Ioan BIRIŞ is a professor in Philosophy and PhD Coordinator at the West University of Timisoara, Romania, specialized in the philosophy of science and the logic of social sciences. Other books (in Romanian): *Totality, System, Holon* (1992, 2007); *Values of law and intentional logic* (1996); *History and Culture* (1996); *Sociology of Civilizations* (2000); *Society and Cultural Communication* (ed., 2006); *Concepts of social sciences. Models and Applications* (ed., 2008); *The role of the imaginary in scientific knowledge* (ed., 2009); *Concepts of Science* (2010); *The philosophy and logic of social sciences* (2014).

IOAN BIRIŞ, *PHILOSOPHY IN THE AGE OF APPLIED LOGIC*

INSTITUTUL EUROPEAN
Iaşi, str. Grigore Ghica Vodă nr. 13
euroedit@hotmail.com; www.euroinst.ro

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IOAN BIRIