



NEW COLLEGE
OXFORD

A Defence of the Notion of 'Foundedness' in Carnap's Aufbau

Author: Sophie Nagler

Source: *The New Collection*, Vol. 14 (Aug., 2020), pp. 68-87

Published by: The Middle Common Room (MCR) of New College, Oxford

Stable URL: <http://mcr.new.ox.ac.uk/journal/Contents2020.php>

The New Collection is a double-blind peer reviewed journal published annually by the Middle Common Room of New College, University of Oxford. For more information about *The New Collection*, please contact new.collection@new.ox.ac.uk.

New College Oxford is a chartered charitable corporation registered with the Charity Commission (registered number 1142701) and whose registered office is Oxford, OX1 3BN.

New College Oxford® is a registered trade mark - No. 2588652



Copyright 2020 by *The New Collection*. All rights reserved. ISSN 1757-2541.

A Defence of the Notion of ‘Foundedness’ in Carnap’s Aufbau

*Sophie Nagler**

*Faculty of Philosophy, University of Oxford
Munich Center for Mathematical Philosophy, LMU Munich*

Abstract

In *Der logische Aufbau der Welt*, first published in 1928, Carnap aims to rationally reconstruct all objects of cognition by logico-definitional means. As a result, he intends to obtain a fully objective framework in which scientific discourse can take place. This is made possible by the novel method of ‘purely structural definite description’ of all scientifically relevant objects, which is first introduced in the *Aufbau*. Key to the attainment of this goal is the notion of ‘foundedness’, which Carnap presents as a new basic notion of logic, in order to establish a link between the purely conventional world of logical and mathematical knowledge and the empirical world of knowledge of scientific objects. This idea experienced major criticism by Friedman (1999a,b) since he considers it to lead to the demolition of the boundary between those two worlds. In this essay, we want to defend foundedness against Friedman’s critique by arguing that its introduction is necessary within Carnap’s logicist world of thought to deal with a more fundamental problem: the demarcation of the empirical parts of the *Aufbau*. In the last section, we will give an outlook on the actual cause for the failure of the *Aufbau*, the lack of a principle to determine the truth of the instances of the basic relation in the *Aufbau*, and we will show how this can contribute to the explanation of Carnap’s future philosophical development and retrospective self-evaluation. This essay serves as a dense informal sketch for a later extensive formal treatment of this reading of foundedness and focuses on its implications for the interpretation of Carnap’s post-*Aufbau* development.

Keywords: foundedness • Carnap • Aufbau • Vienna Circle • structural description • definite description
• verificationism

* sophie.nagler@new.ox.ac.uk

[The Vienna Circle] assumed that there was a certain rock bottom of knowledge of the immediately given, which was indubitable. Every other kind of knowledge was supported by this basis and therefore likewise decidable with certainty. This was the picture which I had given in the Logischer Aufbau.
Carnap (1963, p. 57)

[S]uch a phenomenalist-foundationalist conception is hardly in evidence in the text of the Aufbau itself.
Friedman (1999b, p. 145)

The structure of this essay

Why is Rudolf Carnap's late self-evaluation of his first monograph *The Logical Construction of the World*¹ ('Der logische Aufbau der Welt') so much at odds with his original text? Is it due to psychological peer pressure in the Vienna Circle, as Michael Friedman (1999b) suggests? This essay will argue that both the success and the eventual failure of the notion of 'foundedness' will be the key to a purely philosophical explanation of Carnap's verificationist turn.

To build our argument, we will begin by reconstructing the main argument of the *Aufbau*. In section 1 of this essay, we will thus first semi-formally reconstruct Carnap's investigation of the form of scientific sentences, and we will show how this contributes to Carnap's notion of objectivity under a neo-Kantian reading of the *Aufbau*. Second, we will briefly outline the basic elements of the constitutional theory, which is presented in the *Aufbau*, including an investigation of the sources of the empirical and the analytic components of it. Based on that, the elimination procedure of the basic relation of the constitutional theory, including the introduction and elucidation of the notion of 'foundedness', will be reconstructed. After that, we will present the critique in Friedman (1999a) of the demolished boundaries between analytic and empirical knowledge.

Section 2 is dedicated to the status of logic and mathematics in the *Aufbau*. First, the logicist notions which can be found in the *Aufbau* will be extracted. Second, we will explain Carnap's differentiation between logical value and epistemic value. After this, the reconstructive part of this essay will be finished, and we will merge the lines of thought presented above in our main argument in section 3. Here, we start off by presenting the three conditions that a constitutional theory must satisfy so that it does not collapse into triviality, against Carnap's logicist backdrop. From there, we

¹The English terms 'construction' (the term closer to English language use) and 'constitution' (the term closer to the original and better fitting Carnap's aim) are used interchangeably in this essay, both referring to Carnap's 'Konstitution'.

will show that the first condition, the absence of a purely conventional truth at any point of the constitution, is necessarily satisfied before we show how the introduction of foundedness is an ideal response to the concerns raised by the second condition.

