On the Completion and Generalization of Intuitive Space in *Der Raum*: Husserlian and Drieschian Elements

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Sep. 15th, 2006

§II of Carnap's *Der Raum*[1] is both the strangest and, at first sight, the least relevant to Carnap's later thought. The section is about *Anschauungsraum*, usually translated "intuitive space," though a better translation would be "space of intuition": the space in which objects can be given to us in sensible intuition, which is to say, perception.[2] What Carnap says about it seems both difficult and exotic. Nevertheless I will suggest that this section, if correctly understood—in particular, if taken in the context of Carnap's sources—contains the first example of some important patterns which Carnap would return to again and again.

The features I have in mind are easy to miss because they are not announced as the main theme of the section. Its main point is to assign *Anschauungsraum* to the Husserlian faculty of material eidetic insight. Follow-

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[1] *Der Raum: Ein Beitrag zur Wissenschaftslehre*, Kant-Studien Ergänzungshefte, no. 56 (Berlin: Reuther and Reichard, 1922).

[2] It is worth emphasizing, if only because there seems to be some confusion about this in the literature, that the primary meaning of *Anschauung*, for most authors in this period, is ordinary sense perception (including, for some, also related acts such as fantasy and memory). In other words, it does not mean "intuition" in the contemporary philosophical sense (in the *Aufbau*, Carnap uses *Intuition* to mean something like that), nor is it the name of a special faculty for knowledge about essences or about mathematics. Those who take special faculties like that to be forms of *Anschauung* (and/or call them "pure intuition," "intellectual intuition," *Wesenserschauung*, etc.), are thereby claiming that they are analogous to or in some way connected to sense perception. See Husserl, *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie*, 2d ed. (1922; reprint, Tübingen: Max Niemeyer, 1993) (henceforth: *Ideen* I), §3, p. 11: "Auch Wesenserschauung ist eben Anschauung"; echoed by Carnap, *Der Raum*, §II, p. 23: "Im Allgemeinem mag aber der Ausdruck Anschauung auch die Wesenserschauung mit umfassen."

ing Husserl's writings of the *Ideen* period, Carnap identifies that faculty as the source of all synthetic a priori knowledge.[3] In Husserlian terms: it assures us a priori that certain objects within the region of nature will instantiate certain formal structures—structures which are themselves known to us, by way of *formal* eidetic insight, as a part of formal ontology.[4]

But Carnap can't stop there, because he wants to reconcile Husserlian phenomenology with General Relativity—in other words, with an apparently a posteriori *discovery* about the structure of space. To this end, he claims that eidetic insight reveals only the local character of the *Anschauungsraum*: its behavior in (arbitrarily) small regions. This is an ingenious move, insofar as it is based on Husserl's own assertions about how eidetic insight works: that, namely, it always requires a basis in ordinary intuition of matters of fact.[5] Since perception and perceptual imagination are themselves always local, the argument goes, so too is all material eidetic insight on their basis.

But Carnap can't stop here, either, and this brings us to the part of his discussion I want to address. The problem is that mathematical physics makes constant use of the assumption that *some* determinate geometry applies to arbitrarily *large* regions of space, or even, in physical cosmology, to space-time as a whole. If eidetic insight does not justify that assumption, what does? Husserl himself, when he confronted this question in the *Crisis* period, answered that it is indeed unjustifiable. But Carnap does not

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[3] As noted by Sahotra Sarkar ("Husserl's Role in Carnap's *Der Raum*," in Thomas Bonk, ed., *Language, Truth and Knowledge: Contributions to the Philosophy of Rudolf Carnap* [Dordrecht: Kluwer, 2003], 184), both Carnap and Husserl express some reservations about this Kantian terminology. See, respectively, *Ideen* I, Introduction, p. 6; *Der Raum* §V, p. 63. But both are willing to use it, as Husserl says, "in order to let historical parallels be heard [*anklingen*]" (loc. cit.). Carnap does so beginning on the very page just cited, and Husserl, among other places, at *Ideen* I, §16, p. 31 (beginning: "If one wants to preserve the echoes [*Anklänge*] of Kant's critique of reason ...").

