

The Collected Works of Rudolf Carnap, Volume 1: Early Writings, edited by A. W. Carus, Michael Friedman, Wolfgang Kienzler, Alan Richardson & Sven Schlotter, general editor Richard Creath, with editorial assistance from Steve Awodey, Dirk Schlimm & Richard Zach. Oxford, UK: Oxford University Press, 2019. Pp. xli + 473.

This is the first volume in an ambitious series that will present all of Carnap's published works. This volume begins with a helpful overview of the project by the general editor Richard Creath. Creath claims "a high degree of coherence and continuity" for Carnap's work, and notes that "Making this coherence visible was one motive behind the present effort to make his works available ..." (p. vii). (Unless otherwise indicated, all page references are to the volume under review.) The Gödel edition served as a partial inspiration for the Carnap edition, although in Carnap's case only the published works are included. Creath notes that there are "Parallel efforts" (p. viii) to publish the remaining archival materials. (The most importance instance of this so far is Carnap (forthcoming). See Damböck (forthcoming) for a state-of-the-art discussion that draws on these archival sources. Dr. Damböck has informed me that two additional volumes are in preparation: (i) an edition of Carnap's scientific correspondence up through 1935, and (ii) an edition of Carnap's diaries from 1936 through 1956.) The editors made the wise decision to provide English translations for all of Carnap's published works that initially appeared in some other language. They have also provided an extensive editorial apparatus for each volume: there is a brief editorial introduction for each work followed by extensive notes that clarify various issues that arise in a given text. The volume also provides textual notes that record any variations between versions of the publication. A unified bibliography and index of names concludes the volume.

The first volume covers all of Carnap's publications from 1918 through 1926. None of this work was previously available in English and each publication provides critical content for ongoing debates about the *Aufbau*. As the chronology provided summarizes (pp. xiii-xiv), this was a turbulent period in Carnap's intellectual (and personal) life when he struggled to find his place in professional philosophy. From 1910 to 1914 Carnap studied with Frege, among others, at the University of Jena. For three semesters in 1911-12 he visited Freiburg im Breisgau, where Carnap attended lectures given by the Southwest neo-Kantian Heinrich Rickert. Carnap's academic studies were interrupted by World War I, but resumed in 1919-1920 through studies that culminated in master's dissertations in both physics and philosophy at Jena. In January of 1921 Carnap submitted his doctoral dissertation *Der Raum [Space]*, under the supervision of the Southwest neo-Kantian Bruno Bauch. This dissertation was published in 1922, but it seems that Carnap only settled on an academic career in the following year. This led to a search for a supervisor for the mandatory "Habilitation" that stretched through 1923 and 1924. In 1926 an early version of the 1928 *Aufbau* served as this Habilitation, supervised by Moritz Schlick in Vienna (Carnap 2003). Carnap then began work as a Privatdozent in philosophy at the University of Vienna.

An exceptionally thorough introduction by A. W. Carus and Michael Friedman expands on these biographical details and provides a detailed interpretation of Carnap's philosophical development and priorities during this period (pp. xxiii-xli). Carus and Friedman begin by emphasizing Carnap's "vision of the role of the intellectual in the reconstruction of society" (p. xxiv), as reflected in his first, brief publication "League of Nations – League of States" (pp. 4-9) as well as additional unpublished work and correspondence. Carus and Friedman see here an

“underlying motivation” to apply what Carnap called “goal-oriented reason” to all areas of “the public social-life of people” (p. xxvi). Carnap’s early work on what he sometimes called a “system of science” should thus be viewed from this broadly political vantage point.

