

RUDOLF CARNAP: THE ACTUALITY OF PROGRAMS IN *AUFBAU*

IOAN BIRIȘ*

Abstract. The transformation of the relations between reflection and reality and between concepts and their correspondent objects into themes represents even in the present a field for most heated discussions. The joining of the conceptual schemes correspondent to the intellect and the reality represents a problem which is still to be solved. A solution to this problem was proposed by R. Carnap in his extremely ambitious project from *Der logische Aufbau der Welt* (1928). Overlooked for a long time, this work has returned to the philosophical spotlight in recent years¹, because philosophers finally realized that Carnap's project comprises almost all the major stakes of contemporary epistemology, such as the relation between theory and reality, between concepts and experience, the major lines of a phenomenology and of a "logic of experience" or the status of language and of the concepts of science. Situated at the confluence of some philosophical traditions such as neo-kantian philosophy, the logical analysis of Russell and Wittgenstein, but also the phenomenology, Carnap's program in *Aufbau* starts from some premises such: the need to control experience(= major stake of any scientific knowledge); the orientation towards the *form* of the modern concept of scientific knowledge (under Kant's direct influence); the assertion of a concept of knowledge mostly relational or structural (issue resulted in the orientation towards form of modern knowledge); the need for a methodology engaged in a constructive way and modelled by mathematical thinking; our reporting to the instance of sensitivity in the formation of experience (under the E. Mach's influence).

One can't understand Carnap's project in *Aufbau*² without taking into account the context of the "new logic" of the twenties from the last century, that is of the means in which the concepts of scientific reflection are approached, on the one hand, and on the other hand if one neglects the ways in which one can control the sensitive data of experience. These are the two instances without which one cannot grasp Carnap's approach. "From the analysis of the scientific concepts – writes Carnap – one has concluded that, all the concepts belonging either to the fields of natural sciences, or to psychology and social sciences according to a common classification, lead to a common basis: they are reduced to initial concepts

* West University of Timișoara.

¹ Numerous works and studies have lately contributed to the re-examination of Carnap's work and to the process of becoming aware of the novelty of his program, out of which one must necessarily mention: W.V.O. Quine, *From Stimulus to Science*, Harvard University Press, Cambridge/Massachusetts, London/England, 1995; Friedrich Stadler, *Studien zur Wiener Kreis*, Suhrkamp Verlag, Frankfurt am Main, 1997; Alan W. Richardson, *Carnap's Construction of the World. The Aufbau and the Emergence of Logical Empiricism*, Cambridge University Press, Cambridge/NewYork, 1998; Michael Friedman, *Reconsidering Logical Positivism*, Cambridge University Press, 1999; Sandra Laugier (ed.), *Carnap et la construction logique du monde*, Vrin, Paris, 2001.

² Rudolf Carnap, *Der logische Aufbau der Welt*, Meiner Verlag, Hamburg, 1998.

(*Wurzelbegriffe*), which are reported to the <data>, or immediate contents of living”³. Only through this “reduction” towards “data” one can aim at a uniform science (*Einheitswissenschaft*). First of all the psychic concepts can be “reduced” to their “data” because these ones refer to the psychic phenomena of the subject who possesses the knowledge. Starting from the psychic concepts one can make the concepts which are outside the psyche and from here on one reaches the scaffolding of all other social-scientific concepts. “In this way a genealogy tree of concepts results (system of constitution) in which each concept of science must have its own place, in conformity with its deduction from other concepts, and in the end from the given data. (*Gegebene*)”⁴.

It is clear that for Carnap the role of logic is essential in view of a uniform science achievement and of a rational and coherent explanation of reality. Having this in mind while he edited his work *Aufbau*, that is before 1928, he followed the very convincing example of *Principia Mathematica* (by Russell and Whitehead). One can notice that in his project Carnap had at least two reasons⁵ to follow “the new logic”: 1) constituted as a discipline (after the model from *Principia Mathematica*), the logic offered an eloquent example of the achievement of a rational reconstruction for the mathematics subject; 2) in the form of an analytical instrument, logic could be used not only for the mathematics subject but it also allowed an extension to all scientific knowledge. In this respect Carnap was convinced in that period that “it is even more clear in the present that the theory of knowledge, which isn’t in its essence anything but applied logic, can’t be deprived of logistics just like physics can’t deprive itself of mathematics”⁶.

But what kind of logic are we talking about? In *Aufbau* Carnap is rather skimpy with the explicit definitions related to this subject. It is clear that he has in mind as a pattern the reference work *Principia Mathematica*, work in which he admired especially the method of rational reconstruction of mathematics. But one must not forget other influences also, such as those from *Tractatus of Wittgenstein*, from the conventionalism of Poincaré of the philosophy of science or that of the neo-kant philosophy. On the other hand, without having the intention of continuing the discussions in this direction, there is a certain originality of his thinking and of his approach, since he is not a mere imitator. The new logic of which Carnap is talking is that logic developed by the mathematicians in the last decades before the edition of *Aufbau*. At least this is what he remembers in the preface of the work. It sprung from the need to overcome the crisis of the foundations of mathematics,

³ Rudolf Carnap, *Vechea și noua logică*, (editions and translation in Romanian by Alexandru Boboc), Editura Paideia, București, 2001, p. 32.

⁴ *Ibidem*.

⁵ Pierre Wagner, Le contexte logique de l’*Aufbau*. Russell et Carnap, in vol. Sandra Laugier (ed.), *Carnap et la construction logique du monde*, Vrin, Paris, 2001, p. 17.