[4] This way of putting things is subtly but, I think, importantly different from the formulations of some other interpreters (see, e.g., Michael Friedman, "Carnap and Weyl on the Foundations of Geometry and Relativity Theory," *Erkenntnis* 42 [1995], reprinted in *Reconsidering Logical Positivism* [Cambridge: Cambridge University Press, 1999], 46; Alan Richardson, *Carnap's Construction of the World: The* Aufbau *and the Emergence of Logical Positivism* [Cambridge: Cambridge University Press, 1998], 153). The point is not so much to distinguish a particular instance of a certain formal structure by giving it a particular intuitive character, as to guarantee that a particular concrete structure (which like all such structures has its own intuitive character) will indeed instantiate (be a deformalization of) a certain formal essence.

[5] *Ideen* I, §3, p, 12.

want to take that path. Instead, he attempts to show that our eidetic insight, limited as it is to small regions, nevertheless prescribes a type of global structure to space: a structure general enough to be compatible with both classical physics and General Relativity, yet specific enough to back up the possibility of mathematical physics. He therefore introduces two steps which do not correspond well to anything in Husserl's epistemology: the completion and generalization of the *Anschauungsraum*. And these, I will claim, involve ideas which Carnap was never to repudiate—while at the same time showing the influence both of Driesch and of a different, earlier Husserl.

1 Carnap and Husserl on going beyond the limits of intuition

According to Carnap, the *Anschauungsraum* is "completed" through a step-by-step extension of the features of our limited perceptual space into an unlimited global structure, a *Gesamtgefüge*. This is justified, he says, because "if ... the species of a formation permits a second one of the same species to be added on to it in a determinate manner, we can demand [*fordern*] that this adding-on should be further possible without end" (23). The terms *Gefüge* and *fordern* in this context are Drieschian; I will return to that in the next section. For now it is enough to note that this procedure of "adding on" is supposedly enough to determine a global structure for space—that of a three-dimensional metric space which is everywhere asymptotically Euclidean—without, however, determining further *which* such space it must be. Otherwise put: it supposedly reveals a generic material essence for global space, determining it as the deformalization of a certain formal-ontological structure.[6] This generic material *eidos* is what Carnap calls R'_{3m}.

Here we immediately face two problems. First, it is not easy to see how Carnap's technical construction can work. Indeed, Sahotra Sarkar, writing on this very point, has concluded that the situation is hopeless.[7] Second,

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[6]In contrast, Husserl (*Ideen* I, §13, p. 27) claims that the (specific) material essence of space is a deformalization of "Euclidean manifold" (by which he presumably means: three-dimensional Euclidean manifold). On deformalization and formal generalization see Husserl, loc. cit.; Carnap, *Der Raum*, §IV, pp. 60–61; Michael Friedman, *A Parting of the Ways: Carnap, Cassirer, and Heidegger* (Chicago and La Salle, Illinois: Open Court, 2000), 66–7; Sarkar, "Husserl's Role," 186–7.

[7]For if we add actual small regions of Euclidean space smoothly one to another, we will obviously just get a big Euclidean space, whereas, if we add, so to speak, infinitesimally small regions, then no amount of iteration will ever get us anywhere. See Sarkar, "Husserl's Role," 188.

it now becomes unclear in what sense the *result* of this construction is an *Anschauungsraum*. If material eidetic insight never actually gives the essence of global, unlimited space, how can R'_{3m} count as a material *eidos* at all?[8]

I suspect that the technical problem is not insuperable. Carnap speaks in a rough, pictorial manner, akin to a physicist's talk about, say, adding up cylindrical shells of width dr. It is probably possible to come up with a more rigorous formulation, and likely, moreover, that Carnap himself had some awareness of how to do that.[9] But, even so, the question remains: what led Carnap to express himself in such a confusing way?

