

The Justification of Concepts in Carnap's *Aufbau**

Jonathan Y. Tsou^{†‡}

This paper concerns the recent debate on the nature and motivations of the epistemological project advanced in Rudolf Carnap's (1891–1970) *Aufbau*. Much of this debate has been initiated by Michael Friedman and Alan Richardson who argue (against the received view of the *Aufbau* as a foundationalist defense of empiricism) that Carnap's epistemological project is located in the tradition of neo-Kantian epistemology. On this revisionist reading of the *Aufbau*, Carnap's project is not motivated to address traditional empiricist problems regarding the justification of knowledge, but rather to show how objective knowledge is possible. A central aspect of the *Aufbau* that is neglected in the revisionists' analysis is the role of epistemic justification in Carnap's project. The aim of the present study is to argue that although the general epistemology in the *Aufbau* can be cast as neo-Kantian, Carnap's method of construction theory (or rational reconstruction) is formulated precisely as an empiricist method for the justification of conceptual knowledge. Construction theory radically redefines 'empirical justification' into a formal-conventional notion, and is part of Carnap's more general agenda of redefining epistemology as a purely formal discipline.

1. Introduction. The putative understanding of Rudolf Carnap's *Der logische Aufbau der Welt*¹ (hereafter, *Aufbau*) as a rigorous defense of

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†To contact the author write to The Committee on Conceptual and Historical Studies of Science (CHSS), University of Chicago, 1126 East 59th Street, Room 205, Chicago, IL, 60637; e-mail: jtsou@midway.uchicago.edu.

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1. Carnap ([1928] 1967a); all section references in the text refer to R.A. George's English translation of this work unless otherwise stated. The cultural meaning of 'Aufbau' was associated with a left-wing modernist rebuilding of society (Galison 1996).

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empiricist epistemology has lost its credibility due to a number of revisionist interpreters who have emphasized the neo-Kantian aspects of Carnap's first major work (e.g., see Coffa 1991, chaps. 11–12; Friedman 1999, chaps. 5–6, 2000, chap. 5; Haack 1977; Richardson 1998; Sauer 1989). Recently, Michael Friedman and Alan Richardson have made decisive contributions in this regard, arguing persuasively that, in the *Aufbau*, Carnap is addressing the Kantian problem of how knowledge is possible and articulating a structuralist notion of scientific objectivity. Friedman and Richardson forcefully reject the so-called 'received view' of the *Aufbau* in which Carnap's empiricist-reductionist project is motivated to specify a privileged basis of *certainty* in an empirical foundation, a view that they claim has gained prevalence due to Quine's ([1951] 1980, 1969) well known criticisms of Carnap's project (see Friedman 1999, 89–90; Richardson 1998, 10–13).

The aim of the present study is to re-examine the nature and motivations of Carnap's construction theory in light of the revisionist outlook on the *Aufbau*. My main contention is that the method of rational reconstruction proffered in the *Aufbau* is intimately linked with Carnap's attempt to advance a method for the justification of conceptual knowledge. The paper proceeds as follows. In Sections 2 and 3, I explicate the nature of construction theory with reference to the revisionist interpretation of the *Aufbau*. Central themes discussed in these sections include reductionism, objectivity, structuralism, and conventionalism. In Sections 4 through 6, I argue that construction theory is Carnap's proffered method of epistemic justification. Since Carnap endorses a restricted sense of 'justification,' the main purpose of the latter portion of the paper is to articulate what justification in the *Aufbau* amounts to, focusing on both its conventionalist and empiricist aspects. It should be stated at the outset that my aim in this paper is not to undermine the revisionist interpretation of the *Aufbau*, but rather to indicate its limitations and elaborate it.

2. Construction Theory: A Rational Reconstruction of Concepts. The epistemological method proposed by Carnap in the *Aufbau*, construction theory (*Konstitutionstheorie*), is demonstrated through the presentation of a particular constructional system (*Konstitutionsystem*). In the constructional system outlined in the *Aufbau*, Carnap reduces all concepts to a basis of subjective experience (§§ 106–156), 'concept' (or 'object') being crudely defined as "anything about which a statement can be made" (§ 1).² In the preface to the second edition, Carnap writes:

2. In this paper, I limit my discussion of the technical details and difficulties of the particular constructional system presented in the *Aufbau*, focusing on Carnap's more general episte-

The main problem concerns the possibility of the rational reconstruction of the concepts of all fields of knowledge on the basis of concepts that refer to the immediately given. By rational reconstruction is here meant the searching out of new definitions for old concepts. . . . The new definitions should be superior to the old in *clarity and exactness*, and, above all, should fit into a systematic structure of concepts. (v, emphasis added)

To achieve the desired clarity and exactness, Carnap employs Whitehead and Russell's (1910–1913) theory of relations to the task of 'analyzing reality' (§ 3). In providing an analysis of 'reality,' Carnap means to be analyzing a 'constructional' or 'empirical' concept (as opposed to a metaphysical concept) of reality, conceived of as a *practical heuristic* for analyzing the empirical sciences (§§ 170–178). The result of such an analysis is an epistemological genealogy of concepts in which each concept has a definite place (§ 1). A scientific concept (e.g., 'atom') is reduced when every statement containing the concept is transformed into a statement containing concepts referring to the immediately given, thereby *constituting* the concept. Such constitutional or constructional definitions form a hierarchy, with undefined subjective experiential concepts at the 'ground' (auto-psychological) level and concepts of increasing complexity at 'higher' (physical, heteropsychological, cultural) levels. Concepts at higher levels are to be derived stepwise from the fundamental concepts (§ 1). The resulting constructional system is expressed in the language of modern symbolic logic.