⁶ Rudolf Carnap, *Vechea și noua logică*, p. 21.

crisis to which traditional logic could no longer face. The new logic allowed not only to overcome this crisis which is a result on the negative side but it also represents a step on the positive side, a new starting point for an overall change of philosophy itself. In other words, the new logic wasn't just a mere pattern for Carnap, but in the same time an important instrument for the radical renewal of epistemology and philosophy in general.

Of course, Carnap was not the only excited by the potential of the scientific and philosophical conceptual thinking renewal offered by the new logic. In 1914 Russell published *Our Knowledge of the External World*⁷, and a long time before it in *Begriffsschrift* (1879), Frege conceived the first formal system which questioned the procedure of the traditional logic to consider judgement simply an act in which a predicate was assigned to a subject. Frege proposed the analysis of judgement from the perspective of the notions of function and of object and he introduces the universal and existential quantifiers, imposes the distinction between meaning and meant the theory of propositional functions etc. Carnap will particularly appreciate Frege's contribution in the quantification field for what he calls "the new logic", and some years later (in fact two years after *Aufbau*' publication), in the study *Die alte und die neue Logik* (published in the first number of *Erkenntnis*, 1930–1931), the Vienna philosopher is excited by the symbolical method of the "new logic" which assures the calculating of the sentences, of the functions, which guarantees the rigor of the conclusion, that is it doesn't allow anymore the intrusion of some unnoticed premises, as it often happens in the deductions achieved in the language of the words. If symbolism is connected more to the form of the presentation, Carnap tells us that "the new logic" is also imposed through a large development of the field of logic, the new domains and most important being considered the logic of relations and the theory of the propositional functions. In the traditional logic one finds a unique form of the propositions (judgements) that is the predicative form. When one says "Socrate is a man" we attach a predicate-concept (man) to a subject-concept (Socrate). In exchange, in the case of the relation propositions (for example "*a* is bigger than *b*") "a relation is added to two or more objects (if we want: to many concepts of subject)."⁸

The relation sentences – emphasizes Carnap – are obligatorily necessary to mathematics, but not only to it. The "extralogic" fields need in the same degree the new logic of relations because the past limitation only to predication sentences has lead many times to fatal errors. Following Russell's demonstration, Carnap accepts the fact that for instance the notion "absolute space" is the result of a logic error, not necessarily of a physical science error. The constraint of the traditional logic to form a statement only in a predicative form implies the definition of the space only

⁷ Bertrand Russell, *Our Knowledge of the External World*, Open Court, London/Chicago, 1914.

⁸ Rudolf Carnap, *Vechea și noua logică*, p. 22.

as “the place” of an object. Leibniz – which noticed the importance and possibility of the relation sentences – succeeded to understand in a proper way the notion of space as a “relative space”. That is “the place” of a body is not the thing which expresses in a proper way the notion of space but the “relation” of that body with other bodies. It is that “relation” that represents “the elementary fact” for defining space and not “the place” attributed through a predication judgement. From the moment one accepts the new logic as the most adequate instrument for rational reconstruction of the world (not only of mathematics) the next extremely important step is that of defining the objects of reality. In 1914 Russell aimed to achieve the dream (in *Our Knowledge of the External World*) of the empiricist epistemologists⁹, that of succeeding to explain the construction of the exterior world from the sensitive impressions, this project being resumed with all seriousness¹⁰ by Carnap in *Aufbau*. Such a project implies, as Quine confesses, besides a very good knowledge of the new logic, a fecund philosophical imagination and also a superior understanding of psychology and of physics and of science in general. In the process of the logical reconstruction, the introduction of any new object implies the resort to definitions, precisely to the definition of the name of the object that is introduced.¹¹ But the model offered by Russell and Whitehead in *Principia Mathematica* did not allow any definition procedure. A constructive approach will be needed, in which just like analysis and synthesis correspond to each other and assume each another, construction and “reversion”¹² presuppose one another. In conclusion Carnap distinguishes three types of definitions: explicit definitions, contextual ones (explicit definitions in a large sense) and implicit definitions. Important problems are raised only by the latter ones because the implicit definition doesn’t aim at a determined object (or a concept) but at a “class”, an undetermined object, or an “inappropriate” concept.¹³

⁹ W.V.O. Quine, *From Stimulus to Science*, p. 10.

¹⁰ In his Intellectual autobiography, Carnap confesses that when he read Russell’ work, *Our Knowledge of the External World*, he had the profound impression that the appeal to continue this project was addressed to him in a direct, personal way and that to search in this spirit was assigned to him as his own task. (See P.A. Schilpp, ed., *The Philosophy of Rudolf Carnap*, Open Court, 1963).

¹¹ Rudolf Carnap, *Der logische Aufbau der Welt*, § 38.

¹² In the specialized literature, especially due to Quine’s reductionist interpretation (starting with *Two Dogmas of Empiricism*), the term used Carnap in German for this intervention is – “*zurückführung*” – was equated to that of “reduction”, which we consider to be an overstatement and it distorts Carnap’s idea. A more appropriate understanding of the spirit of Carnap’s approach would be the using of this term in the meaning of “reversion”, which expresses a “re-direction”, a “re-coming” to the starting point, to the initial state. For example, in conformity with the basis idea in *Aufbau*, according to which all the objects and all the notions can “re-come” to the basis entities (not necessarily reduced to them), an object *a* can be realized starting from objects *b* and *c*, that is the statement about *a* can be “re-directed” through the reversion operation in the statements about *b* and about *c*.