The answer, I think, has to do with the second, epistemological problem raised above. By invoking an iterative process of "adding-on," Carnap alludes to a case in which iterative adding-on is literally at issue: namely, the process, basic to Husserl's early views on arithmetic, of adding new members to sensible collectiva. It is difficult to prove that Carnap actually does have that in mind: although the *Philosophie der Arithmetik* is mentioned in the bibliography of *Der Raum*, and is at one point explicitly cited, it clearly has nothing like the presence of *Ideen* I. Still, given Carnap's serious interest in Husserl, it would have been natural for him to consult the earlier book. And what Husserl says there is strikingly relevant. He admits that our actual ability add on members in intuition is extremely limited. This looks like a major problem for the formation of large number concepts, because, as Husserl says, "no concept can be thought without being founded in a concrete intuition."[10] But, he explains, besides authentic, intuitive representations, we can also form "logically equivalent" symbolic ones which serve as "surrogates" for them—even, where the actual object is "inaccessible," as *permanent* surrogates (216).[11] Under certain circumstances, moreover,

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[8]See Sarkar, op. cit., 182; Richardson, *Carnap's Construction*, 156. (However, to the extent that Sarkar and Richardson's worries are about the freely stipulated nature of the *Forderungen*, they will be addressed below in the section on Driesch.)

[9]Since our sensible intuition doesn't include any absolute scale, it could be maintained that eidetic insight only reveals laws which apply arbitrarily well in arbitrarily small regions. The resulting axioms could be then stated in purely local (differential) terms, and the *Forderungen* about adding segments along lines replaced with the demand for an affine connection.

[10]*Philosophie der Arithmetik: Psychologische und logische Untersuchungen* (Halle-Saale: C.E.M. Pfeffer [Robert Stricker], 1891), 84.

[11]Husserl gives, as an example of symbolic representation, the representation of a certain house as the house on such-and-such corner of such-and-such an intersection (216). That two representations are "logically equivalent" means, basically, that they refer to the same

we can form symbolic representations which extend beyond—even *infinitely* beyond—the capabilities of our intuition. This is possible when "a clear principle is given, according to which any concept which has already been formed can be transformed (or can be *symbolically represented* as transformed) into a new one which is sharply distinct from the first," so that "it is a priori determined, through sharp conceptual moments, what this continuously extending set includes or can include, and what it cannot."[12]

Husserl's main interest at this stage is the number series, but he also mentions geometry: one example of something beyond the reach of our intuition is "the light-years of the astronomers" (214), and one example of an infinite set which can be symbolically represented is the set of points on a line (247). So it would be no stretch for Carnap to apply this idea, in his own context, to the quasi-iterative construction of global space. The same idea, moreover, also helps to explain the processes of "generalization" by which he arrives at spaces of higher dimension. This supposedly involves the realization that complete three-dimensional spaces of different kinds can be found together inside a higher-dimensional space, "in the sense in which ... R'_{3m} contains planes, spheres, and the most various other surfaces."[13] Here, too, we have a series of ways of "adding-on" (or adding-up) which has a very limited basis in our authentic spatial intuition, but which then proceeds, symbolically, infinitely far beyond that.

It still remains unclear whether R'_{3m}, let alone some higher-dimensional manifold, is properly called a "space of intuition": after all, no object corresponding to these conceptual structures can ever be given in sense or imagination. Carnap himself seems unsure when he speaks of higher-dimensional formations as given in "a mode of representation related to intuitive grasping which is composed of intuitive and conceptual [elements]" (30). But the comparison to the number series shows that such knowledge, whether "intuitive" or not, might well be a priori—that is, in this case, *synthetic* a priori. That comparison is disturbed only by the claim, crucial to Carnap's project, that in the geometrical case we have a *choice* of what to "demand" in order to complete the structure. If all *Forderungen* are ours to make (Carnap calls them "free-willed positings"), then how can any of them be a priori neces-

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objects (217). In other words, this is something like extensional equivalence. There is obviously some relationship between these ideas and Carnap's treatment of structural descriptions in the *Aufbau*; the remarks at *Der Raum*, §II, p. 22 are an intermediate stage.

[12] *Philosophie der Arithmetik*, 247.