Carnap’s other publications in this period are a 1921 review of Hugo Dingler’s *Physik und Hypothese*, the 1922 version of the dissertation *Der Raum*, and three papers: “On the Task of Physics and the Application of the Principle of Maximal Simplicity” (1923), “Three-Dimensionality of Space and Causality: An Investigation of the Logical Connection Between Two Fictions” (1924), and “On the Dependence of the Properties of Space on Those of Time” (1925). The final publication in this volume is the 1926 pamphlet *Physical Concept Formation*. Carus and Friedman analyze these works by distinguishing two projects: a “system of science” project and an “*Aufbau*” project. The basis for this division is not entirely clear, and Carus and Friedman often make connections between the two. They begin with an initial emphasis on building a unified system of science in Carnap’s pre-dissertation work. Here they note a “more rationalist or Leibnizian spirit” than the positivist tradition of Comte and Ostwald, which is plausibly ascribed to Frege’s influence and a broadly neo-Kantian intellectual context (p. xxvii). Carnap’s earliest known exploration of a post-Kantian alternative to empiricism was through the special form of conventionalism developed by Dingler. In 1920 Carnap corresponded with Dingler to determine if Dingler could act as his dissertation advisor. Right around this time, though, Carnap isolated a major difference between Dingler’s approach and the approach pursued by Einstein that Carnap came to prefer. While Carnap agreed with Dingler on the need for science to make stipulations, it was not required that one follow Dingler and opt for stipulations that make the physical laws simple to state. Instead, it is preferable to adopt stipulations with the

aim of simplifying the resulting description of the physical world. The choice is clearly laid out in the 1923 “Task of Physics” paper, where Carnap concludes that Dingler’s approach faces severe obstacles (p. 237).

A system of science, then, will be based on conventions, and these conventions are best chosen with the aim of simplifying the description of the physical world as we find it. Carnap’s first attempt to build part of such a system was in June 1920 when he sketched “an axiomatization of relativistic space-time kinematics” (p. xxx). While his plan to develop this sketch into a doctoral dissertation was abandoned, Carnap continued in earnest with this project in the philosophy of physics, producing a 100-page typescript by 1924, and publishing a paper based on it in 1925. The axiomatization takes for granted the relations of coincidence and temporal ordering for points on world-lines, and aims to use logically articulated axioms to formally derive the “topology” of space-time.

Carus and Friedman helpfully use the differences between Carnap’s master’s dissertation on the foundations of geometry from 1920 and his doctoral dissertation on space from 1921 to motivate their characterization of Carnap’s development in this period. In 1920 Carnap had insisted that the deductive logic of Frege and Russell left out the crucial part of logic that determines how “any possible object of science forms itself into an object to begin with” (p. xxxi). By 1921 Carnap had begun to shift towards the 1926 view that, as Carus and Friedman put it, “the ‘objects of science’ could indeed be constructed by deductive logic alone” (p. xxxii). In the 1921 dissertation this position has not yet been achieved as there is a crucial role for an “intuitive” space that connects the “formal” spaces available through deductive logic to the “physical” spaces considered by physics. But Carus and Friedman suggest that Carnap’s appeal

to this sort of intuitive space is in tension with his other commitments. This tension will eventually dislodge any distinctively phenomenological source of knowledge from Carnap's system of science.

One way to make sense of this pressure that is consistent with Carus and Friedman's introduction focuses on the contrast between the axiomatization of some science and the clarification of the concepts of that science. For Carnap an axiomatization is successful when one has arrived at axioms whose logical consequences include all the statements of that science. A system of science would then be a single axiomatization of all the statements that we take to hold for the real world. All the inferences from the axioms should proceed from the character of the formal, logical symbols of some adequate logical language such as Russell and Whitehead's *Principia Mathematica*. Still, Carnap is well aware that some non-logical symbols must appear for the axioms to characterize some non-logical domain. The central issue for the system of science project is how these non-logical symbols are to be chosen. For a conventionalist about physics, many of these non-logical symbols can be motivated by goals like simplicity, as Carnap had realized through his engagement with Dingler. It seemed obvious, though, that some non-conventional aspects of our experience must be brought to bear to secure the content of the remaining non-logical symbols. In the 1921 dissertation Carnap appeals to Husserl to motivate a notion of "Wesensschauung" or "immediate grasp of essences" (p. 119) that would provide a non-conventional basis for all admissible physical geometries. Influenced by Weyl's interpretation Einstein's theory of general relativity, Carnap insisted that these essences mandated that physical space be infinitesimally Euclidean. Given this "form of intuition" (p. xxxiv) all observational experience could be placed in a topological

physical space. This mandatory basis could then be extended and rounded out through the usual conventionalist considerations.