¹³ Rudolf Carnap, *Der logische Aufbau der Welt*, § 15.

What is perhaps more important regarding the definitional process in *Aufbau* is represented by the structural definitions. This step is made by Carnap in order to account for the situation in the empirical sciences, situation for which the pattern in *Principia Mathematica* no longer offered solutions. In order to characterize in a formal way the empirical entities, Carnap admits that an object can be defined by describing the relations which it has with other objects. In this way, Carnap fructifies the new field of logic (= the theory of relations) for the entire field of the empirical knowledge. These structural definitions resemble up to a certain point the implicit ones, used particularly by Hilbert in the domain of axiomatic geometry, but can't be reduced to the latter ones since a defined structural description characterizes but a single object, an empirical one that is an extra-logic one.¹⁴ With this type of structural definitions Carnap's position breaks away a lot from that of Russell's, the Vienna philosopher placing himself in another philosophical perspective. Russell talks about the possibility of a "direct knowledge" of the entities (for instance, the direct knowledge of colors and of taste), while Carnap aims to overcome the subjective aspects of the elementary experiences with the help of the structural descriptions. In his theory of the rational reconstruction, Carnap considers the objects as secondary in relation to the structural relations, here being closer to Wittgenstein in *Tractatus*, for whom the sentence is a description of a state of facts. (4.023). To Wittgenstein the *sentence* had been introduced in *Tractatus* through the term *Bild* (image). "This term can be deceiving because many associate to the expression *image* a photo, a reflection in the mirror, a portrait, an icon. To Wittgenstein the word stands for patterns, for *structural descriptions* of some states of things. He follows in this respect the german physician Heinrich Hertz, who, in his book from 1894 about the principles of mechanics, characterizes the constructions of this theoretical science as images or models of the physical systems."¹⁵

Without any doubt, the problem of the sources used by Carnap in the elaboration of his project in *Aufbau*, but also of the influences which came from different directions is a complex one, and this is not the proper place to be investigated in detail. We have to remember though, that besides the influences from Russell and Frege, from Wittgenstein and other logicians, Carnap's conception can't be understood outside the german philosophical tradition, especially that of Kant and the neo-Kant philosophy, but also the german scientific tradition in the physics domain where the works of Helmholtz, Boltzmann, Hertz ori Mach imposed themselves. Even though their influence was not necessarily direct as C. Moulines emphasizes¹⁶ at a certain moment but through other names

¹⁴ *Ibidem*.

¹⁵ Mircea Flonta, *Gânditorul singuratic. Critica și practica filosofiei la Ludwig Wittgenstein*, Editura Humanitas, București, 2008, p. 129.

¹⁶ C. Ulises Moulines, La (re)construction formelle de l'expérience. Carnap et Nicod, in vol. Sandra Laugier (ed.), *Carnap et la construction logique du monde*, p. 44.

such as Dingler, Driesch, Jacobi, Ziehen and others, cited in *Aufbau*, it is nevertheless true that their ideas can be felt in Carnap's construction. Hertz's idea that in the end the system of mechanics is composed of "images" structured in a deductive way, that these images are patterns of our representations about the real things, was almost a "common good" among the German scientists and among the philosophers interested in the theory of science. In the same direction was Boltzmann's advice to consider the concepts and statements of physics as "mental images", patterns which describe the facts known through experience. In what Hertz is concerned, who becomes the most influential physicist in this direction, in his work *Die Prinzipien der Mechanik in neuem Zusammenhange dargestellt* (1894), he starts from the methodological requirement of deriving the future from the past, brings to our attention the fact that we form the different internal images or symbols about the external objects, images which can be developed by means of other past images, considered as patterns. With the important observation that for the same objects we can have different images, which means that in contemporary terms, there is a "theoretical subdetermination of experience", Hertz prefigures in this way the successive generations of positivists¹⁷ for which, just like for Pierre Duhem, for instance, truth must not be searched in singular sentences, but in much larger or more restricted systems of representations. But what status do these "images" have, these patterns about real things? In Hertz's view they need to answer to three requests¹⁸: a) the logical request, that is the request that these images be allowed (*zulässig*), that they don't contradict the principles of logic; b) the empirical request, that is the condition that the images be appropriate (*richtig*), that they are in concordance with reality, with the relations in reality; c) the pragmatic request, that is the request that the images be adequate (*zweckmässig*), as simple as possible, that they don't contain as far as it's possible empty or not necessary relations. If the first request can be established unequivocally by the formal observation of the means in which an image breaks or not the principles of logic, and the second one can be established also unequivocally by means of experience, the third request puts us in a delicate position, because establishing the situation of adequacy of an image doesn't represent in general a process of unequivocal decision, but different opinions of the researchers and only a gradual control of more images on the time axis can offer us the more adequate image.

In order to obtain the more or less complete picture of the context in which Carnap's projects are stated in *Aufbau* one must not also forget the Vienna philosopher's admiration for the Gestaltist philosophy. The *Gestalt* psychology has its originality, as J. Piaget notices at a certain moment, in the fact that it questions the existence of sensations as prior psychological elements, considering that what is

¹⁷ Giovanni Boniolo, Maria Luisa Dalla Chiara *et al.*, *Filosofia della scienza*, Raffaello Cortina Editore, Milano, 2002, p. 70.