[13] Carnap, *Der Raum*, §II, p. 30.

sary, and how can we tell which are? So we need to understand the ways in a choice of *Forderungen* can or cannot be made in advance of all experience.

2 Carnap and Driesch on *Forderung*, *Ordnung* and *Gefüge*

While Husserl is a philosopher who needs no introduction, the same perhaps cannot be said of Hans Driesch. Today Driesch is mostly remembered, if at all, as a proponent of neo-vitalism. In Germany in the 20's, however, he had some reputation for his work on general issues of logic, metaphysics, and epistemology. Carnap, at least, mentions him prominently, both in *Der Raum* and in the *Aufbau*, and with special attention to his logico-epistemological book, the *Ordnungslehre*.[14] In *Der Raum*, Carnap describes formal geometry not only as a part of Husserlian formal ontology, but also as a "pure *Ordnungslehre*," or as a part of logic "in the sense of *Ordnungslehre*," or "general *Ordnungslehre*."[15] He explains our synthetic a priori knowledge of the *Anschauungsraum* in terms, not only of Husserl's *Wesenserschauung*, but also of Driesch's independence from the "quantum of experience" (22). And he lists Driesch as a source to consult on "the widening of the spatial realm" (81, note to p. 26).[16]

Driesch's system is complicated, but the main features of interest here can be summarized briefly. All philosophy begins with phenomenological reflection upon the stream of experience. Nothing much could be said about this, however, if there it were not for certain "order constituents"[17] in the stream of experience thus revealed. Such an order constituent is a sign of "final conclusiveness" (*Endgültigkeit*) (5). It establishes that what has been experienced has been experienced as such-and-such, and that this "as" *ought* to hold for all further experience, as well (6). The second part of philosophy, *Ordnungslehre*, thus arises as "the theory of final conclusiveness on the grounds of a methodological solipsism" (8).

Because this *Ordnungslehre* is what first establishes or reveals an ought,

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[14] *Ordnungslehre: Ein System des nicht-metaphysischen Teiles der Philosophie, mit besonderer Berücksichtigung der Lehre vom Werden*, 1st ed. (Jena: Diederichs, 1912). This is the edition Carnap cites in *Der Raum*; the *Aufbau* he cites the second, significantly revised edition (1923).

[15] *Der Raum*, §I, p. 8; §IV, p. 60; note to p. 60, p. 85.

[16] The specific citation from Driesch is to the *Ordnungslehre*, p. 109 ff. (the section on space). The other three authors listed there are mathematicians: Killing, Pasch, and Kerry.

[17] *Ordnungslehre*, 6.

Driesch says that its "primordial achievement" (*Urleistung*) is a demand, a *Forderung*, of order (7). Every order constituent presents itself as the fulfillment of this demand (18). Ordering thought thus fulfills its own demands in the act of making them: it cannot be constrained by any order, because it first produces and recognizes order. In this sense, all order is its "free achievement" (34). Nevertheless, according to Driesch, there is a kind of *Forderung* which reflects back on the ordering ego itself, an "ought to posit positings which ought to hold" (6). This is what eventually allows thought to posit objects which make demands on *it*, and about which it can therefore be incorrect. Such objects, which first occur in the realm of natural actuality, are then "as if" independent of the ego (161–2).

The special type of *Forderung* in question is "the self-demand of PARSIMONY OF POSITINGS" (110). Driesch first discusses it at length in his section on space—in other words, in the very section which Carnap explicitly cites—but its full importance becomes clear only in the realm of natural actuality, where thought seeks to achieve its goal of parsimony by establishing a quasi-logical necessity, according to which later experiences are "as if co-posited" with earlier ones (146). This demand can be met, however, only in a certain selected piece, a certain *Ausschnitt*, of experience (132), within which experiences are interpreted as the appearance of naturally actual objects at different points in their process of becoming. Now a "system," or *Gefüge*, for Driesch, is an ordering-type in which each element implies all the others, so that the generic character of the *Gefüge* already predetermines all the different ways it can be instantiated (93, 121).[18] Nature, therefore, from the point of view of *Ordnungslehre*, is just a selection of experiences in which "a particular *Gefüge* of ordering thought-demands is found to be *fulfilled*: a *Gefüge* of demands with respect to BECOMING" (132).