In the *Aufbau*, reductionism is the central methodological strategy utilized by Carnap to transform all concepts into concepts referring to sense-data (§ 2). Carnap states that a concept is reducible to another concept if all statements about the former concept can be transformed into statements about the latter concept; *A* is reducible to *B*, if statements about *A* can be transformed into statements about *B* (§ 2). The reduction of a concept involves the production of a rule that prescribes how statements about concept *A* are to be transformed into statements about concept *B*. The general rule that indicates how a concept is to be transformed into another is called a 'construction rule' or 'constructional definition.' Carnap defines 'transformation' more precisely with the notion of coextensiveness

mological method of construction theory. In the constructional system presented in the *Aufbau*, Carnap attempts to derive all concepts of knowledge from the two-place relation of "recollected similarity." Retrospectively, Carnap (1963a) describes this project as a "reduction of scientific concepts to a phenomenal basis" (20). For a comprehensive and detailed discussion of the constructional system presented in the *Aufbau*, see Goodman ([1951] 1966) and Richardson (1998, 51–70). Goodman's critical exposition remains one of the best treatments available.

(i.e., universal equivalence) of propositional functions (§§ 32, 35).³ A proper transformation (and hence reduction) of concept *A* to concept *B* occurs if for each propositional function exclusively about concept *A*, there exists a coextensive propositional function exclusively about *B* (§ 35). Conformably, Carnap defines ‘constructional definition’ as a rule of translation that suggests how any propositional function in *A* can be transformed into a coextensive propositional function in which only *B* occurs. The simplest type of constructional definition employed in the *Aufbau* is the rule of explicit definition, which prescribes that all occurrences of *A* in a statement are to be replaced with equivalent statements involving *B*.

On the received view (i.e., the view suggested by Quine), the purpose of Carnap’s reductionist project is to ground scientific concepts in a (phenomenal) basis of *certainty*. Revisionists rightfully eschew this view, emphasizing that Carnap’s utilization of a phenomenal basis in the *Aufbau* is circumstantial rather than essential to construction theory. Carnap merely favors this basis for its ‘epistemic primacy’ and alternative bases (e.g., physical or heteropsychological) can serve as equally legitimate (§§ 57–63).⁴ Carnap’s qualification that it is possible to reconstruct concepts using alternative bases anticipates the ‘liberalization of empiricism’ associated with his ‘principle of tolerance’ (Carnap [1934] 1937, § 17). In his autobiography, Carnap (1963a) is especially clear on this issue:

When I developed the system of the *Aufbau*, it actually did not matter to me which of the various forms of philosophical language I used, because to me they were merely modes of speech. . . . This neutral attitude . . . was formulated as “principle of tolerance” in *Logical Syntax* and I still hold it today. . . . (18)

Besides this tolerant attitude towards possible bases for constructional systems, it is significant that Carnap makes no indication that the autopsychological basis that he uses in his trial system is more *certain* than any of the other domains that are constructed from it (§ 106). On the contrary, *all* of these levels are informed by the empirical sciences and equally subject to revision (§ 122). Based on these considerations, revisionists argue that the aim of the *Aufbau* is not to rationally reconstruct scientific concepts using a phenomenalist basis, per se, but more generally to rationally re-

3. In the preface to the second edition, Carnap states that he is no longer satisfied with his discussion of the extensional method (§§ 43–45), and would prefer a more liberalized version of the thesis (ix).

4. Epistemic primacy refers to the order that concepts are known in cognition. A concept is said to be epistemically prior to a second concept, if recognition of the second concept presupposes the first (§ 54). Carnap’s choice of an autopsychological basis follows from his *desire* to reflect the actual process of cognition in his illustration of a possible constructional system (§§ 64, 100).

construct concepts using *any* basis. On this understanding, it is misguided to view Carnap's project as being motivated to identify an empirical foundation of certainty for epistemology in the tradition of British empiricism. On the contrary, construction theory is formulated to meet the quite different aim of securing the objectivity of scientific concepts.

Revisionists argue that the central problem motivating Carnap's reductionist project is not the empiricist problem of how we can have knowledge of the external world, but the more general Kantian problem of how objective knowledge is possible. Carnap raises the problem as follows:

Even though the subjective origin of all knowledge lies in the contents of experiences and their connections, it is still possible, as the constructional system will show, to advance an intersubjective, objective world, which can be conceptually comprehended and which is identical for all observers. (§ 2)

As suggested by Richardson's (1990) paper, "How Not to Russell Carnap's *Aufbau*," the foundationalist reading has gained its legacy due to readers' tendencies to read Russell's 'external world program' directly into the *Aufbau*. Although Carnap does take Russell as a fundamental point of inspiration, what Carnap inherits from Russell is his logic, not his problem. In Carnap's hands, Russell's logic is not applied to justify our knowledge of the external world, but rather to articulate a new conception of objectivity that assimilates logicist and neo-Kantian principles.⁵

