propositions from empirical ones.

It has been pointed out by Michael Friedman (among others) that the strength of Carnap's notion of 'syntax' runs afoul of the limitations imposed by Gödel's theorem, at least if Carnap's "Principle of Tolerance" is construed so as to require a *neutral perspective* from which the relationships among the various linguistic frameworks can be assessed, and the distinction between analytic and non-analytic drawn. Quite rightly, Friedman points out that in order to draw such a distinction for a given framework one needs, by Gödel's second incompleteness theorem, resources exceeding the ones of the framework in question. Hence, there cannot be any neutral, weakly syntactical point of view from which the distinction can be drawn.

Ricketts has a powerful reply to Friedman. After pointing out that Carnap was "fully cognizant" of the technical situation, he argues that logical pluralism does not by any means commit Carnap to a weak neutral syntax. Witness, for instance, Carnap's observation that only "dogmatic obduracy" might prevent the constructivist from employing a classical metalanguage in order to compare his linguistic framework to the classical logician's. As Ricketts quite efficaciously puts it, "in the Principle of Tolerance Carnap commends to his audience an attitude that, when imbibed, saps foundational wrangling over correctness and promotes metamathematical investigations" (p. 236).

Ricketts' paper contains much that cannot be done justice to in a review, even as long as this one. One more point is worth mentioning, though, *viz.*, Carnap's possible replies to another powerful objection by Gödel concerning analyticity. In "Is mathematics syntax of language?" Gödel criticizes the positivists' position according to which analytic statements must be shown to be conservative over the empirical statements (on the view that logic and mathematics are neutral with regard to any specific subject matter). But this objection presupposes a conception according to which analytic propositions are superimposed over the empirical language. This might have been a conception with some currency in the Vienna Circle, but it was not Carnap's. To think otherwise is underestimate the reach of Carnap's break with tradition: for Carnap "there is no clear conception of empirical statement . . . apart from the incorporation of observation predicates into a language with its consequence relation" (p. 237).

Richard Creath's "Languages without logic" completes this remarkable triad of Carnap papers. Creath focuses on Carnap's conception of logic and the extent to which the notion of analyticity stands or falls with that of logical truth. The basic idea behind Carnap's notion of logic is that logical truths are identified by their vocabulary, so that a proposition is a logical truth if and only if it involves (essentially) only such vocabulary. However, Carnap's *conventionalism* makes the task of isolating a purely logical vocabulary much more difficult, especially if the task is not construed as language-specific, but as involving the definition of 'logical part of  $\mathcal{L}$ ' for variable  $\mathcal{L}$ . Here Carnap brings in the notion of *determinateness*, along with the claim that any expression built up using only logical vocabulary is determinate, in that either it is valid or its negations is. Creath points out that this is an exceptionally strong requirement, as it is perfectly possible for there to be languages with no logical vocabulary at all (a consequence that for Carnap's project is nothing short of disastrous), and that more in general determinateness of the vocabulary is neither necessary nor sufficient for an expression to be a logical truth.

Thomas Oberdan's paper is intended to supply a fresh perspective on one of the crucial episodes in the history of analytic philosophy, namely the debate on the epistemological status of *protocol*

*sentences*. According to the “received view,” the debate pitted Schlick (who thought there was a privileged class of sentences providing inferential warrant for scientific statements without being themselves inferentially warranted) against Neurath and Carnap (who proposed that *no* beliefs are immune to revision). Oberdan claims that this is not the most useful way to look at the debate: for one thing, it bypasses the fundamental issue the Vienna Circle was interested in, i.e., how language relates to experience, and hence the precise rôle played by empiricism. Oberdan then proceeds to reconstruct the debate within this broader context, revealing the deep philosophical issues behind what could be sometimes be mistaken for a technical question the significance of which was only apparent to a small group of *initiati*.

### *Experience, empirical knowledge, and empiricism*

Joia Lewis Turner’s article is also concerned with dispelling an oversimplified view of the epistemological doctrines of the Vienna Circle. In particular, Turner focuses on the profound tension, in Schlick’s thought, between conceptual knowledge and intuition. After reviewing Schlick’s early attempts to come to a solution, Turner takes up Schlick’s mature theory of *Konstatierungen*, loosely translated as “affirmations.” Affirmations are synthetic proposition, which, however, are not hypotheses. Like analytic statements, to understand them is to “verify” them; in a sense, they straddle the border between the linguistic and the non-linguistic.

Alan Richardson’s contribution to the volume moves from the paper Carnap gave at the 1935 Paris Congress for the Unity of Science. In that paper, Carnap distinguishes three stages in the development of scientific philosophy, the first one being the rejection of metaphysics, the second the rejection of the synthetic a priori and the consequent adoption of empiricism, and the third the transition to the logic of science. This last is the focus of Richardson’s paper. The transition is identified by Carnap himself with the shift from the project of the *Aufbau* to the project of *The Logic Syntax*, a shift that took place in the crucial decade between 1928 and 1937.

Richardson adopts a “Kantian” reading of the *Aufbau* along lines suggested, among others, by Alberto Coffa and Michael Friedman. This interpretation of the *Aufbau* is supported by a number of passages where Carnap points out that although each person’s “stream of experience” is qualitatively different, they all share the same *structural properties*. The distance from traditional empiricism is underscored by the observation that whereas for Russell all knowledge is ultimately knowledge by acquaintance, for the Carnap of the *Aufbau* all knowledge is ultimately knowledge by description. As Richardson observes, the implicit danger in such a project is to erase the distinction between the logical and the empirical, in that “all objective statements become logical truths” (p. 316).

For Richardson this problem arises because Carnap is combining the two ideas that (i) the epistemological notion of construction can be captured in terms of explicit definability in a system; and that (ii) the notion of logical truth supervenes upon (and, in turn, uniquely determines) the notion of a linguistic framework, with a conception of logic derived from the Frege-Russell tradition, according to which logic is a universal language. Whereas the two ideas essentially require a metalinguistic stance, the Frege-Russell conception of logic leaves very little room for metalinguistic investigations. The solution to this problem, which Carnap will come across early in 1931 is to put the whole *Aufbau* into the “formal mode of speech” a move that eventually will lead to the *Logical Syntax* and the pluralistic view of the Principle of Tolerance.

The book closes with an interesting historical afterword by Ronald Giere, in which he begins to cast some light on the other end of the story, i.e., the way in which logical empiricism transplanted itself to the United States in the late 1930’s and 1940’s, gained acceptance, and eventually became, at least for a long stretch, the dominant position in philosophy of science. Giere emphasizes that the

move across the ocean was ideological as well as geographical. In particular, the old-standing left-wing ties to progressive European political movements faded in the background, the movement “merged” with — and to an extent replaced — American Pragmatism, and new problems and concepts were taken up.

The old *Wissenschaftliche Weltauffassung* of the Vienna Circle, with its emphasis on the rôle of actual scientific theories (relativity, space-time, etc.) gave way to the more palatable (for American philosophy departments) “philosophy of science” focusing on general issues unrelated to actual scientific practice: induction and probability, explication and explanation, etc.

This part of the story still needs writing, and the rôle and heritage of the American version of logical positivism still awaits a dispassionate assessment. But in this case, we face the possible obstacle that such an assessment would have to look at a past that is for many too recent, without the benefit of a level perspective and historical detachment.

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