¹⁸ Mircea Flonta, *op. cit.*, p. 159.

given initially is a configuration, a whole which is to be explained¹⁹. When we see a tree, for instance we don't perceive firstly its leaves or its branches, we perceive the tree as a "form", as a "structure". But the *Gestalt* notion – bring to our notice Wolfgang Koehler – can have two meanings in German: form, as attribute to things, and form as objective and independent entity. That is why Gestaltism developed in two directions. One, which, under the influence of phenomenology considers that form is constitutive to the structural activity of the perceptive conscience, and the other one which accepts the form as being exterior to the subject, that is it is composed only of environment variables. (Skinner's interpretation, etc.).

In that period of time, Carnap will follow the first direction which was in consonance with E Mach's influence. One must not forget the fact that Rudolf Carnap was well aware of the crisis of physics foundations of the first decades of the XXth century. This crisis brought in the spotlight a conceptual challenge from theoretical physics and reclaimed conceptual and methodological renewals. In this way, Carnap will find himself among those who, like Mach, hoped that a physiologist or psychophysicist epistemology will be more capable to assure more solid foundations to scientific knowledge²⁰. Mach, in his *Analyse der Empfindungen* (1886), had already tried such a project of substantiation of science in general, and of physics in particular, on the more profound and solid (considered by some) basis of biology that is on the analysis of sensations. Mach's project was also appreciated in that period by the father of phenomenology, Husserl, who wrote at the beginning of the XXth century in the following way: "many of the most fecund methods characteristic for the most advanced sciences can be brought to a grateful understanding only by relating them to our psychic features. Mach expresses himself admirably in this respect..."²¹. The basis idea of such an approach was that the starting point in the scaffolding of the scientific knowledge must be represented by a pattern of the phenomenal world of sensations, pattern from which one can build the passing towards the macroscopic physical objects situated in space and time.

At this moment we have, though merely sketched, the main backgrounds of the scientific-intellectual context in which Carnap shapes his project from *Aufbau*. And it isn't just about a simple project, but a "super-program", as Moulines also states, because Carnap's work contains in fact more partial programs: the program for using "the new logic" in view of its transformation into an efficient instrument not only in the field of mathematics, but for the entire field of scientific knowledge; the program to build a new theory of knowledge based on the physiology

¹⁹ Ioan Biriş, *Totalitate, sistem, holon*, ediția a doua, Editura Universității de Vest, Timișoara, 2007, p. 40–42.

²⁰ See also C. Ulises Moulines, *op. cit.*, p. 45.

²¹ Edmund Husserl, *Cecetări logice*, vol. I (Romanian translation by Bogdan Olaru), Editura Humanitas, București, 2007, p. 279–280.

of senses and the psychology of perception, that what is known today as under the name “naturalized epistemology” (especially under Quine’s influence), but the roots of such a project can be detected in Helmholtz; the program to math the experience, that is to make a mathematical pattern of the sensory experience which represents a passage towards physics.

With such an ambitious “super-program” it is no wonder that, retrospectively, in his intellectual autobiography, even Carnap saw the human subject in *Aufbau* as a sort of Turing machine which builds the world by manipulating symbols, and the contemporary exegesis remarks with a certain surprise that the newest themes in the philosophy of the mind – like the problems of Self, of the dualism and of the intentionality – had already been approached in a algenius way a long time ago before the Vienna philosopher’s work had appeared.

Let us see how the objective formulated by Carnap at the beginning of his work can be attained in *Aufbau*, that is to build a logic system of the concepts of science, a pyramidal system which resembles a storied building. Russel’s influence from the theory of types inspires Carnap to conceive the passing from the lower level to the superior ones trough a transitivity operation since all the superior levels are built starting from the basis level. In Moulines’ opinion it isn’t about a practical application of Russell’s theory, but about a construction belonging to the theory of assemblies of Bourbaki: that is one passes from store n to store $n+1$ by composing assemblies from subassemblies of entities from n , where certain relations establish. By using the acquisitions of the “new logic” Carnap thinks that one can reconstruct succesively the objects from the basis level of sensitivity, the auto-psychological objects, then the physical ones resulted from the formal-logic combination of the sensitive data, in order to move on to hetero-psychological construction from the intersubjective level and in the end to attain the cultural objects.

The starting point in building the logical system of the science concepts is represented by the elementary sensitive experiences (*Elementarerlebnisse*), which represent for the system the originary elements (*Urelemente*), but these are “elements” in a gestaltist meaning, that is structures, forms with a holist character . Seen in this way, for Carnap the elementary experiences are not subjective feelings which cannot be communicated, they are not psychological elements felt with a unique quality, instead they are overalls, configurations of “entities” of “points” of the sensitive and the relations between them. One emphasizes these relations because “the points” of „the points” of the lived experience stay non-analysed. This theory may seem unclear but the gestaltist examples can illuminate us, and in the end Carnap’s idea becomes more intelligible. So, at a certain point, Carnap states that a certain sensitive quality, for example a tone or a color may appear as an “element” or a “quasi-element”²², but what interests us in such an experience is

²² Rudolf Carnap, *op. cit.*, § 76.

the relation, the logic function of qualities. But what relation are we talking about? According to the gestaltist theory, for example, in a color we can find two or more shades of the same color but a certain shade can't be isolated in that configuration only by reporting it to the other shades.