3. Logic, Structure, and Objectivity. According to revisionists, the aim of construction theory is to secure the objectivity of scientific concepts by capturing what is intersubjectively communicable in conceptual knowledge, viz., its structural form (Friedman 1999, chap. 5; Richardson 1998, 180–206).⁶ For Carnap, the objectivity of conceptual knowledge lies in the

5. Richardson (1998) argues that Carnap advances two notions of objectivity in the *Aufbau*, one internal to construction theory and one external to it; Richardson dubs these interrelated projects as 'the intersubjectivising project' and 'the project of purely structural definite descriptions' (25–51, 89–91, chap. 8). Carnap's first project is to secure objectivity *within* construction theory by constructing an intersubjective world from the subjective world of experience. For this project, Carnap assumes that human experience ('the given') has a minimal formal structure and that classical mathematical physics is sufficiently rich to capture this 'structure of appearance.' Richardson (1998) concludes that this project is incoherent because it mistakenly locates the motivational distinction (viz., the objective-subjective distinction) within a constructional system where *all* constructed concepts are supposedly objective (187–191). As will be explained subsequently, Carnap's second project advances a more general meta-epistemological notion of objectivity as pure logical structure.

6. Demopoulos and Friedman (1985) contrast Carnap's thesis of structuralism with the 'structural realism' in Russell's (1927) *Analysis of Matter*.

structural properties of relations obtaining between concepts (§§ 6, 10, 12, 16). Whatever is not structural (i.e., whatever is empirically ostensible) in a relation is subjective, and must be removed in construction theory. Carnap explains:

The series of experiences is different for each subject. If we want to achieve, in spite of this, agreement in the names for the entities which are constructed . . . then this cannot be done by reference to the completely divergent content, but only through the formal description of the structure of these entities. (§ 16)⁷

Here, Carnap argues that to secure the objective meaning of concepts, it is necessary to provide a formal description of the relations obtaining between concepts. The logic of *Principia Mathematica*, conceived as a conventional tool for formal analysis, serves this role in construction theory. Carnap writes: “*Logic (including mathematics) consists solely of conventions concerning the use of symbols, and of tautologies on the basis of these conventions*” (§ 107, emphasis in original).

More precisely, Carnap describes the structural properties of relations with the definitional tool of ‘purely structural definite description’ (§§ 11–15, hereafter PSDD). A PSDD uniquely specifies a concept by defining a concept exclusively in terms of relational structure without reference to the content of the relation or its relata (§ 11). The essential feature of a PSDD is that it is capable of capturing the minimal properties necessary to unequivocally specify relevant concepts (§ 13). Carnap presents an example of how individual objects on a map of a railroad network can be specified without reference to ostensive objects (§ 14). The idea, roughly, is that any of the relevant objects (i.e., train stations) can be specified merely with reference to a single relation (‘nextness’) via PSDDs (see Richardson 1998, 47–49). In the context of the constructional system presented in the *Aufbau*, Carnap’s strategy is analogous. All concepts are to be reduced to purely formal definitions that refer to structural properties obtaining between concepts without any reference to ostensible content.⁸

7. Immediately following this passage, Carnap notes the difficulty of discriminating between identical relations with differing contents (§ 16). An example is the isomorphic relation of continuous linear ordering in spatial and temporal relations (see Friedman 1999, 97–98). Carnap maintains that these identical relations are to be discriminated in construction theory by their formal ‘places’ within a global constructional system, i.e., solely on the basis of their structural properties (§§ 14–15).

8. Revisionists argue that Carnap’s failure to meet this goal is the most serious problem with the constructional system presented in the *Aufbau* (Demopoulos and Friedman 1985; Friedman 1999, 101–108; Richardson 1998, 87–89). The difficulty arises when Carnap attempts to remove the non-logical primitive (recollected similarity) relation by restricting possible basis relations to ‘founded’ relations (i.e., experienciable or natural relations) and conceiv-

On the revisionist reading, construction theory aims to provide an objective account of what scientific concepts mean by rationally reconstructing them into an epistemological genealogy. Logical definitions (constructional definitions) are conventional introductions of signs that redefine concepts in terms of previously defined or primitive concepts (Richardson 1998, 185–187). Carnap's proposal assumes both a structuralist conception of objectivity and the possibility of the 'unity of the object domain' (§ 4).⁹ The nature of Carnap's solution is revealed when he writes:

[T]he fundamental thesis of construction theory . . . asserts that fundamentally there is only one object domain and that each scientific statement is about the objects in this domain. Thus, it becomes unnecessary to indicate for each statement the object domain, and the result is that *each scientific statement can in principle be so transformed that it is nothing but a structure statement* . . . this transformation is not only possible, it is imperative. For science wants to speak about what is objective, and whatever does not belong to the structure but the material (i.e., anything that can be pointed out in a concrete ostensive definition) is, in the final analysis, subjective. (§ 16, emphasis in original)

The idea is that objective conceptual meaning in science is purely structural. Since all concepts, in principle, belong to the same conceptual domain, the objective meaning of all scientific concepts can be expressed in a language that is sufficiently rich to capture the essential structural properties of concepts. The resources of the logic provided by Whitehead and Russell (1910–1913) meet Carnap's desideratum nicely.