In section 4, we will present indicators in favour of the thesis that the third criterion established in section 3.1 is not met in the Aufbau and that this fact leads to its failure. Eventually, we will give an outlook on how this thesis can explain Carnap's future philosophical development as well as how it can—unlike Friedman (1999b, chapter IV)—provide a philosophical explanation for the apparent self-contradiction in Carnap's autobiography.

1 THE NOTION OF 'FOUNDEDNESS' IN THE AUFBAU

1.1 OBJECTIVITY BY STRUCTURAL DEFINITE DESCRIPTION

1.1.1 *Purely structural scientific statements*

What is the form of scientific statements, according to Carnap's Aufbau, first published in 1928 and here referred to as Carnap (1998)? In Carnap (1998, §§10-16) several distinctions and semi-formal definitions are introduced, which we want to reconstruct briefly:

1. A *relational description* ('Beziehungsbeschreibung') of an object A relative to a domain D is the set of all relations between A and other objects in D. Relational descriptions do not contain the set of the properties of A (cf. §10).
2. A *structural description* ('Strukturbeschreibung') of an object A relative to a domain D is a relational description that only contains the formal properties of each element of the relational description. Structural descriptions do not contain the relational descriptions themselves (cf. §11).
There are two ways to give a complete structural description: first, by giving its *unlabelled graph* ('(nicht mit Gliedernamen versehene[]) Pfeilfigur'); second, by giving a list of all pairs of items in D which satisfy the relation, but in which all items of the list are labelled by terms that only make sense within the list (such as randomly chosen numbers), for all relevant relations. This list is called a *number pair list* ('Nummernpaarliste').
3. A scientific statement makes *sense* only if the meaning of all names of the objects it contains can be given.

4. The *meaning* of a name of an object can be given either by an *ostension* ('Aufweisung'), meaning, 'pointing at it, making it perceivable', or by a *definite description* ('Kennzeichnung').
5. A *definite description* gives exactly the number of descriptive properties of the object in question such that it can be uniquely determined, relative to its domain. Carnap emphasises here that those properties cannot be found a priori but only by utilising the domain, meaning that there must be at least one object in the domain that satisfies the descriptive properties (cf. §13).
6. A *structural definite description* is a definite description which gives the descriptive properties in the form of a structural description of an object in question, relative to its domain.
7. By
 - (a) the hypothesis that there is only one domain for scientific statements as presented in §4, and
 - (b) the hypothesis that purely structural definite descriptions are possible within the domain of scientific statements (cf. §15),

Carnap concludes that every scientifically meaningful statement can be transformed into a structural one, which only consists of structural definite descriptions. It is important to keep in mind here that the truth of both hypotheses, (a) and (b), depend on the successful construction of a constitutional system, as Carnap admits. The fulfilment of this task is attempted by him in §§106-156.²

1.1.2 Objective scientific language

What is the use of purely structural definite descriptions then? In other words: for what reason should we choose them over ostensions to give our scientific sentences meaning? Ostensions are dependent on the individual perception of material objects. But this is subjective in nature. Since science strives for objectivity, it is imperative not to depend on one single epistemic subject's perception but to use data from a plurality of epistemic subjects; specifically, what they agree upon. Here, the structural definite descriptions come into play: if one single purely structural relational network, in which every object of the domain can be accommodated by the use of

²We are aware that these definitions partly reoccur in a more formal manner later in the *Aufbau*. In particular, the precise definition of structure can be found in §34. Nevertheless, this semi-formal account should be sufficient for our present purposes.

purely structural definite descriptions, is used by all epistemic subjects at once, it can serve as the conceptual framework in which inter-subjective scientific communication can take place. The structural definite description for every object, again, depends on the agreement of observational data given by different epistemic subjects (cf. Carnap, 1998, §16). In other terms, scientists can communicate with one another and compare their results, meaning the same objects, by restricting themselves to speaking about formal properties of the relations of the objects they observe, although their qualitative perception may diverge significantly. The identity of objects would in this objective scientific language, which the constitutional theory³ of the Aufbau aims for, be restricted to having an isomorphic relational structure within the network.

1.1.3 The neo-Kantian interpretation of the Aufbau

This notion of objectivity in the Aufbau has first been emphasised by the so-called neo-Kantian interpreters of the Aufbau, such as Sauer (1985) and, mostly, Friedman (1999a). These authors bring Carnap's pursuit of objectivity in line with his neo-Kantian heritage, rooted in the Southwest school and the Marburg school. This is seen as an opposition to the earlier Aufbau interpreters, who tend to emphasise the Russellian and empiricist influence on Carnap's Aufbau (cf. Pincock, 2009, pp. 956-959). In this essay, we largely agree with the neo-Kantian interpretation of the Aufbau as offered by Michael Friedman, on which our critique will be based. Nonetheless, we will not investigate this distinction any further for our present purposes.