Gestalt only exists through the relations between its components, the relations being in priority in relation with the elements. If the configuration and relations change, the object also changes although the elements remain the same. When one changes the relations between the keynotes of a melody, the melody itself changes; if one modifies the relations between the elements of a painting, the image also modifies etc. Coming up to the above example, that of distinguishing between the shade of a color and other shades from the same color, it is clear that this operation of distinction can take place only through the following two steps: 1) the existence of a relation between shades since only if we base ourselves on them can we relate one shade to the other; 2) discrimination of one shade can be done only by comparing the background with the other shades, background similarity being given by the color to which the shades belong.

That is why Carnap situates the similarity relation at the basis level of the system, at the level "zero" of the construction. It is a diadem relation, interprets Moulines, that is "on the temporal level of the phenomenal reality we are having an asymmetrical relation, the *memory* (the subject or Turing machine can remember in moment t that they had a partially similar experience in moment $t - s$); structurally speaking, we are having a symmetrical relation, a *partially similar* one which part of the sensitive qualities. The diadem relation of the *similarity memory* (*Ähnlichkeitserinnerung*) is in this way, the cornerstone of the entire construction. By taking over this relation, Quine will describe it in the following terms: "Carnap's basic relation between elementary experiences was *remembering as similar*. I shall call it R . One elementary experience, x , bears R to another, y , if x includes a memory of y as partially resembling x "²³. Quine agrees in his 1995 work, together with other contemporary American philosophers, that Carnap's project in *Aufbau* is again of actuality and that the evolution of science and of epistemology imposes the reconsideration of Vienna philosopher's stakes. Carnap didn't need, emphasizes Quine in his last work, at the end of his life, of supplementary predicates to denote elementary experiences, since an elementary experience can be found in the R relation with any other experience, in the end with everything else. In Quine's terminology, the science stimuli are exactly the elementary experiences in Carnap's language.

In the constructionist theory of *Aufbau*, the objects (or concepts) from each level are "constructed" from the objects (concepts) of the previous level. In this process one has to take into consideration at least the following main aspects: a) the

²³ W.V.O. Quine, *From Stimulus to Science*, p. 10.

characteristics of the basis level, level on which all the upper levels are based b) the determination of the ascent forms through which we rise from one level to the other; c) investigating the way in which one can build different types of objects can be built through repeated applications of the ascending forms; d) the form of a system resulted from such a construction. While the basis level from which one starts, represents extralogic entities, the other levels are logic constructs, respectively *forms* of ascent in the construction, forms of the object and forms of the system. A system built in this way is not one of a classifying type, but a derivational, genealogic one. Starting from the similarity relation, the derivational process emphasizes the partial similarities, the similarity cercles the quality classes, the partial identities, the similarities between the qualities, the sensory classes etc. As Quine emphasizes²⁴, the partial similarities are defining elements for the similarity relation itself, and the similarity cercles are larger classes of elementary experiences in which each experience is partially similar with the other. And a class of qualities is the class in which all the elementary experiences which compose it, express the given quality being more restricted than the similarity cercle. In this way, a class of qualities will always be the common part of the similarity cercles, which it covers in a reasonably diverse experience, each of the five senses of the knowing subject offering the largest classes of qualities.

If one takes into consideration the complex program of Carnap only under a physics aspect, of course it isn't a singular case but it belongs to a series in which it is preceded by Brücke's, Du Bois-Reymond's and Helmholtz's initiative and E. Mach's conception to create *Berliner Physikalische Gesellschaft* (in 1845). The originality of Carnap's construction is given in a great degree by the means of mathing the experience, like it appears in *Aufbau*. As we have already suggested, besides the new logic used on a large scale in the construction of the system, under a mathematical aspect Carnap uses massively the theory assemblies, but he doesn't limit himself to it but he will appeal to the topological patterns. The phenomenal world is built by Carnap starting from the similarity memory, on which the partial similarity is built, then the similarity cercles, the sensitive qualities and the quality classes. In Moulines' opinion, the special form of mathing the experience done by Carnap is "absolutely original" and it "represents probably the most creative and admirable part of *Aufbau*"²⁵. It is about the idea to build a mathematical pattern of the phenomenal world which has to be independent, logically independent from physics and physiology. In a primitive manner, Moulines considers that the idea can be found in Mach also, but also in Poincaré and Russell. The closest to Carnap's ideas seems to be French nationality Nicod (though it seems that Carnap didn't read his works).

²⁴ *Ibidem*, p. 11.

²⁵ C. Ulises Moulines, *op. cit.*, p. 49.

For Poincaré, on a kantian more special philosophical plan, the topology is especially interesting since it has a synthetic character a priori, being a systematization for the form of spacial intuition. The mathematician and thinker Poincaré is interested in a space of sensitive experiences, a “phenomenal” space (independent from the physical space) in which our sensations are placed. Moulines sees in Poincaré’s project the first intention to assign a mathematical structure to the conglomerate of sensations without supposing a physical knowledge. Russell’s attempt, from this perspective doesn’t rise to the level proposed by Poincaré, since the British philosopher isn’t interested in the mathing of experience but instead in the construction of a “bridge” between the sensitive elementary experiences and the physical objects. In exchange, Jean Nicod, a Russell’s disciple, in his work *Géométrie du monde sensible* (1923), though he seems to pose himself the same problem of the “bridge” between the sensitive and the physical, he will go in the direction which will preoccupy Carnap, that of the formal reconstruction of the space of sensitive experiences. Interested by a geometry to be adequate to the phenomenal world of sensitive experiences, Nicod will consider that for such a program the indivisible points of euclidian geometry are not adequate as “prime elements”, but it is necessary to have entities of a special kind, which should not be “infinitely small”, that is a sort of sensory constellation, volumes (Moulines calls them “sensory bubbles”), of topological spaces. Very close to Carnap’s ideas, Nicod establishes three types of relations in the phenomenal space, the purely temporal relations, the qualitative similarity and the local similarity. By Nicod’s project and by the complex construction of Carnap, the sensitive phenomenal world starts to be thought as a geometric univers, the similarity relations allowing to built topological spaces or spacial fields, fields of qualities.