This selection is possible, however, only thanks to more fundamental types of *Gefüge* which occur at earlier stages. Suppose, to take Driesch's example, that I have an experience of seeing three houses. This will only count as a *correct* experience, an actual perception of houses, if it does not

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[18]Driesch indicates several times in the text (pp. 87, 93, 138) and also in the index (344) that *Gefüge* is supposed to be the equivalent of, or replacement for, the term *System*. This is part of his general policy of using German, rather than Greek or Latinate, terms (see p. 10). Cf. Thomas Mormann, "Synthetic Geometry and the *Aufbau*," in Bonk, ed., *Language, Logic, and Truth*, 47. Mormann seems puzzled by Carnap's use of the term *Ordnungsgefüge*: he notes that it is "not a terminus technicus in mathematics," but doesn't suggest any alternative origin.

contradict the unified positing of nature demanded by the principle of parsimony. But the possibility of such contradiction depends on the unified order, not only of time (which is what the demand for parsimony with respect to becoming immediately entails), but also of space.[19] To say that an experience is correct is to say that "HERE and NOW, that is, in these points of the space of nature ... and the time of nature ..., THIS SUCH exists with natural actuality."[20] And the unified structure of space is itself the result of an earlier demand for parsimony, which results in its own *Gefüge*.

Looking back at that earlier stage, we can follow up to the exact point where Carnap and Driesch diverge. According to Driesch, spatiality is a primitive type of being-thus (*Sosein*): a mode of relatedness marked by certain characteristics which themselves "are just there for thought," and can no more be described than, for example, the color green (109). Carnap opens §II of *Der Raum* with the same point, using Driesch's technical term, *Sosein*.[21] Driesch (loc. cit.) goes on to enumerate the primitive "characteristics" in question; he refers the reader to Hilbert (among others) for further details. Carnap offers a more detailed list of axioms, derived from Hilbert, which determine essentially those same characteristics.[22] Beyond these characteristics, according to Driesch, "thought knows" one more thing about spatial experiences: namely, that "SPACE as ONE is the common arena of their existence," so that "segments, planes, and parts of space can be increased by a SO MUCH through adding-on others of the same kind" (loc. cit.). We have already seen Carnap's version of that, and how, in a Husserlian vein, he understands its implications for the range of intuition-based knowledge. Finally, Driesch explains that thought must now make "distinct" use of the *Forderung* of parsimony, because there is here "a genuine choice between several final-conclusivenesses which present themselves as possible to adhere to" (109-10), and goes on to show how only the demand of parsimony requires space as a whole to have a certain type of order, and in particular to satisfy

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[19]The asymmetry between Driesch's treatments of spatial and of temporal order is very marked: the former belongs to pure or general *Ordnungslehre*, while the latter is a feature of the theory of natural actuality (see *Ordnungslehre*, 82, 148). Carnap is aware that such a treatment will not sit well with General Relativity, but he dodges the issue in *Der Raum*: see §III, pp. 40–41, 46.

[20]*Ordnungslehre*, 160.

[21]*Der Raum*, §II, pp. 22, 24, and note that Driesch is cited (among others) in the note to the latter page, p. 80.

[22]*Der Raum*, §II, pp. 24–5.

the parallel postulate (111–16). This, at last, is where Carnap and Driesch part ways.