1.2 THE CONSTITUTIONAL THEORY IN THE AUFBAU

1.2.1 Methodical solipsism

In §§106-156 of the Aufbau, the actual construction of a constitutional system takes place. In his preceding investigations, Carnap identifies two possible domains in which a constitutional system can be based: first, the physicalistic domain, as described by what he calls 'thing-language'; second, the psychic domain, which can either be restricted to the content of one's own consciousness ('eigenpsychische Basis') or include the contents of other people's consciousness as well ('allgemeinpsychische Basis'). Although Carnap sees the advantages of a 'physicalistic' basis, he bases

³The term 'constitutional/constructional theory' can either refer to an actual system such as the one which is presented in the Aufbau or to the discipline of studying such systems.

the constitutional system presented in the Aufbau on the content of one's own consciousness. This is for the reason that an individual-psycho basis seems to reflect the order of epistemic primacy ('erkenntnismäßige Primarität'), which is the logical order of cognition: the cognition of some objects is a necessary condition of—and thus epistemically prior to—the cognition of others, which is in turn epistemically prior to the cognition of different entities, and so forth. He refers to this purely methodical decision of the basis of his constructional system as methodical solipsism ('methodischer Solipsismus') (Carnap, 1998, §§54-60).

1.2.2 *The empirical basic relation and analytic level forms*

Carnap's constitution has two main components, one empirical and one analytic. The empirical component is what is known as the basic relation ('Grundbeziehung'), the recollection of similarity ('Ähnlichkeitserinnerung'), between two elementary experiences, which are elements of the content of the (fixed and highlighted but not specifically named) epistemic subject's⁴ consciousness. These are the basic elements of the constitution and cannot be analysed themselves although they can be ascribed components by the synthetic method of quasi-analysis⁵ (cf. Carnap, 1998, §§61-83; §108-109). The analytic component is the constitution of all other epistemologically, or scientifically, relevant objects in a purely logical manner from the basic relation by means of definition. The underlying logic Carnap exploits in the Aufbau is a type-theoretic logic such as that developed by Russell and Whitehead. Carnap determines two relation-theoretical entities as the two primitive constituents of the chain of extensional definitions, in which his constitutional theory consists: classes and relations, known as level forms of the constitution ('Stufenformen') (cf. Carnap, 1998, §§27-42; §106).

1.2.3 *The layout of the constitution*

What is constituted in the Aufbau? What objects are epistemologically—i.e., for him, scientifically—relevant for Carnap? Three levels ('Stufen') of objects are dealt with in the exemplary constitution in the Aufbau: first, Carnap starts by defining all objects

⁴Here also referred to as 'one'.

⁵The methodology of quasi-analysis (see Carnap, 1998, §71) plays a key role in Carnap's system. It allows us to determine the quasi-components of the states of consciousness, which are primitives of the construction and, hence, unanalysable, can be subject to analysis. The basic idea is that some (quasi-)entities are defined in terms of equivalence relations amongst others. Quasi-analysis is closely akin to Frege's 'logical abstraction' (cf. Frege, 1884, §62). For a detailed discussion see Richardson (1998, pp. 51-64) and Goodman (2012, ch. 5).

that are cognised by one's own consciousness (cf. Carnap, 1998, §§108-121). Particularly important in this part of the constitution is §119, which is dedicated to the detailed demonstration of the reduction of every scientific statement to a statement about the basic relation, using the example of the statement about three-dimensionality of the colour body (cf. also Carnap, 1998, §153). This first part is the only part of the constitution that is carried out in full logico-mathematical rigour. Later parts are limited to rough battle plans for carrying out the constitution. So is the second part, where Carnap constitutes physical objects as dealt with in the thing-language⁶ such as space, visual objects, one's own body, or other people (cf. Carnap, 1998, §§123-138). The upper levels of the constitution are objects of other people's consciousness (cf. Carnap, 1998, §§139-149) and, finally, mental objects, the subject of the humanities, by their mental manifestations and in line with the constitution of their physical documentations (cf. Carnap, 1998, §§150-151). From here, Carnap hints at the constitutions of other kinds of objects, for which he names values as an example (cf. Carnap, 1998, §152).

1.3 THE ELIMINATION OF THE BASIC RELATION

1.3.1 Objectivisation by elimination

At this point in the *Aufbau*, before Carnap starts discussing the philosophical implications of his constitutional results in book V, Carnap completes the circle in terms of his prior investigations on objective scientific statements, as dealt with before in that essay: so far, he has only given a structural definite description in logical-relation theoretical terms based on the empirical relation of recollection of similarity. But, as we have seen before, an objective conceptual space for science to operate in requires reduction to definite descriptions that are purely structural and, thus, do not contain ostensible content. This means that Carnap needs to eliminate the basic relation. He attempts to show that this is possible in §§153-155 and we want to reconstruct this elimination process below.

1.3.2 The elimination procedure

Initially, Carnap identifies two requirements the elimination has to meet.

⁶The language using a materialistic domain and, hence, accepting the existence of everyday objects. The thing-language is also the language standardly employed in the empirical sciences (cf. Carnap, 1998, §52).