It is interesting that such a project remains catchy only for Central European philosophical thinking, thing which explains in a great degree the trajectory of Carnap’s work, that is its passing to a certain degree of oblivion until the post war period. The return in the post war actuality of the work *Aufbau* is caused in a great degree by Quine and Nelson Goodman. For Quine, Carnap’s work is a very actual one and with viable multiple facets²⁶. For Goodman, Carnap’s project must be criticized in a severe way and in the end removed. The approaches that are intended to exploit the carnapien project and those which intend to reveal its lack of basis, start from the basis element of Carnap’s construction, that is the similarity relation is situated at the basis of the system. On an exaggerated nominalist position, Goodman²⁷ tries to demonstrate that starting from the similarity relation of colours, for instance, in conformity with the construction rules proposed by

²⁶ True, there have been other attempts to exploit the work of Carnap, some particularly interesting as that of C. Ulises Moulines, *La estructura del mundo sensible*, Ariel, Barcelona, 1973. Since it was published in Spanish, it remains virtually unknown.

²⁷ Nelson Goodman, *The Structure of Appearance*, Harvard University Press, 1951.

Carnap, one will arrive at the impossibility to make classes on the abstract principle. Let us suppose that we have in front of us many objects which have one or more colors from an assembly of 3 colors: red (r), yellow (y) and blue (b). Without knowing anything else besides the kinship relation or of “color similarity” that is the possession of a common color (according to Carnap’s gestaltist principle), let us try to establish the classes of colors, that is what it is common (abstract in Goodman’s opinion) from the similarity circles. Let us say that in the case of our objects the red color (r) appears only in the objects which also have the yellow color (y), in the following combinations: 1. yr ; 2. y ; 3. yb ; 4. b ; 5. ybr . Can color classes “red”, “yellow” be encompassed separately, wonders Goodman? The answer is negative since the class for the “red” is included in the class for the “yellow” color, it is part of it (the class for the “red” color” $\{1\ 5\}$ is just a part of the class for the “yellow” color $\{1\ 2\ 3\ 5\}$). Consequently, if no color is common to all the objects in an assembly, we won’t make up a class on the basis of the abstraction principle. In the end, thinks Goodman, consistent to his nominal position, the abstraction problem itself is disputable, since it is difficult to establish under which conditions a quality is or not common to the assembly of people ²⁸.

Without any doubt, Carnap’s conception is not easy to be deciphered, maybe it also has some sterile and in excess elements as Michael Dummett appreciates²⁹, but Goodman’s analysis itself seems to induce some confusions. Can the “abstract” notion equate what is “common”? No, in a strict sense the “abstract” predicate only aims at overlooking or not taking into consideration some features considered irrelevant from a certain perspective. Then one cannot reproach “the abstraction problem” to Carnap³⁰. Then, Goodman’s critics is tributary to his “projective” type conception. While Carnap is preoccupied to offer a system of empirical “reconstruction” of the world of knowledge, so a “genesis” (which can be causal starting from the sensitive stimuli, which interprets Quine in the end), Goodman

²⁸ *Ibidem*, p. 125.

²⁹ Michael Dummett, *Originile filosofiei analitice* (Romanian translation by Ioan Biriş), Editura Dacia, Cluj-Napoca, 2004, p. 236 (interview with Fabrice Pataut).

³⁰ Unfortunately the different meanings assigned to abstraction often let us confused. Even in some philosophical dictionaries there are such mistakes. In our opinion it is right to talk about the abstraction process, case in which we have in mind the selection, retention of a characteristic, of a note and the neglect of the others, and abstraction is the result of this process. That is why abstraction should be made distinct from what is common, that is from “general”, which is obtained following the generalization operation, of extrapolation of a characteristic of a class of objects. One can also express in this way the unity of that class. Also the abstraction must be differentiated from the “universal”, which expresses rather what is repeatable, as a result of the repeat operation. If we understand in a proper way Carnap, to him abstraction has the meaning of selecting something from a multitude, of a color or a color palette, for instance, as Cassirer also thought. His accepting of transitivity, in certain situations is allowed not in the virtue of abstraction as a common element, in general but in the virtue of universality, that is of the repeatability of elements or of making relations at the different levels of the logic construction of the world.

presents rather an alternative to Carnap's project a "projective" type alternative which, of course can be served by the principle of abstraction. In this way, Goodman is talking of course about the induction problem, not about Carnap's construction type. By referring to this problem, Quine emphasizes that at a certain point the attempts to confirm an induction were aggravated by Hempel's paradox: that is the observation of a black raven should constitute a confirmation for the hypothesis that "all ravens are black", on the other hand the observation of an object which is not a raven and consequently it is not black either should be a confirmation for the hypothesis that "an object which is not a raven it is not black". The two hypothesis are logically equivalent, from which the paradoxical conclusion that any object which is white, for instance should be a confirmation for the hypothesis that "all ravens are black".