Not that Carnap departs from Driesch entirely, however. He agrees that the "spatial system" (*Raumgefüge*), while not determined by empirical facts, is indeed determined from an "end-positing" standpoint which invokes the "teleological and methodological principle" of simplicity.[23] But this principle, he explains, involves a *Forderung* for simplicity which "relates to the total presentation of the facts"—a demand for parsimony not in geometrical determinations per se, but only in "the structure which follows on the ground of those determinations" (§III, p. 56).[24] In other words, just as Carnap derives the limits of eidetic insight from Husserl's own principles, he now claims that Driesch ought himself to recognize the overriding importance of thought's goal of order in the realm of nature. The "end and goal" of the construction of intuitive space is the construction of "a contradiction-free *Gefüge*" of physical actuality (§IV, p. 61). The overriding teleological principle of simplicity in natural law therefore reaches back into the earlier stages of *Ordnungslehre* and creates an *ought*: that certain *Forderungen* which *could* be made independently of the "quantum of experience" *ought* not to be; that the structure of space "ought" not to be "freely chosen without regard for [the empirical facts], even though the thinkable possibility of that choice must always be maintained" (§III, pp. 55–6).

Hence whereas Carnap disagrees with Husserl about the extent of material eidetic insight, he disagrees with Driesch about the extent of teleological determinateness in advance of experience. But this is equally much a disagreement about the limits of the synthetic a priori, because all synthetic a priori judgments, according to Driesch, are based on a priori *Forderungen* for co-positing, which make the subject of the judgment co-posit its predicate "simply because they *demand* its ought-to-be-co-positing nature."[25] If the global structure of space ought *not* be chosen in advance of experience, in fact, then one might think that there would be no synthetic a priori knowledge of it at all: just an a posteriori choice between the many possible contradiction-free geometries.[26] But thought demands unity and order.

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[23] *Der Raum*, §III, p. 56.

[24] Note that although *Forderung* can mean "postulate" in a technical sense (as a translation of Euclid's term αἴτημα), Carnap's use of it in contexts like this shows that he has much more than this technical sense in mind.

[25] *Ordnungslehre*, 80; see also 162.

[26] I suspect that some idea like this is behind Sarkar's question as to why we even need

An "unmediated standing against and outside of one another as either-or" of different possible geometries would be "most unsatisfying from the viewpoint of scientific unity."[27] And so there is still room for an a priori demand for order: for a *Gefüge*, namely, from which all the possible choices can be derived. Such a structure must prescribe to its members all and only those properties which make it possible to regard them as consistent extensions of perceptual intuition. Carnap claims to have shown that these do not include any one determinate dimensionality, or any extra-topological structure whatsoever: in particular, that they do not include the demand that any metric be defined.[28] But they do include topological properties deriving from the fact—known with material eidetic certainty—that spatial experience is everywhere locally Euclidean. And these, according to Carnap, are precisely the properties which make it *possible* to supply a space with the full structure of a Riemannian manifold. He concludes that R'_{nt}—in effect, the system of all metrizable topological spaces of any (uniform) dimension—is "the most universal *Gefüge* built out of members with the character of intuition."[29]

Our knowledge of this universal system—our knowledge, that is, that the concrete individual relation-structure, *physical* space, must fall under one of its members—can be called "synthetic a priori." For, on the one hand, physical space is the space in which sensible particulars are encountered, and so material eidetic insight guarantees that it[30] will have the correct *local* properties. And, on the other hand, because the global demand posed by the system R'_{nt} is just the demand for order and unity which is responsible for selecting out a realm of natural actuality in the first place, experiences which fail to conform to it will count not as actual perception but as dream or fantasy or hallucination. Carnap, admittedly, does not explicitly make this last point anywhere in *Der Raum*. But it is found in the very passages of Driesch which he cites, and we know, furthermore, that it was soon to

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a "philosophical geometry" ("Husserl's Role," 187–8).

[27] *Der Raum*, §II, p. 30. Note that this is the "viewpoint" Carnap mentions in the preceding sentence, from which R'_{3m} is not only capable of generalization but requires it. Cf. Sarkar, "Husserl's Role," 183.

[28] Carnap is not crystal clear on this point, but it seems the only way to make sense of his hierarchy: the R_{nm}'s are generic metric spaces with indeterminate metric, whereas the R_{nt}'s are metrizable topological spaces for which no metric structure—not even a generic, indeterminate one—has been supplied.

[29] *Der Raum*, §II, p. 31.