Structural description of the basic relation First, since the choice of the basic relation is not precisely determined before constructing a constitutional system,⁷ there is the opportunity to choose a different one. As the introduction of a different basic relation causes all other objects in the constitutional system to be changed into statements about it rather than the original basic relation, the properties of the objects within the new constitutional network, the form of which is relative to the new basic relation, would also shift accordingly. This means that the properties of the objects relative to the constitutional theory are bound to the basic relation and, conversely, that the basic relation can be described definitely by the properties of the objects of a constitutional theory within such. This is only limited by the choice of objects, used for that reason: the objects have to be at a sufficiently high level of the constitution, i.e. the formulae, constituting the objects relative to the constitutional theory must be of sufficiently high complexity (cf. Carnap, 1998, §153).

Foundedness The second requirement is what Carnap calls foundedness ('Fundiertheit') of the relation on which the first restriction is applied. When defining this restriction, Carnap seems to pull off a trick by calling it an undefinable notion. This means that it can neither be defined within our framework nor can it be a purely logical concept. Carnap suggests a solution to this problem by introducing the notion of foundedness as a logical term. We will skip this problem for the moment, and we will return to it later. Although Carnap does not offer a definition of the notion, he elucidates it: a relation is founded if it can be experienced. Thus, although the statements, derivable from a constitutional theory, change if its basic relation is replaced by another, the empirical content of those statements (all of them combined) does not (cf. Carnap, 1998, §154). In §155 Carnap carries the procedure of eliminating the basic relation by imposing the two restrictions, mentioned above, using the statement on the three-dimensionality of the colour body as the high-level sentence required to meet the first restriction.⁸

1.4 FRIEDMAN'S CRITIQUE OF FOUNDEDNESS

Carnap's consideration of foundedness as a primitive logico-mathematical term, is the major bone of contention in Friedman (1999a, chapter III). Here, Friedman identi-

⁷Carnap himself considers several different bases with different basic relations, as mentioned above.

⁸More precisely, any use of recollection-of-similarity is reduced to quantification over founded relations which satisfy the correct empirical constraints. We want to thank an anonymous reviewer for this nice phrasing.

fies the notion of foundedness with the possibility of the second option for breathing meaning into a statement other than structural definite descriptions: the possibility of ostensions. Indeed, this seems to be a contradiction of Carnap's original constitutional programme at first glance. In §13 of the Aufbau Carnap clearly states that the following construction will show the possibility of a purely structural constitutional system that is obtained not a priori but in a constructive way. For Friedman, this amounts to a fundamental problem:

If we succeed in disengaging objective meaning and knowledge from ostension and lodge them instead in logical form or structure, then we run the risk of divorcing objective meaning and knowledge from any relation to experience or the empirical world at all. We run the risk, that is, of erasing the distinction between empirical knowledge and logico-mathematical knowledge. (Friedman, 1999a, p. 103)

Although we can follow this analysis by Friedman, we do not agree with his assessment. For us, this is not a desperate attempt by Carnap to solve his constitutional project but rather a reasonable solution within the world of thought of the Aufbau. However, we will argue that Carnap was justified to move on after the Aufbau towards a verificationist programme and we will try to explain that development, based on our analysis.

2 LOGIC AND MATHEMATICS IN THE AUFBAU

2.1 LOGICISM IN THE AUFBAU

Pivotal for the deliberations to come will be a closer look at what Carnap says about the epistemic value of logic in the Aufbau. We are aware that Carnap's logicism is an extraordinarily broad topic. That is why we will limit ourselves to excerpts from his remarks on this topic in the Aufbau. What seems to leap to the eye first is §107, where Carnap wants to constitute logic and mathematics within the constitutional theory. For the underlying logic ('Logistik'; outdated term)) he clearly references Russell's and Whitehead's 'Principia Mathematica'. Insight into Carnap's thought at the time of the Aufbau might be given by the following passage:

[D]ie logischen und mathematischen Gegenstände

[sind] nicht eigentliche Gegenstände im Sinne der Realgegenstände (der Objekte der Realwissenschaften) [...]. Die Logik (einschl. [sic] der Mathematik) besteht nur aus konventionellen Festsetzungen über den Gebrauch von Zeichen und aus Tautologien auf Grund dieser Festsetzungen. (Carnap, 1998, §107, letter spacing as in the original)⁹

Here, we can see that Carnap considered logic and mathematics to be based on symbolic representations of mere conventions of a tautological nature, a variant of logicism (cf. Tennant, 2017). What is important to mention is the emphasis on logico-mathematical objects as non-actual objects, opposed to the actual objects of the factual sciences. Friedman (1999b, p. 126), following Lotze, identifies the meaning of the former term with objective, timeless validity ('Gültigkeit'); the latter term is identified with existence. This again hints at Carnap's neo-Kantian heritage, as Friedman points out, since the actual objects, factual science ('Realwissenschaft', in Carnapian terms) deals with, are 'made possible' (Friedman, 1999b, p. 126) by the non-actual. This is because the latter is thought of as 'governing our thought' (ibid.). Hence, logic and mathematics are independent of the coincidences of the actual world ('Unabhängig von den Zufälligkeiten der wirklichen Welt' (Carnap, 1998, p. XVIII)), as he puts it later in his German introduction to the second edition of the *Aufbau*. Building on that, we want to take a closer look at the even more insightful §§50-51 in the following.