4. Rational Reconstruction as a Method of Justification. The aim of the remainder of this paper is to articulate how Carnap's method of rational reconstruction is a form of epistemic justification. In doing so, I hope to provide a more balanced perspective on the nature of Carnap's epistemological project in the *Aufbau*. Although revisionists are correct to stress that construction theory is motivated to secure the objectivity of scientific concepts, they fail to sufficiently acknowledge that this goal facilitates a

ing of 'foundedness' as a basic concept of logic (§§ 153–155). Even if one excuses the ad-hoc nature of Carnap's strategy here, this solution conflicts with a basic aim of construction theory, viz., to provide an account of objectivity that separates objective meaning from subjective experience.

9. For a discussion of the unity of science thesis and its relation to the *Aufbau*, see Carnap (1963a, 50–53), Creath (1996), Friedman (1999, 97–101), and Richardson (1998, 183–187). The possibility of the unity of the object domain is crucial since it yields the prior possibility that there can be intersubjective agreement regarding *what* is under discussion (Ryckman 1991).

more general goal within the context of the epistemology of the *Aufbau*, viz., to provide an empiricist method for the justification of scientific conceptual knowledge. In drawing attention to this more general goal of construction theory, I hope to clarify what is both correct and obscured in the revisionist account on the nature of the epistemology of the *Aufbau*. In particular, I argue that when the goal of construction theory is recast from objectivity to justification, what is suggested is not an exclusively neo-Kantian project, but a project that assimilates aspects of both neo-Kantian and empiricist epistemology.

In the preface to the first edition of the *Aufbau*, Carnap indicates that construction theory is motivated to address questions of epistemic justification by means of reductionistic methodology:

We are here concerned, in the main, with questions of epistemology, that is with questions of the reduction of cognitions to one another. The fruitfulness of the new method is shown by the fact that the answer to the question of reduction can be provided through a uniform reductional system of the concepts which occur in science. This system is much like a genealogy; it requires only a few root concepts. . . . This requirement for justification and conclusive foundation of each thesis will eliminate all speculative and poetic work from philosophy. As soon as we began to take seriously the requirement of scientific strictness, the necessary result was that all of metaphysics was banished from philosophy, since its theses cannot be rationally justified. (xvi–xvii)

Now, if construction theory is a method of epistemic justification, then how does Carnap's project facilitate this end? A succinct answer can be found in the opening lines of *Pseudoproblems in Philosophy* (hereafter, *Pseudoproblems*), Carnap's ([1928] 1967b) non-technical article published in the same year as the *Aufbau*:

The aim of epistemology is the formulation of a method for the justification of cognitions. Epistemology must specify how an ostensible piece of knowledge can be justified, that is, how it can be shown that it is authentic knowledge. *Such a justification, however, is not absolute but relative; the content of a certain cognition is justified by relating it to the contents of other cognitions which are presumed to be valid.* Hence, one content is “reduced” to another, or “epistemologically analyzed.” (305, emphasis added)

This passage, I think, encapsulates the nature of Carnap's method of construction theory in the *Aufbau*.¹⁰ Consider an *Aufbau*-style rational recon-

10. As a qualifying note, *Pseudoproblems* was completed by Carnap in 1927, the end of Carnap's first year in Vienna and roughly two years after the *Aufbau* was completed. As

struction. Construction theory *exhibits* how the meaning of concepts at higher levels are related to the meaning of concepts at lower levels. In clarifying the inferential and non-inferential (or more accurately, 'presumed to be valid') parts of knowledge and showing how they are related, a constructional system addresses questions of justification by specifying clearly on *what* basis knowledge is inferred. This sort of formal clarification amounts to a 'rational justification' of concepts insofar as it provides a demonstration of how such concepts can be intersubjectively understood. Carnap's understanding of justification as being relative to a basis of 'presumed validity' is strictly opposed to the ideal of attaining absolute justification—his counter-suggestion is that justification can only be secured relative to the choice of a constructional system.

To some extent, the general notion of justification sketched above can be assimilated within the revisionist view of construction theory. What is suggested by the revisionist view is that insofar as Carnap's project addresses questions of justification, it falls squarely in the neo-Kantian tradition (see Friedman 1999, 124–132). In contrast with empiricist epistemology, which takes the justification of beliefs, the refutation of skepticism, and the provision of a certain foundation for knowledge in an empirical basis as its primary problems, neo-Kantian epistemology is engaged in the prior problem of how objective judgements are possible. This neo-Kantian problem is essentially a question concerning what makes judgments capable of being either true or false. From this perspective, questions of epistemic justification *follow* from considerations of how subjective ideas come to acquire objective meaning. According to revisionists, Carnap's answer is conventionalist: objective judgments are possible by means of placing concepts into a global constructional system with a conventionally chosen basis. The significance of rationally reconstructing concepts in this way is that it stipulates objectively meaningful conditions, within that system, for what makes statements about a concept true or false. Carnap writes: "[T]he indication of the nominatum [read, meaning] of the sign of an object, consists in an indication of the truth criteria for those sentences in which the sign of the object can occur" (§ 161).¹¹ In other

such, *Pseudoproblems* reflects a stronger influence of the Vienna discussions and Wittgenstein's ([1922] 1983) *Tractatus* (see the preface of the second edition of the *Aufbau*, x–xi). For the purposes here, I want to highlight the fact that Carnap's discussion of an epistemic method of justification in *Pseudoproblems* (305–315) appears to be a non-technical discussion of the very method of rational reconstruction advanced in the *Aufbau*. In this connection, it is worth noting that Carnap's entry for 'justification' in the index of the *Aufbau* says 'see rational reconstruction' (360).