[30] Or some manifold of lower dimension within it (see Carnap's argument in this regard, §V, pp. 66–7).

turn up in the *Aufbau*.[31]

We can thus understand Carnap's claim that R'_{nt} constitutes the sum of all our synthetic a priori knowledge about spatiality, or that in other words it belongs to the "conditions of the possibility of any object of experience whatsoever."[32] Those words from the *First Critique* have been understood in various ways. In *Der Raum* they have the following Husserlio-Drieschian sense: a "condition of possibility of any object of experience" is a property of sensible objects whose necessity can be made a matter of eidetic evidence, once thought makes all those demands which, in advance of all experience, it ought to make.

3   Carnap's later thought

It would be useful to study the continuing interaction between Husserl and Driesch in Carnap's next major work, the *Aufbau*. Here, however, I will instead briefly deliver on my initial promise to show that certain *themes* introduced, under their influence, in *Der Raum*, stayed with Carnap throughout his life.

The main thing to notice is that, because Husserl's eidetic insight is analogous to sense perception, Carnap in *Der Raum* is already a kind of empiricist.[33] Carnap will soon turn against this kind of eidetic data, as well as, in general, against any kind of "pure being-such" which can be experienced but not explicitly described. Even later on, however, he always remains relaxed on the question of what is to count as empirical data. The point is always that there be *something* to which our speech and thought is responsible, against which it can be checked. Eidetic insight, it seems, was rejected because Carnap found it unsuitable to fulfill that role, rather than, say, because of a naturalistic worry that human beings have no causal interactions with essences.

In *Der Raum*, in any case, Carnap still treats eidetic insight as an admissible source of quasi-*empirical* data. And, if "empiricism" is understood in that broad sense, then there are striking similarities between the form it takes here and the forms it takes much later in Carnap's development.

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[31] *Der logische Aufbau der Welt* (Hamburg: Felix Meiner, 1998 [reprint of the 2nd ed.]), §170, pp. 237–8. The same thought is already clearly present in the "Entwurf" of 1924 (document ASP/RC081-05-02), p. 3.

[32] *Der Raum*, §V, p. 67.

[33] As, indeed, Husserl claims to be in the *Ideen*: see §20, p. 38.

There is, first of all, the thought that the realm of scientific knowledge vastly exceeds, and yet continues to be justified by, its empirical basis. In the *Aufbau*, with its strict reductionism and verificationism, this theme is muted, but still present in several ways. First, the empirical statements of the *Aufbau* system can in general only be reduced to statements about the *entire* stream of the subject's experiences. But, as Carnap himself emphasizes, the idea that I might have simultaneous access to all that is a wild fiction[34]—no better than the fiction that I might intuitively grasp a huge collectivity, or the whole of space, or a four-dimensional shape. In that way all such statements go way beyond the actual data that back them up. Secondly, Carnap says in the *Aufbau* that a constitutional system with a different basis—for example, a physical basis—would be equally acceptable, meaning equally as *empirical*, as the methodologically solipsistic system actually adopted there.[35] Carnap does not explain how the concepts in such a system could be tested for empirical validity, but clearly it could not be by reducing them to the given. Finally and most explicitly, Carnap at one point defends the status of pure mathematics as *Erkenntnis* not, as one might expect, on the basis that mathematical language is tautologous, but rather on the basis that there is *some* "relation of dependence," in either direction, between mathematical statements and empirical ones.[36]

All three of these features gain prominence in Carnap's later thought. When Carnap begins to say that universal statements can never be completely verified[37]—meaning, not by any finite amount of data—he is in a way only countenancing a slight (or slightly transfinite) expansion of the idealized empirical subject which the *Aufbau* already requires. And when he says that even particular statements about the physical basis can in general not be reduced to protocol sentences but are instead justified by the fact that protocol sentences can be deduced from *them*,[38] he is in a way just fleshing out a possibility he had already raised in the *Aufbau*. And when, finally, Carnap

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[34]See *Aufbau*, §101, pp. 139–41.

[35]The possibility of a system with physical basis is discussed in §59, pp. 80–81. That constitutional systems with other bases draw the same boundary between empirical and metaphysical is asserted (without proof) at §176, p. 247.