2.2 LOGICAL VALUE AND EPISTEMIC VALUE

In §50 and §51, Carnap introduces the distinction between the epistemic value ('Erkenntniswert') of a statement and its logical value ('logischer Wert'). The former is given as the sense according to the imagination of the statement in question. The latter term refers to its truth value. By executing the programme of constitutional theory, one reduces statements about the objects we are concerned with by means of constitutional, i.e., explicit, definitions,¹⁰ only containing the basic relation. This means

⁹English translation (Carnap, 1937, §107, emphasis as in the original): 'It is important to notice that the logical and mathematical objects are not actually objects in the sense of real objects (objects of the empirical sciences). *Logic (including mathematics) consists solely of conventions concerning the use of symbols, and of tautologies based on these conventions.*'

¹⁰We are aware that Carnap actually considers several different types of definitions in the *Aufbau* (cf. Carnap, 1998, §38-39), including the infamous definitions-in-use. We also know that this has been an

that both statement functions ('Aussagefunktionen'), the one before and the one after the reduction, are equal in extension. The transformation process could potentially lead to an epistemically meaningful statement being transformed into a mere triviality if only the logical value is preserved. So, as Carnap puts it, constitutional translations are weaker than language translations since the former merely preserves logical value; but the latter preserves epistemic value in addition to that.

3 AVOIDANCE OF TRIVIALISATION: A DEFENCE OF FOUNDEDNESS

We hold that these paragraphs, §§50-51, are key to settling Friedman's doubts about the notion of foundedness. Carnap was very much aware—as we have just seen—that the constitutional project could run the risk of turning epistemologically meaningful statements into trivialities, even before introducing the notion of foundedness. Since logico-mathematical truths are considered to be conventionally true and constitutional theory is only worried about preserving logical value, it needs only a true (empirical) statement to be put into the constitutional-definitional reduction machinery to possibly make it trivial.

3.1 THREE CONDITIONS

To avoid such trivialisation, one must employ three conditions:

1. First, at no step of the constitutional system must there be a statement that is true merely by logico-mathematical (for us: conventional) means.
2. Second, we must ensure that our basic relation is itself empirical.
3. Third, we must be able to determine all instances of the basic relation in the constitutional system as true.

apple of discord in the literature: Coffa (1991, p. 221-222), and the response in Friedman (1999a, p. 98). We will stick to Carnap's own definition in §51 which holds explicit definitions to be substitution rules.

3.2 NO CONVENTIONAL TRUTH IN CARNAP'S CONSTITUTIONAL SYSTEM

3.2.1 *No necessity*

How does Carnap ensure these conditions are met? Logic and mathematics are, as mentioned above, constituted before the actual constitutional system. In fact, logic and mathematics are not constituted at all, as constituting an object means its reduction to the basic relation by means of logic. But logic is conventionally true; it does not require empirical input for its justification; mathematics, on the other hand, is reducible to logic. That is, why logic is constitutionally, i.e. logico-epistemically, prior to the actual constitutional system.¹¹ One needs logic to constitute the constitutional system, but no element of the constitutional system is necessary to define logic. Vice versa, we do not need to define basic concepts of logic within our constitutional system, although logic is necessary for its construction since it was already there in the first place. This means that it is not necessary to construct a logically true statement in Carnap's constitutional system at any stage; still, is it possible?

3.2.2 *No possibility*

The specific form of the constitutional system is defined by the statements about its objects. These are fixed by the scientific indicators (sufficient, temporarily preceding conditions) of the (empirical) basic states of affairs underlying the objects in question (cf. Carnap, 1998, §49). All relational descriptions taken from those and all structural descriptions, in turn, abstracted from the relational ones are ultimately based on the indicators of the empirical states of affairs. Thus, structural descriptions over the domain of scientifically relevant objects do always contain empirical content. Since some structural descriptions, namely those which are sufficient to describe all scientific concepts definitely, are the constituents of Carnapian constructional system, this contains empirical content in any statement at any level of the constitution. As we see, it is impossible to have a logically true statement at any step of the constitution.¹²

¹¹This priority is also mirrored in the paragraph structure of the *Aufbau*.

¹²As an anonymous reviewer urged us to clarify, 'system' here does not refer to Carnap's entire language but to the unlabelled graph network, based on the basic relation. Although Carnap makes use of tautologies when constructing the constitutional network, all tautologies are already available to him prior to the constitution, including those containing empirical objects, as we argued in 3.2.1.