11. Coffa (1991) translates this sentence as: "[T]o give the meaning of an expression of an object consists in giving the truth criteria of the sentences in which the sign of the object can

words, attaining conceptual objectivity through rational reconstruction results in *definitive answers* to questions posed about concepts within that system. Although I believe that this picture of justification is, at the very least, implicit in the revisionists' account, their failure to sufficiently articulate this particular aspect of construction theory has consequently obscured the extent to which Carnap's method can be located in the empiricist tradition. For Carnap, the ultimate significance of securing the objectivity of concepts is to ensure the empirical testability and answerability of concepts. As such, construction theory is an empiricist method of justification in the sense that it aims to rationally justify concepts by showing how questions posed about them can be empirically answerable.

5. Rational Justification, Science, and Empiricism. In the concluding chapter of the *Aufbau*, under the heading "Aims and Limits of Science," Carnap discusses scientific methodology with reference to the constructional system outlined in his book (§§ 179–183). This discussion elucidates the precise sense in which construction theory serves as an empiricist method of justification. Carnap understands science as a 'system of conceptual knowledge,' and he maintains that its aim is to 'find and order true propositions' (§§ 179–180). This aim can be reached through two interrelated tasks: (1) the introduction of concepts in a constructional system, and (2) the ascertainment of the empirical relations between the concepts of a constructional system (§ 179). Hence, Carnap maintains that science aims to meet two tasks, the first conventional and the second empirical, but both equally important.

Carnap's discussion of science suggests that construction theory functions as a method of justification by relating (or coordinating) the conventional and empirical parts of conceptual knowledge. The first task of science (in a logical rather than temporal sense)—rational reconstruction—demands that scientific knowledge be formulated in an objective constructional system because "to be able to make statements about objects at all, we must be able to construct these objects" (§ 179). The significance of this requirement, for Carnap, is that it raises the very possibility of the second task of science, "the investigation of the non-constructional properties and relations of the objects" (§ 179). In this sense, a constructional system is *constitutive* of scientific knowledge insofar as the reconstruction of concepts in a constructional system

occur" (220). Coffa (1991) argues that the semantic holism that Dummett attributes to Frege makes its first explicit statement in Carnap's *Aufbau* (218–222). For a different perspective on Carnap's holism in the *Aufbau*, see Friedman (1999, 98–100).

yields objectively decidable and answerable empirical judgments and tests about concepts (§ 180).¹² Carnap writes:

From a logical point of view . . . statements which are made about an object become statements in the strictest scientific sense only after the object has been constructed, beginning from the basic objects. For, *only the construction formula of the object*—as a rule of translation of statements about it into statements about the basic objects, namely about relations between elementary experiences—*gives a verifiable meaning to such statements, for verification means testing on the basis of experiences.* (§ 179, emphasis added)

Thus, we can see how construction theory serves as an empiricist method of justification. For Carnap, it is only against the background of an antecedently stipulated constructional system (e.g., one with an autopsychological basis) that objectively meaningful empirical questions about concepts can be raised. Only after such a reconstruction has taken place do the concepts in the system acquire objective meaningfulness in the sense that statements that are made about reconstructed concepts will be subject to empirical testing. In this manner, concepts are rationally justified insofar as reconstruction gives rise to conditions of empirical answerability for statements made about concepts.

The understanding of construction theory as an empiricist method of justification makes sense of Carnap's claim that science 'has no limits,' meaning that 'there is no question in science whose answer is unattainable' (§ 180). Carnap writes:

[I]n principle, every legitimate concept of science has a definite place in the constructional system. . . . Since we are here concerned only with answerability *in principle* . . . assume that we have reached a stage where the concepts which occur in the statement in question have already been placed within the constructional definition. . . . [T]he sentence will have a form in which (outside of logical symbols) it contains only signs for basic relations. . . . Thus, the sentence which was

12. Robert Hudson (1994) stresses the importance of this point in a somewhat different context. In contrast with tradition foundationalist readings, Hudson (1994) defends a foundationalist reading of the *Aufbau* in which Carnap's phenomenal base is not intended to "furnish objects whose representational accuracy is assured" (239). Hudson argues that a minimalist foundationalism ('foundation' understood as 'a basis of objects or states whose presence or absence can be ascertained without recourse to prior judgments about the presence or absence of other sorts of objects or states'), which provides the basis for *verificationism*, is present in the *Aufbau*. Hudson (1994) notes that Friedman and Richardson 'completely ignore' the role of verificationism in the *Aufbau* (239). For a reply to Hudson, see Uebel (1996). For a discussion of the issue of verificationism in the *Aufbau*, see Creath (1982) and Friedman (1999, 89–90, 108–113).