This paradox signaled by Hempel was exaggerated by Goodman through the perplexity of the example of green emeralds³¹. If one supposes for example that one has noticed until a certain moment that all emeralds are of the green color, it is expected that the next emerald which we will see will be of the green color. Let us imagine that after a certain moment call it t , the noticed emeralds are of the blue color. We can built then a new adjective "greeblue" by the contraction of "green" and "blue" that is the "greeblue" emeralds can contain the green ones which can be noticed until moment t , and the blue ones (which exist) which were examined after moment t . In this way one can expect that the next emerald which will be noticed will be green as well or again greeblue. We find ourselves again in face of a paradox: the next emerald can be green and simulatenously blue since all the emeralds examined have been greeblue. Of course, on the basis of the common experience we are not tempted at all to think that the next emerald will be blue. It is alarmingly difficult, though, to tell why this inference is not legitimate while the conclusion to the green one is. What we can see clearly is that to say that we expect that the future cases be like the past ones means to say nothing³².

How can we explain the fact that we expect that the next emerald be green or greeblue? Goodman's answer is that while the "green" adjective is *projectable* it can be prolonged in the future "the greeblue" adjective is not. Otherwise said, the conclusion projects in the future especially those features which are projectable, better rooted, by neglecting the others. Which is the base on which this operation takes place? Quine wonders if not on the basis of resemblance letting us to understand that Carnap is right and not Goodman, who stresses himself to break the idea of resemblance from the basis of Carnap's construction? Because Quine emphasizes the question of what features are projected can be then very well

³¹ W.V.O. Quine, *Ontological Relativity and Other Essays*, Columbia University Press, New York, 1969, p. 114.

³² W.V.O. Quine, J.S. Ullian, *Țesătura opiniilor* (Romanian translation by Mircea Dumitru), Editura Paralela 45, Pitești, 2007, p. 101–102.

formulated in this way: what thing counts as resemblance?³³ The fact that emeralds have in common the green color counts as resemblance, while the color greeblu isn't in the same situation. It is in fact, thinks Quine about our natural abilities to recognise certain characteristics since our eye for projectability is our eye for resemblance³⁴. The induction procedure, used on a large scale in the scientific and the common knowledge is not something "extremely intellectual", because the other animals do it too. Our eye for resemblance and projectability – continues Quine – is, in its roughest part a part of our animal legacy³⁵. We have a born tendency, concludes Quine to notice features such as green, and on its basis to make successful predictions. The answer to the above questions must be searched in the terms of the natural selection. That is why the teleological explanations towards which Goodman's attempt moves must be subordinated to the casual ones.

We can say in a way Quine develops in his works a naturalized epistemology starting from one of the basis programs in *Aufbau*, that is from Carnap's attempt to overcome the crisis from physics foundations by appealing to the phenomenal world of psycho physiology and biology. Maybe this appeal is not accidental, since, as Graham Priest states³⁶, in the German and English language tradition there are many philosophers who have a solid education in the natural science domain. This is the case for Carnap or Quine. As we've already mentioned, in the period in which he wrote *Aufbau*, Carnap hoped that the solid foundation of scientific knowledge could be looked in the biologic strata of reality, but not in conformity with Mach's model, instead in conformity to the primary relation of *gestalt* type resemblance. Carnap's choice is of a naturalist order, by making a criterion from the information offered by the empirical sciences for the concepts which will be used in the reconstruction process of those sciences, though the approach seems to take place in a circular way.³⁷ The construction system proposed by Carnap can be considered one of a physicalist type, but let's not forget that the psychic objects can be reversed to the category of physical objects, and the physical ones in their place can also be reversed to the category of psychic objects, the problem being one of choice³⁸ and of coding in a language. In conformity with the gestaltist principle, for Carnap there is no isolated sensitive data, since everything that experience offers us is constituted in relational structures (*Beziehungsgefüge*), so the objects must not be thought as a sort of "points", but as "nodes" of complex and structured relations.

³³ *Ibidem*, p. 103.

³⁴ *Ibidem*.

³⁵ *Ibidem*, p. 104.

³⁶ Graham Priest, Quine: Naturalism Unravelling, communication presented at the *Simpozion omagial – 100 de ani de la nașterea lui Quine*, The Faculty of Philosophy, University of Bucharest, 8–9 november 2008.

³⁷ Alan W. Richardson, *op. cit.*, p. 34.

³⁸ Rudolf Carnap, *Aufbau*, § 57 și 64.

In the case when the primary sensitive experiences don't offer us objects, don't present us "things" (because they are *undinglich*), which is then the reality layer from which to start? Carnap tells us that it is the resemblance relation which we should put at the basis of the constructionist system of the scientific knowledge. And Quine, when he analyses the natural genres will appreciate that we don't need to search beneath our similarity sense, because there is nothing more fundamental for thought and language („there is nothing more basic to thought and language than our sense of similarity"³⁹). This thing can be very well noticed when we learn how to use a new word. Such a process – emphasizes Quine – depends on a double similarity: on one hand, the similarity on a temporal line between the present circumstances and the past ones in which that word was used, and on the other hand, the phonetic resemblance between the present uttering and the past utterings of this word. With the indication that the "similarity" and the "genre" notions are variants or adaptations of the same notions, because the similarity can be defined through the term genre: we are saying that two things resemble one another if they are of the same genre. We find the same situation in Carnap, in *Aufbau*, when he presents the genre identity as a membership of two states of things (*Zustände*) to the same thing, that is to their genre. In this way, identity doesn't target simply the object to which language refers, but the genre, species which this object represents⁴⁰.