3.2.3 *Empirical content and definite description*

This is also related to the first criterion Carnap imposes on the elimination procedure of the basic relation in §§153-155, as explained above: the basic relation should be definitely described (in purely structural terms) by the inner-constitutional properties of the objects constituted from it. Since the basic relation is empirical, which is what motivated Carnap to eliminate it in the first place, it cannot be described by purely logico-mathematical statements but only by statements also containing empirical value. Hence, the statements used for the structural definite description of the basic relation must contain empirical content.

3.3 THE EMPIRICAL NATURE OF THE BASIC RELATION

3.3.1 *The importance of an empirical basic relation for constitution theoretical epistemology*

What has not been discussed yet is whether the basic relation is actually empirical. This is indeed a profound problem, as this is not granted by the setting of the constitutional theory. We might be mistaken about whether the relation which we have taken as the starting point for the constitution does indeed hold between objects in the world. At the point of the constitution where the basic relation is introduced, only pure logic is yet available as a tool for logico-epistemological justification, as we have just seen. Modelling the different steps of the constitutional system after empirical content, the indicators of the basic states of affairs, is again only logico-epistemologically justified if the basic relation itself is empirical. This is the case since—strictly speaking—the objects of the constitution are, for constitution theory, mere derivations of the basic relation. In other words, the only part of the definition of the objects of the constitution theory which is not just pure logic is the basic relation. If the basic relation is not empirical, we cannot guarantee that all scientific-epistemological statements will not simply become mere trivialities as soon as we apply logico-definitional methods on them. Instead of having provided a framework for the discourse of empirical science, we would have merely created a mathematical playground without any relation to the actual world. It is essentially at odds with Carnap's aim of eliminating metaphysically charged language forms for the very reason of its lack of empirical content. However, if we cannot feel assured that Carnap's construction is based on an empirical basic relation, it is in danger of becoming subject to the same criticism. For a constitution theorist, epistemology itself is in danger here.

3.3.2 *Foundedness as the 'bug fix'*

There is no way out of this problem by the given means at this point of the *Aufbau*. We need a 'bug fix'. The solution, which Carnap himself supplies, is the notion of 'foundedness'. This is exactly what we need: our problem is that we only have pure logic available to justify the empirical status of the basic relation (or better: that it is logico-empistemologically justified to use an empirical basic relation). 'Foundedness' is, as it happens, exactly that: a basic notion of pure logic. The reasons for Carnap to introduce this notion read exactly as the obstacles of our current situation: foundedness cannot be deduced from pure logic, nor is it part of any outer-logical field (cf. Carnap, 1998, §154).

3.3.3 *The redemption of foundedness*

What seems to be a drastic and desperate step by Carnap is a well-conceived suggestion to directly target the problem of the application of logic and mathematics in constitutional theory, perhaps even in scientific discourse in general. Logic is purely conventional and therefore the statements deduced from it are a priori true. The same holds for mathematics since it is reducible to logic (we must keep in mind that we are in the world of thought of the *Aufbau* here, which is logicist). But in the case of constitutional theory and science, we do not want mere a priori truths. Instead, we want empirical content to determine the truth of the statements in question. At the same time, we want to make objective, i.e. inter-subjectively communicable, statements about the world, which Carnap, as we have seen before, considers requiring the form of structural definite descriptions. In other words, we want to formalise the empirical input from empirical sources. Constitutional theory aims to provide the means for that. Foundedness ensures in this picture that, although we employ formal methods, our epistemological framework for discourse and investigation in science is in the end empirical. Instead of erasing the distinction between empirical and logico-mathematical knowledge, of which Friedman accuses Carnap for introducing foundedness as a logical primitive, Carnap saves what is crucial for constitution theory and for the framework of scientific discourse it wants to provide: a distinction between the empirical and logical parts of the constitution.¹³

The last remaining question of the three stated above is: can we make out the sentences in the construction, which are instances of the basic relation, as being true?

¹³The difficulty Carnap encounters in the *Aufbau* in making clear this distinction and the fatal problem of foundedness, which we will argue for in the following section, can be considered a foreshadowing of the Carnap-Quine debate on analyticity (see Leitgeb and Carus, 2020).

We think that Carnap holds this statement to be true. This is the actual Achilles' heel of the Aufbau as we will see in the next and last section of this essay.

4 TOWARDS THE VIENNA STAGE

4.1 SELF-CONTRADICTIONS IN CARNAP'S AUTOBIOGRAPHY

A major point of concern for the neo-Kantian interpreters of the Aufbau is the apparent self-contradiction Carnap displays in his intellectual autobiography. Here, he writes:

[The Vienna Circle] assumed that there was a certain rock bottom of knowledge of the immediately given, which was indubitable. Every other kind of knowledge was supported by this basis and therefore likewise decidable with certainty. This was the picture which I had given in the Logischer Aufbau; it was supported by the influence of Mach's doctrine of the sensations as the elements of knowledge, by Russell's logical atomism, and finally by Wittgenstein's thesis that all propositions are truth-functions of the elementary propositions. (Carnap, 1963, p. 57)