[36]Namely, because a mathematical statement can stand in contradiction to empirical facts. See §181, pp. 257–8.

[37]First in "Die physikalische Sprache als Universalsprache der Wissenschaft," *Erkenntnis* 2 (1932):440 and then, at greater length, in "Testability and Meaning," *Philosophy of Science* 3 (1936):425–7.

[38]Also first in the "Physikalische Sprache," loc. cit.

says that the theoretical language is connected to the observation language at only a few points,[39] he simply gives to the whole of physical science the status that pure mathematics has in the *Aufbau*.

What, however, justifies science in using these huge extra-empirical structures? What, in other words, marks science off from metaphysics—which Carnap never gave up on attacking for its lack of empirical content? The answer is, first of all, that these structures are *freely* constructed in a region where the empirical basis does not compel us to go one way or another. From *Der Raum* and the conventionalist papers which followed it, through the *Aufbau*, down to Carnap's late writings, he always emphasizes that. But he also always emphasizes, as he does in *Der Raum*, and as Driesch does in the *Ordnungslehre*, that "freedom" in this context doesn't mean the freedom of indifference. A free choice is not a choice that is arbitrary (*willkürlich*), but rather one in accordance with practical principles (*Grundsätze*).[40] First and foremost among such principles is the principle of "scientific parsimony" (ibid.), which in *Der Raum*, as in the *Ordnungslehre*, is mostly manifested in the demand for a simple and unified causal connection of events. That, once again, remains an important focus for Carnap through the conventionalist papers, the *Aufbau*, and beyond. But a further or deeper consequence of the principle of parsimony is the demand for the "unity of science": recall that the generalization of space is said, in *Der Raum*, to be required "from the viewpoint of scientific unity" (30). This demand, which means roughly that the whole conceptual apparatus of science should form a single system with its roots in a relatively limited basis, is also one that Carnap would never drop.

Carnap and Driesch's use of the Kantian term "principle," in a context where the issue is the nature of freedom, suggests, furthermore, that the *supreme* practical principles ought to be ethical in nature. In the *Ordnungslehre*, the penultimate stage (before psychology, which is really a transition to metaphysics) concerns the ethical and religious as order-structures which, thought demands, ought to be desired for the totality of the human race and for the world as a whole. Driesch raises, but does not resolve, an issue about what sort of wished-for human "totality" (*Ganzheit*) is correctly demanded

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[39] "The Methodological Character of Theoretical Concepts," in H. Feigl and M. Scriven, eds., *Minnesota Studies in the Philosophy of Science*, vol. 1 (1956), 47. The C rules "connect sentences of L_O with certain sentences of L_T, for instance, by making a derivation in the one or the other direction possible."

[40] *Der Raum*, §III, p. 36.

here: whether an order in which all humans are ultimately interchangeable, or one in which each individual must find his or her special role.[41] This tension between a utilitarian ethics, on the one hand, in which individuality is sacrificed to the whole, and an individualistic ethics of self-expression, on the other, is more or less identical to the dichotomy presented by Carnap's advisor, Bruno Bauch, in the first two sections of his own essay on ethics[42]—a work which Driesch, for his part, recommends.[43] It is probably significant, therefore, that Carnap, in the Preface to the *Aufbau*, addresses that very dilema, and claims—or, to speak more cautiously, expresses the faith—that the new attitude, the *neue Sachlichkeit*, of which scientific philosophy is a limited but essential part, will resolve it. But I will leave further consideration of this last point for some other occasion.

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[41] *Ordnungslehre*, 275–6.

[42] "Ethik," in W. Windelband, ed., *Die Philosophie im Beginn des zwangzigsten Jahrhunderts: Festschrift für Kuno Fischer*, vol. 1 (Heidelberg: Carl Winter, 1904), 54–103. Bauch's essay is divided into three sections: the first on utilitarianism, the second on Nietzschean "amoral individualism," and the third on "critical ethics."

[43] *Ordnungslehre*, 262 n. 1. Evidently, however, neither Driesch nor Carnap found Bauch's resolution of the tension in his third section satisfactory.