given when the question was posed has now been so transformed that it *expresses a definite (formal and extensional) state of affairs relative to the basic relation* [cf. § 48]. In keeping with the tenets of construction theory, *we presuppose that it is in principle possible to recognize whether or not a given basic relation holds between two given elementary experiences*. Now, the state of affairs in question is composed of nothing but such individual relation extension statements, where the number of elements which are connected through the basic relation, namely, of elementary experiences, is *finite*. *From this it follows that it is in principle possible to ascertain in a finite number of steps whether or not the state of affairs in question obtains and hence that the posed question can in principle be answered.* (§ 180, emphasis added)

For Carnap, science is unlimited in the sense that the truth or falsity of questions posed about reconstructed scientific concepts can (in principle) be decisively addressed by empirical means. As such, reconstructed concepts are ‘rationally justified’ in the sense that questions posed about them are empirically ascertainable.

In construction theory, Carnap’s usage of ‘empirical theorems’ (§ 106), in building constructional systems, ensures the empirical answerability of questions posed about reconstructed concepts. Carnap maintains that there are only two types of theorems that are utilized to build any constructional system: (1) *analytic theorems*, which are deduced exclusively from the constructional definitions, and (2) *empirical theorems*, which specify the relations between constructed concepts that are only ascertainable through experience. Carnap writes: “If an analytic theorem is transformed into a statement about the basic relation(s) of a system, a tautology results; if an empirical theorem is thus transformed, it indicates empirical, formal properties of the basic relation(s)” (§ 106). Hence, empirical theorems have the peculiar status of being both formal and empirical. They are formal insofar as they are purely structural statements, however, they are empirical insofar as they express relations that are only known through experience (Richardson 1998, 66). In the context of Carnap’s ‘analysis of reality,’ “this means that . . . empirical theorems express an empirically ascertained state of affairs” (§ 106). That is, in ‘realistic language,’ the mode of speech of the empirical sciences (§§ 95, 98), these theorems function to determine the empirical truth conditions for questions posed about the concepts of a constructional system (it should be emphasized that these truth conditions refer to an empirical or constructional concept of reality). By building a constructional system with empirical theorems, which serve to set the limits of empirical discernibility with respect to reconstructed concepts (see Hudson 1994, 240–242), Carnap ensures that questions made about these concepts will be empirically ascertainable.

The analysis above suggests that revisionists fail to adequately address the role of empiricism in construction theory. In focusing their analyses to establishing the claim that construction theory aims to secure the objectivity or intersubjectivity of conceptual knowledge, revisionists have failed to sufficiently address the question of why reconstructing concepts in an objective system is important. As suggested here, the significance of intersubjectivity, for Carnap, lies precisely in the fact that questions posed about reconstructed concepts will be empirically ascertainable. Thus, construction theory is a characteristically empiricist method insofar as it recommends that concepts are to be justified by showing their connection with empirical experience (cf. Carnap 1937, 33; Hudson 1994, 239–242; Uebel 1996, 283–289). On this reading, construction theory is a method of justification that requires the relationship between reconstructed concepts and observable experiences to be formally demonstrated (and the clarification of this particular relationship is what ultimately provides the ‘rational justification’ of concepts).

It is important to emphasize that Carnap’s empiricist requirement of answerability is not limited to a constructional system with an autopsychological basis, but applicable to *all constructional systems*. In considering alternative bases for constructional systems (§§ 55–64), Carnap is most optimistic towards a physical basis, citing the advantage that “there is a greater degree of intersubjective agreement” (viii). To see that intersubjectivity is not simply a virtue in itself but a means to empirical answerability, consider the possible physical bases that Carnap proposes, viz., ‘electrons,’ ‘four-dimensional space-time points,’ or ‘world lines’ (§ 62). For Carnap the important feature of each of these intersubjective bases is that: “The perceptible physical things and properties can then easily be constructed from the things and properties of physical science, since they are uniquely determined by them” (§ 62, cf. Carnap 1936a, 463–468; 1937, 9–14). This particular point is clarified by Carnap (1963b) in a reply directed towards Goodman:

While Goodman [1963, 549–552] prefers a phenomenalist system, I [now] prefer a physicalistic one because I regard certain features of the latter as more advantageous. Let me mention . . . the intersubjective character of the physicalistic basic concepts (observers will in general agree about the *observable properties* of things in their environments although their subjective experiences might differ). . . . I also agree with Goodman’s view that every system should . . . deal with the problem of relations which, in a [phenomenalist] system are characterized as *relations between experiences or sense data and perceptible things*. (945, emphasis added)

As this passage makes clear, the importance of intersubjectivity, for Carnap, is that it permits agreement among various observers on the ‘observable properties’ of concepts in the system, i.e., it stipulates empirically answerable truth criteria for statements made about concepts. The fact that all constructional systems are subject to an empiricist constraint of this kind suggests that construction theory can legitimately be characterized as an empiricist method of justification.