Carnap—in retrospect—takes a stance on the purpose of the Aufbau which seems significantly different to the neo-Kantian position, such as Friedman's (as described in this essay). This approach sounds much more like the positivist picture Carnap embraced after he became part of the Vienna Circle (after writing the Aufbau): the meaning of a sentence depends on its verification (cf. Stöltzer and Uebel, 2006, pp. XXXVIII-XL), in the terminology of the Aufbau: on the ostension of the basic objects which are mentioned in it and their inter-relations. This is an open contradiction to the structuralist conception of meaning which we have reconstructed under a neo-Kantian reading in this essay. Friedman (1999b, chapter IV, pp. 145-152) explains the issue by denying that Carnap refers to his own motivations here. Instead, Friedman thinks that Carnap illustrates the ideological reception of the Aufbau in the intellectual climate of the Vienna Circle. We are not fully convinced by Friedman's explanation for the apparent dissonance between the Aufbau and Carnap's later view on it and we want to offer the sketch of a slightly different solution in the following section.

An anonymous reviewer of this paper pointed out that they consider Tsou's view

(Tsou, 2003) close to the account presented in this paper. We want to seize this opportunity to point out how his paper indeed differs from ours. Tsou merges the two dominant readings of the *Aufbau* in his essay: he agrees with the neo-Kantian interpretation, which we have endorsed in this essay, insofar as he shares their reading of the *Aufbau* as essentially concerned with the question of an objective framework for empirical science. However, he also agrees that Carnap's reductionist methodology is significantly connected to objective empirical conditions of justification in the form of his reductionist methodology. This latter claim is at odds with the neo-Kantian interpreters and in agreement with the older line of readings of the *Aufbau*, tracing back to Quine. This family of interpretations reads the *Aufbau* in the Russellian tradition of British empiricism as well as, retrospectively, from the Carnapian papers of the days of the Vienna Circle. Under this reading, Carnap is indeed looking to find a 'rock bottom of knowledge' from the introductory quote in the *Aufbau*. We disagree with this second component of Tsou's reading: we do not think that Carnap's motivation for the *Aufbau* is based on any Russellian project looking for a 'rock bottom of knowledge' but essentially concerned with questions of objectivity. Instead, we want to suggest that it was indeed the open questions of the *Aufbau* which have motivated Carnap to move to a more Russellian project in his later Vienna days. Unlike Tsou, we do not seek to dispense with or modify the neo-Kantian reading; but rather we want to stay faithful to it. Our aim is merely to give an alternative rational explanation for Carnap's later autobiographical self-contradictions.

4.2 A RATIONAL EXPLANATION

As we have said in the last section, we need some principle which allows us to recognise the truth of all instances of the basic relation in the constitutional system to make the constitution function. We think that Carnap was aware of this fact and the incompleteness of the *Aufbau* in that regard when he published it for the first time in 1928. This would explain why the core idea of a fully structural constitutional system and, thus, the elimination of the basic relation is so little emphasised throughout the *Aufbau*: neither is it mentioned in §1 which sets the goals of the project nor in §156 where the theses of the *Aufbau* are explicitly listed. §§153-155, in which the elimination of the basic relation takes place and where the notion of foundedness is introduced, are even labelled 'can be omitted' ('überschlagbar'). We think that this was due to Carnap's awareness of the lacking keystone which would show the indubitable truth of the instances the (founded) basic relation in his construction.

The central piece of evidence for this thesis is the enthusiastic adoption of verification as the criterion for meaningful sentences, which was adopted by Carnap right after the publication of the *Aufbau* (cf. Stöltzer and Uebel, 2006, pp. XXXVIII-XL). Only after Carnap had adopted verificationism was the missing keystone for the project of constitutional theory found since verificationism provides an offer for the ‘rock bottom of knowledge’,¹⁴ a truth-determining principle for all scientific sentences, which is absent in the *Aufbau*. Certainly, the empiricist Carnap’s verificationism is very much at odds with the structural conception of meaning which serves as the backbone of the *Aufbau*.¹⁵ However, many other leitmotifs of the *Aufbau* persist in Carnap’s philosophical work and later re-appear in his *Die logische Syntax der Sprache* (Carnap, 1934)¹⁶.

Unlike Friedman, we do not have to make the case for mere irrational ‘peer pressure’ to explain the verificationist stage in Carnap’s philosophical life and his later view on the *Aufbau*; but, we can offer a rational and philosophical reason: by moving on to the Vienna station Carnap saw a chance to find answers to the last open question of the *Aufbau*.

Summary: foundedness defended

According to the *Aufbau*, every scientifically meaningful statement can be translated into a structural one. This translation is necessary to achieve inter-subjectively communicable, or better: objective, discourse. This is the major focal point of the neo-Kantian interpreters of the *Aufbau*.