The upshot of this position is that some spatial concepts are not conventionally chosen, but have a basis that is more fundamental. This is consistent with imagining some illuminating derivation or characterization of these spatial concepts along with others that have proved puzzling, such as concepts of time, cause and the self. One way to appreciate Carnap's preoccupation in 1922 with "the total system of concepts" (p. xxxv) is that he sought to clarify what concepts must be taken as basic, and what could be reduced to what, using whatever tools he felt comfortable calling "logical".

Carus and Friedman point out that Carnap's reading of Russell's *Our Knowledge of the External World* in early 1922 provided the basic inspiration for how this system of concepts could be achieved. In his 1924 paper Carnap spoke of a "primary world" that was used to specify a "secondary world" that exhibited lawful causal relations that were absent from the primary world. Russell inspired Carnap to carry out a construction of this primary world of experience using some more primitive relations between these experiences. The first working out of this program is to be found in the 1922 manuscript "From the Chaos to Reality". In that manuscript, as Carus and Friedman summarize it, "a phenomenological distinction between 'living' and 'dead' experiences (essentially Hume's 'impressions' and 'ideas', respectively) serves as the basis for the construction of a temporal ordering of remembered and present experience" (p. xxxvii). This phenomenology is not a Husserlian grasp of essences as it allows one to construct the aspects of our spatial experience that Carnap had left unanalyzed in the dissertation. In this manuscript, though, there is still the same sort of troubling gap that has

puzzled commentators on the *Aufbau*. After sketching how to construct the primary world of experience from the chaos of experience, Carnap then tacks on two “fictions” associated with causality and substance in order to obtain “reality”. As with *Aufbau* section 126, it is hard to see how these two methods can be combined so that the result is a “logical construction” (p. xxxviii, fn. 21).

Carus and Friedman argue that the decisive turn away from “the notion of a purely given world requiring no construction” (p. xxxviii) occurred sometime in 1924 before Carnap’s January 1925 talks in Vienna. There Carnap emphasized a thesis that was not explicit in his earlier work: “overcoming subjectivity: transition from material to structure” (p. xxxix). When this structuralist conception of objectivity was applied to the basis of his earlier constructions, Carnap “arrived at the conviction that the objects of knowledge can indeed be constituted completely structurally” (p. xxxix) using the formal logic of Frege and Russell. Any non-structural inputs are redundant and inconsistent with the objectivity of science, so “phenomenological discernment had no job to do any more” (p. xxxix).

The main published work in this volume is Carnap’s dissertation *Der Raum*: the German-English text amounts to 151 pages, followed by Friedman’s 35 pages of textual notes. These notes often develop detailed interpretations of a given passage or relate Carnap’s remarks to their broader intellectual context. Carnap distinguishes formal, intuitive and physical space, and traces many disagreements about the nature of space to a failure to identify what sort of space is at issue. The logical study of formal spaces provides a wide variety of options for how to characterize physical space. In line with his broadly conventionalist program, Carnap aims to isolate the non-conventional constraints on this process. It is here that the character of intuitive

space takes center stage, and how one thinks of it will determine how one evaluates the achievements of Carnap's dissertation. As Friedman puts it, Carnap's goal is to single out "the structure of an arbitrary Riemannian metrical manifold by a layered application of the Hilbertian axioms" (p. 183) for geometry, and then to add in additional postulates to fix aspects that are not determined by the axioms. But Carnap supposes that the required axioms can each be given a local interpretation as "Intuition always pertains only to a limited spatial region" (p. 57). This turns out not to be the case: some of Hilbert's axioms are actually too restrictive, and so Carnap's procedure fails to deliver the most general class of Riemannian manifolds (p. 183). Thus Carnap is not entitled to conclude "our global system has the property that Euclidean geometry holds everywhere in the small" (p. 63) as his combination of axioms and postulates do not deliver such a generic structure.

Despite these failures of execution, the philosophical aims of *Der Raum* are relatively clear: use some kind of Husserlian intuition to provide the phenomenologically fixed starting point for the conventional specification of the features of physical space. This only makes sense if there is an intimate relation between the events that we experience and the events that we place in this physical space. We can know that the events that we experience will conform to the character of intuitive space. For Carnap, these aspects of intuitive space are topological: "Topological space represents what is common to all of them and is therefore to be regarded as the form of what can be comprehended through an immediate grasp of spatial essences" (p. 119). This naturally sets up a project for considering how this grasp functions and what sort of knowledge it can deliver, whether of space or other aspects of the physical world.