6. The Nature of Justification in the *Aufbau*. Although I have argued that construction theory can be characterized as an ‘empiricist’ method of justification, this should not underscore the fact that Carnap takes himself to be redefining ‘empirical justification’ as a purely formal notion. The justification of concepts, for Carnap, is achieved by exhibiting, in the language of logic, both the epistemological basis and the truth conditions for objective judgments about concepts. This exhibition or logical analysis of meaningfulness amounts to showing how the logical relations between a concept and other concepts at different levels relate to the empirical answerability of such concepts. As such, construction theory is a method that redefines ‘empirical justification’ as a formal-logical relation obtaining between groups of statements (cf. Uebel 1992). In addition to providing Carnap with the formal means to frame scientific concepts objectively within particular constructional systems (thereby providing a rational justification for them) logic also plays a prominent meta-philosophical role in the *Aufbau*. In this latter role, logic provides Carnap with the means to recast all of traditional epistemology that is infected with metaphysical assumptions (Richardson 1998, chap. 8).

Logic grounds Carnap’s metaphysical-neutrality in the *Aufbau* with a purely structural language applicable to all aspects of epistemology, limiting discourse to formal definitions that neither require nor permit any ‘deeper interpretation.’ For Carnap, construction theory represents the metaphysically-neutral standpoint that can capture the core agreement of *all* epistemological schools. Carnap presents this common point of agreement as follows:

[U]ltimately, all knowledge goes back to my experiences, which are related to one another, connected, and synthesized . . . *this is the theory of knowledge in its entirety . . . the so-called epistemological schools of realism, idealism, and phenomenalism agree within the field of epistemology. Construction theory represents the neutral foundation which they have in common. They diverge only in the field of metaphysics . . . only because of a transgression of their proper boundaries.* (§ 178, emphasis in original)

By reconstructing this picture of knowledge into purely logical terms, Carnap takes himself to be withdrawing from the fruitless debates that occur at the level of metaphysics. On this understanding, logic provides Carnap with the *a priori* tools necessary to replace metaphysically based epistemologies with a formal-logical discipline (Friedman 1999, 94; Richardson 1998, 26–28).¹³ As expressed in Carnap's intellectual autobiography, Russell's (1914) conception of 'the logical-analytic method of philosophy' is the main inspiration driving the centrality of logic in the *Aufbau* (see Carnap 1963a, 13–20). The most explicit endorsement of this meta-philosophical role for logic is stated poignantly by Carnap ([1928] 1967b) in *Pseudo-problems*:¹⁴

It has been frequently emphasized that the epistemological quest for the justification or reduction of a cognition to others must be differentiated from the psychological question concerning the origin of a cognition. But this is only a negative determination. For those who are not satisfied with the expressions "given", "reducible", "fundamental", or those who want to eschew using these concepts in their philosophy, the *aim of epistemology has not been formulated at all. In the following investigations we propose to give a precise formulation of this aim.* It will turn out that we can formulate the purpose of epistemological analysis [i.e., the formulation of a method of justification] without having to use these expressions of traditional philosophy. *We only have to go back to the concept of implication* (as it is expressed in if—then—sentences). This is a fundamental concept of logic which cannot be criticized or even avoided by anyone. . . . (306, emphasis added)

This passage indicates the centrality of logic in Carnap's conception of epistemology. Logic plays a fundamental role not only in driving Carnap's metaphysical-neutrality, but in clarifying the very aims of philosophy. In the *Aufbau*, logic grounds the whole of project of epistemology by recasting the principles of epistemology in logical terms (Richardson 1998, 191–196).

13. This agenda is executed decisively when Carnap (1936b) rejects epistemological questions altogether in favor of a 'logic of science' (see Richardson 1998, 207–208). In this article ("From Epistemology to Logic of Science"), Carnap (1936b) draws a sharp distinction in epistemology between a psychological and logical part and proposes that the former be left for empirical psychologists, while the latter be the business of scientific philosophers. It is worth noting here that Carnap is not just rejecting metaphysically based epistemologies, but also the very epistemological project of construction theory.

14. Although Richardson (1998) has emphasized the importance of this passage in demonstrating the primacy of logic in the *Aufbau* (26–28, 191–196), he does not acknowledge that the passage occurs in the context of Carnap's discussion of 'justification' as the 'aim of epistemology.'

In the *Aufbau*, ‘justification’ consists of a logical analysis of conceptual knowledge. To justify a concept is to reconstruct it as a constructional definition located within an ordered constructional system in which concepts are reducible to a basis (e.g., a sense-data or physical basis) that is presumed to be valid. Rational reconstruction serves as a method of justification insofar as it shows clearly on *what* basis conceptual knowledge is presumed to be objectively and empirically meaningful. Unlike traditional empiricist notions of justification (in the tradition of Locke, Hume, and Russell) that aim to justify our knowledge of an ‘external world’ in an empirical foundation of certainty, Carnap’s notion of justification aims to rationally justify conceptual knowledge by showing how conceptual knowledge *can* be objectively meaningful.¹⁵ Objective meaningfulness, moreover, gains its significance only insofar as it clarifies the empirical basis of concepts. As Carnap stresses repeatedly, the object of reality to be reconstructed in construction theory is a ‘constructional’ or ‘empirical’ concept of reality (§§170–178). As such, Carnap’s method rejects traditional *absolute* notions of justification in favor of a more deflationary notion that is explicitly conceived as being *relative* to the choice of a constructional system. Thomas Uebel (1996) characterizes Carnap’s strategy nicely: “The claim to scientific knowledge is not justified from without, rather, it is being shown what justification is in science and how objectivity best be thought of from *within* science” (396, emphasis in original).