In the *Aufbau*, Carnap constitutes every scientific object along the logico-epistemological order of cognition by means of logical definition. The basic relation, the recollection of similarity, is the only empirical entity in that construction. Every other object in the constitutional theory is generated from it. In order to accomplish the goal of the *Aufbau*, the objectivisation of scientific discourse, Carnap eliminates the basic relation by structural definite description in terms of high order objects constituted from it and by introducing a novel notion, called ‘foundedness’ as a basic concept of logic.

For the logicist *Aufbau*, logic and mathematics are of purely conventional and tautological nature. Two statements have the same logical value if they are equal in extension. Constitutional transformations preserve logical value, but they do not preserve epistemic value. This property shows a risk of trivialisation into which the *Aufbau* could run, as constitutional definitions can possibly turn epistemically mean-

¹⁴Cf. the quote in the beginning of this essay.

¹⁵We would like an anonymous reviewer for urging us to make this point explicit.

¹⁶Or in English: ‘The logical syntax of language’ (Carnap, 1937).

ingful statements into logical truths, or in Carnap's thought: trivialities.

We argued that this problem can be avoided if three conditions are fulfilled. First, at no step of the constitutional system must there be a statement that is true merely by logico-mathematical means. Second, we must ensure that our basic relation is itself empirical. Third, we must be able to determine all instances of the basic relation in the constitutional system as true.

The first condition is satisfied since logic and mathematics are constituted outside the constitutional system and since every statement in the constitutional system is ultimately based on its corresponding underlying state of affairs. The second criterion is not ensured by the constitutional system itself, as we have seen. Nonetheless, foundedness turned out to be the ideal 'bug fix' for this problem.

In the last section of the essay, we gave an outlook on how our prior investigations can be used to offer a better explanation than Friedman's 'Vienna reception' thesis for the change in Carnap's later self-reception of his project in the *Aufbau* and his philosophical development after the *Aufbau*. What the *Aufbau* had failed to provide, verificationism was able to supply: a justification for the truth of all instances of the basic relation in his constitution, a 'rock bottom of [scientific] knowledge'.

We are aware that this essay is a mere informal brief sketch of our reading of foundedness. However, it is intended to set the stage for a later elaborated formal treatment of our reading of foundedness. It, additionally, shows the attractiveness of our reading for a philosophical understanding of Carnap's verificationist turn during his Vienna days. ❁

ACKNOWLEDGEMENTS

The author would like to thank the anonymous reviewers of *The New Collection*, as well as Neil Dewar, for their helpful comments.

Bibliography

- Rudolf Carnap. *Logische Syntax der Sprache*. Springer, 1934.
- Rudolf Carnap. *The Logical Syntax of Language*. Kegan Paul, 1937.
- Rudolf Carnap. *The Philosophy of Rudolf Carnap*, chapter Intellectual Autobiography, pages 3–81. Open Court, 1963.
- Rudolf Carnap. *Der logische Aufbau der Welt*. Felix Meiner Verlag Hamburg, 1998. First published 1928.
- Alberto Coffa. *Carnap before Vienna*, volume The Semantic Tradition from Kant to Carnap: To the Vienna Station, chapter 11, pages 207–222. Cambridge University Press, 1991.
- Gottlob Frege. *Die Grundlagen der Arithmetik: eine logisch mathematische Untersuchung über den Begriff der Zahl*. w. Koebner, 1884.
- Michael Friedman. *Carnap's 'Aufbau' Reconsidered*, volume Reconsidering Logical Positivism, chapter 5, pages 89–113. Cambridge University Press, 1999a.
- Michael Friedman. *Epistemology in the 'Aufbau'*, volume Reconsidering Logical Positivism, chapter 6, pages 114–162. Cambridge University Press, 1999b.
- Nelson Goodman. *The Structure of Appearance*, volume 53. Springer Science & Business Media, 2012.
- Hannes Leitgeb and André Carus. Rudolf Carnap. Supplement B. Carnap versus Quine on the Analytic-Synthetic Distinction. In Edward N. Zalta, editor, *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University, fall 2020 edition, 2020.
- Christopher Pincock. Carnap's Logical Structure of the World. *Philosophy Compass*, (4/6): 951–961, 2009.
- Alan Richardson. *Carnap's Construction of the World: The Aufbau and the Emergence of Logical Empiricism*. Cambridge University Press, 1998.
- Werner Sauer. Carnaps 'Aufbau' in kantianischer Sicht. *Grazer Philosophische Studien*, (23): 19–35, 1985.

Michael Stöltzer and Thomas Uebel. *Einleitung der Herausgeber*, volume Wiener Kreis. Texte zur wissenschaftlichen Weltauffassung von Rudolf Carnap, Otto Neurath, Moritz Schlick, Philipp Frank, Hans Hahn, Karl Menger, Edgar Zilsel und Gustav Bergmann, chapter Einleitung, pages IX–CIV. Felix Meiner Verlag Hamburg, 2006.

Neil Tennant. Logicism and Neologicism. In Edward N. Zalta, editor, *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University, winter 2017 edition, 2017.

Jonathan Tsou. The justification of concepts in Carnap's Aufbau. *Philosophy of Science*, 70(4): 671–689, 2003.