One contentious issue that the dissertation raises is the significance of Husserl for Carnap's philosophical development. Carnap obviously took Husserl's work seriously in this period, and even attended some of Husserl's lectures in Freiburg in 1923-24. Weyl's importance for Carnap is also difficult to determine. Weyl makes extensive use of Husserl's *Wesensschauung* to motivate some kind of synthetic a priori basis for physical space. One proposal is that Carnap read Weyl's *Space, Time, Matter* and was motivated by Weyl's work to isolate his non-conventional basis for space in Husserlian terms. However, in an extended note Friedman emphasizes the differences between the approaches that Carnap and Weyl pursued to physical space. Weyl in a sense goes deeper into the issue by deriving the "infinitesimally Euclidean (Pythagorean) character of the metric" from a "Wesensanalyse" with a starting point that is more intimately tied to general relativity. By contrast, Carnap treats the deliverances of intuition as "a brute fact" (p. 206) and also encounters severe technical problems. Still, it is clear that Carnap continued to study Husserl and Weyl after the dissertation with the express aim of deepening and improving his derivation of the features of intuitive space. (See Weyl 1952 for a translation of the fourth edition of the book from 1923. Changes between the editions of the book are relevant to this debate. See Ryckman 2005 and 2016 for extensive discussion of Weyl, Husserl and Carnap.)

The crucial turning point in Carnap's development, then, must have come in 1924 when Carnap turned away from any kind of Husserlian basis and embraced an approach that fits more squarely in the tradition of logical empiricism. As the title of a recent paper by Carus puts it, "Carnap and Phenomenology: What Happened in 1924?" (Carus 2016). Carnap scholars will surely weigh in on this difficult question in the coming years. One highly contested proposal is

that Carnap co-opted and essentially plagiarized Husserl's nascent "constitution theory" in the *Aufbau* (Mayer 2016, which is effectively undermined by Damböck 2018). Carus and Friedman's interpretation is that Russell's procedure of logical construction pushed Carnap to an increasingly logical and structural characterization of his experiential basis. A third option is that Carnap recoiled from phenomenology in favor of a more naturalistic reconstruction of scientific knowledge (Pincock 2005). This option is also suggested in Carus and Friedman's introduction when they note Carnap's interest in "the analysis of existing knowledge [in order to] determine its internal workings and to see how these fit into various possible structures" (p. xl). If our extant scientific knowledge provides a prima facie basis for our systematization of science, then no fixed phenomenological basis is required. As with Russell's *Our Knowledge*, the goal may be to achieve "a reconciliation between psychology and physics" (1914, p. 97; see Klein 2017). This naturalistic strain in Carnap's thought in this period would thus place his work much closer to Neurath than is usually supposed (Uebel 2016).

Carnap's 1925 paper "On the Dependence of the Properties of Space on those of Time" is the only publication devoted to his axiomatization of the "kinematics of space-time." Here, as in *Der Raum*, Carnap's philosophical goals are clear, but the technical execution is problematic and difficult to interpret. The editors have included a very helpful essay by David Malament that sets out the problems with Carnap's axiomatization and relates it to a similar project by Robb. Carnap aims to show that "the topological properties of the spatial order can be derived from the topological properties of the temporal order and of coincidence" (p. 303). Carnap imagines a network of world lines composed of world points. When two world lines cross, a point from each line stands in the coincidence relation. In addition, each line has a temporal

orientation so that for two points on a given line, one is later than the other. In a conventionalist framework, it is natural to suppose that Carnap took these topological properties to be the only genuine properties, while all remaining projective and metric features could be settled by stipulation. To effect the derivation Carnap imagines a number of formal axioms that are sufficient to derive all the needed theorems. With appropriate definitions, these theorems are said to include the topological features of the spatial order. Carnap's strategy is to first partition the points from each world line so that each point from each world line is assigned to a unique "spatial class". This partition is then available to fix a neighborhood relation for each point. This would allow Carnap to derive theorems such as the claim that space is three-dimensional (p. 319).