It is educational in this sense the example given by Carnap in order to make an "object", by emphasizing that the different states of things (as temporal parts, that is "parts" on the temporal line of similarity) precede the operation of building an object as an entity persistent in time. In this case the genre identity reveals to us as a report between the temporal parts of the object and these ones can be the referents of some demonstrative pronouns. From Carnap's example with a tram who is travelling in different temporal moments, one can remember two expressions: a) this rail car is the same which travels until now on line 10 (*die ist derselbe Wagen, der bisher auf der Linie 10 fuhr*); b) this tram has in A the same rail cars as in B (*dies Straßenbahn in A hat dieselben Wagen wie die in B*). In this two expressions the term "same" (*derselbe, dieselben*) expresses the identity judgement and the demonstrative "this" (*die, dies*) expresses the reference of two different states of things. If the particular object expressed by the demonstrative "this" corresponds to the temporal part, in exchange the persistent object corresponds to the genre. In other words, the genre identity can only be applied to physical objects, persistent in time, which means that in the auto-psychic world (*die eigenpsychische Welt*), where the objects can't be made yet, we can't talk about the genre identity and consequently, about classes. It is not accidental that this genre identity is introduced by Carnap in *Aufbau* only when paragraph 128 talks about

³⁹ W.V.O. Quine, *Ontological Relativity...*, p. 115.

⁴⁰ Rudolf Carnap, *Aufbau*, § 159.

the making of visible things (*Sehdinge*)⁴¹. The visible things are “classes” of entities, of “points” of the visual field.

This philosophical direction imposed by Carnap regarding the structural description of knowledge experience on the basis of the similarity relation and of the quality spaces seems to be confirmed by more and more in the late years also by the researches from the cognitive perspective. Recent studies from this area of investigation bring to our attention the fact that the different concepts of knowledge are structured and we can speak about *conceptual spaces* (concepts organized on the colors’ space and the sounds’ space etc.) Any conceptual space contains a certain number of qualitative dimensions, and these dimensions can have a sensory and non-sensory character, since they form the context in which we can design the objects of knowledge and the relations between them.

BIBLIOGRAPHY

- Biriş, Ioan, *Totalitate, sistem, holon*, ediția a doua, Editura Universității de Vest, Timișoara, 2007.
- Boniolo, G., Dalla Chiara, M.L. et al., *Filosofia della scienza*, Raffaello Cortina Editore, Milano, 2002.
- Carnap, Rudolf, *Der logische Aufbau der Welt*, Meiner Verlag, Hamburg, 1998.
- Carnap, Rudolf, *Vechea și noua logică*, (editions and translation in Romanian by Alexandru Boboc), Editura Paideia, București, 2001.
- Dummett, Michael, *Originile filosofiei analitice* (Romanian translation by Ioan Biriş), Editura Dacia, Cluj-Napoca, 2004.
- Flonta, Mircea, *Gânditorul singuratic. Critica și practica filosofiei la Ludwig Wittgenstein*, Editura Humanitas, București, 2008.
- Friedman, Michael, *Reconsidering Logical Positivism*, Cambridge University Press, 1999.
- Goodman, Nelson, *The Structure of Appearance*, Harvard University Press, 1951.
- Husserl, Edmund, *Cecetări logice*, vol. I (Romanian translation by Bogdan Olaru), Editura Humanitas, București, 2007.
- Kistler, Max, Le concept de génidentité chez Carnap et Russell, in vol. Sandra Laugier (ed.), *Carnap et la construction logique du monde*, Vrin, Paris, 2001.
- Laugier, Sandra (ed.), *Carnap et la construction logique du monde*, Vrin, Paris, 2001.
- Moulines, C. Ulises, La (re)construction formelle de l’expérience. Carnap et Nicod, in vol. Sandra Laugier (ed.), *Carnap et la construction logique du monde*, Vrin, Paris, 2001.
- Moulines, C. Ulises, *La estructura del mundo sensible*, Ariel, Barcelona, 1973.
- Priest, Graham, Quine: Naturalism Unravelled, communication presented at the *Simpozion omagial – 100 de ani de la nașterea lui Quine*, The Faculty of Philosophy, University of Bucharest, 8–9 November 2008.
- Quine, W.V.O., *From Stimulus to Science*, Harvard University Press, Cambridge/Massachusetts, London/England, 1995.
- Quine, W.V.O., *Ontological Relativity and Other Essays*, Columbia University Press, New York, 1969.

⁴¹ Max Kistler, Le concept de génidentité chez Carnap et Russell, in vol. Sandra Laugier (ed.), *Carnap et la construction logique du monde*, p. 166.

-
- Quine, W.V.O., Ullian, J.S., *Țesătura opiniilor* (Romanian translation by Mircea Dumitru), Editura Paralela 45, Pitești, 2007.
- Richardson, Alan W., *Carnap's Construction of the World. The Aufbau and the Emergence of Logical Empiricism*, Cambridge University Press, Cambridge/NewYork, 1998.
- Russell, Bertrand, *Our Knowledge of the External World*, Open Court, London/Chicago, 1914.
- Schilpp, P.A. (ed.), *The Philosophy of Rudolf Carnap*, Open Court, 1963.
- Stadler, Friedrich, *Studien zur Wiener Kreis*, Suhrkamp Verlag, Frankfurt am Main, 1997.
- Wagner, Pierre, Le contexte logique de l'Aufbau. Russell et Carnap, in vol. Sandra Laugier (ed.), *Carnap et la construction logique du monde*, Vrin, Paris, 2001.