The notion of justification that I have argued Carnap is forwarding in the *Aufbau* anticipates ideas that are crystallized in Carnap’s mature ‘philosophy of linguistic frameworks’ culminating in his classic paper “Empiricism, Semantics, and Ontology” ([1950] 1956). Carnap’s distinction in this work, between ‘internal’ and ‘external’ questions, gives rise to a related distinction between ‘theoretical’ and ‘pragmatic’ justification. In my view, Carnap clarifies, in this later work, the status of questions regarding the choice of a basis for a constructional system as external

15. With respect to the troublesome passages in Carnap’s (1963a) autobiography where he retrospectively describes his project in the *Aufbau* as an attempt to reduce all knowledge to a ‘basis of *certainty*’ (50, 57), I would suggest the following interpretation (cf. Friedman 1999, 145–152). Like the revisionists, I do not think that Carnap’s remarks in his autobiography—that appear to simultaneously vindicate the received view of the *Aufbau* and vitiate the revisionist view—can be taken at face value. In particular, I believe that Carnap’s unqualified usage of ‘certainty’ is misplaced and it obscures the conventionalist aspects of construction theory. In accordance with the interpretation defended in this paper, I would suggest that Carnap’s reference to a basis that is ‘certain’ stands for something more qualified like a basis that is ‘presumed to be valid’ or ‘unproblematic with respect to empirical judgments.’ As such, Carnap’s reference to a ‘certain basis’ would be understood as a ‘certain basis for *empirical discrimination*.’

questions (i.e., questions that are not meaningfully answerable as true or false) that only admit pragmatic justification. By contrast, questions regarding concepts that are reconstructed within a constructional system are internal questions (i.e., questions that are meaningfully answerable given the rules of an agreed upon constructional system) that admit theoretical justification. Like the method of justification advanced in the *Aufbau*, all notions of truth or falsity, and hence theoretical justification, of internal assertions are understood by Carnap as being relative to the choice of a constructional system. Moreover, Carnap's conventionalist notion of justification in his later writings also prescribes objective meaningfulness (i.e., intersubjectivity) as the key requirement for theoretical justification.

7. Conclusion. In this paper, I argued that the epistemological project of the *Aufbau*, construction theory, is a method of justification. I articulated this argument with reference to the neo-Kantian interpretation of the epistemology of the *Aufbau* defended by Friedman and Richardson. While I agreed with revisionists in their general claim that construction theory is motivated to secure the intersubjectivity or objectivity of scientific concepts, I argued that this project is couched within a broader goal of providing a method for the 'rational justification' of concepts. I argued that construction theory meets this broader goal in its proffered method for formally reconstructing concepts. By rationally reconstructing concepts into an objective genealogy, reconstructed concepts are rationally justified because their empirical conditions of answerability or decidability are specified. On this understanding, the rational justification of concepts, for Carnap, involves both a conventional and empirical aspect. On the one hand, justification is conventional insofar as any constructional system is the result of a conventional or pragmatic decision regarding the basis of the reconstructed system. On the other hand, justification is empirical because after the basis of a constructional system is chosen, objective empirical conditions of answerability are specified. What this specification of empirical conditions amounts to is the provision of truth conditions for questions posed about concepts within a system. Because the answers to such questions are relative to a chosen basis, Carnap's notion of justification is conceived as being relative to the validity of the chosen basis of a constructional system.

In shifting the focus of analysis of Carnap's project from issues of objectivity to justification, I argued that the nature of Carnap's epistemological project is more accurately characterized as involving both neo-Kantian and empiricist aspects, rather than falling neatly into either tradition. The fact that Carnap's perspective in the *Aufbau* is meant to be reconciliatory, is indicated in the preface to the second edition:

Traditional empiricism rightly emphasized the contribution of the senses, but did not realize the importance and peculiarity of logical and mathematical forms. Rationalism was aware of this importance, but believed that reason could not only provide the form, but could by itself (a priori) produce new content. (vi)

Carnap's characteristic response to this perceived overemphasis on opposing sides is to synthesize both views in the neutrality of logic. If the motivating epistemological insight of construction theory is shifted—from neo-Kantianism, per se—to such a synthesis, then what is correct and obscured by both the received and revisionist views can be stated with clarity. The received view is correct in its supposition that Carnap's project is addressing questions of justification by adopting reductionistic methodology, however, it obscures this project by supposing that the search for justification implies the search for certainty. The revisionist view is correct in its supposition that Carnap's project is addressing questions of objectivity, however, it obscures this project by supposing that the attempt to construct objective meaning has no significant connection with the aim of empirical justification. As urged in this paper, a more comprehensive understanding of construction theory can be gained by focusing attention on the issue of justification. In defending such a reading, my aim was to bring attention to a theme that I believe is already implied by the revisionist interpretation but, in my view, not sufficiently articulated. In elaborating this theme, I hope to have made a contribution—building upon the significant steps that have been already made by revisionists—to a better understanding of the epistemology in Carnap's *Aufbau*.

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