Malament highlights a number of puzzles and problems for Carnap's axiomatization. Perhaps the most significant issue is that the most plausible rendering of Carnap's definitions of spatial class and neighborhood allow for networks of world-lines where there are no spatial classes. This is because in a fully generic setting, for any proposed spatial class that might be identified, there can be world-lines that fail to intersect that class (p. 334). Malament notes a revised way to characterize spatial classes, but it remains unclear if this revision is consistent with Carnap's broader philosophical aims. The importance of this axiomatization for Carnap is made clear in a 1923 letter to Reichenbach. There Carnap says that, just as Russell's logic "begins earlier" than a traditional axiomatization of arithmetic, so too does Carnap's axiomatization go deeper than Reichenbach's 1924 axiomatization of space-time: "I start from a considerably large number of axioms, which contain [enthalten] only concepts of logic (in particular the theory of relations), and end up finally with the complex derived propositions,

which correspond (partly) to your axioms.” (Translated at Pincock 2003, p. 91 and noted by Damböck (forthcoming).) It is unclear whether Carnap meant to include the basic relations of coincidence and temporal order in the scope of logic at this point or if he was already imagining that their non-logical character was irrelevant to objective science.

This volume concludes with the 1926 pamphlet *Physical Concept Formation*, with extensive notes by Richard Creath and Alan Richardson. Here Carnap moves beyond temporal and spatial concepts, and considers other physical concepts like temperature that play a central role in our physical theories. Carnap imagines three stages of concept formation: qualitative, quantitative and abstract. While perceived properties with their specific qualities form the starting point of this process, the needs of science push the investigator to isolate those properties that are conducive to quantitative measurement. Carnap identifies the necessary conditions for quantitative measurement to occur in terms of two relations for a topological ordering of quantities and three conventions to assign determinate metrical features (p. 371). This process culminates in a fully abstract characterization of the physical world in terms of a collection of sequences of 14 numbers. Each world-point is first picked out by 4 numbers that settle its place in space-time. The remaining numbers fix the 10 basic quantities of physics: “here physical study turns into the *arithmetic study* of a particular number system” (p. 417). *Weyl’s Space, Time, Matter* may again be an inspiration, although a helpful note by Creath and Richardson points out that by 1926 some complications with this approach should have become apparent to Carnap (pp. 437-438).

This volume exhibits the highest standards of scholarship, and provides every reason to expect that the entire series will provide invaluable insights into Carnap’s philosophical

significance. Carus and Friedman's introduction supplies an indispensable framework for making sense of the published works included in this volume. Of course, many details of Carnap's development are not discussed in this introduction and other Carnap scholars will surely propose alternative interpretations in the future. Here the "parallel efforts" in Carnap scholarship that Creath mentions in his introduction will be crucial. For example, this volume does not provide a survey of the extant unpublished manuscripts from this period and there is no sustained discussion of Carnap's correspondence. Perhaps the main interpretive debate concerns the roots of Carnap's structuralist conception of objectivity: are there pressures in this direction prior to 1924 and are there countervailing considerations that could be used to qualify its scope in the *Aufbau* and beyond?

If we step back and try to assess Carnap's philosophical achievements in this period, even the most enthusiastic reader of Carnap is bound to reach a mixed conclusion. It is difficult to discern much "coherence and continuity" in this work beyond grappling with the limitations of a conventionalist interpretation of physics. Carnap often enunciates ambitious philosophical goals, but is unable to deliver the technical details to back them up. In addition, there are various attempts to connect his own work up to what other more senior figures in the field are doing, as with Dingler, Husserl and Schlick. An interpreter of Carnap may have to admit that there simply is no unified program here. Instead, it may turn out that Carnap's intellectual development was not governed by any internal logic, but was highly contingent on whom he was engaging with and what opportunities he was afforded for professional development. This may be the best way to make sense of the changes in Carnap's views and the corresponding tensions found in his published works. This understanding of Carnap's early works may also

help to clarify Carnap's enormously influential later reflections on the limitations of philosophy as a theoretical discipline.*

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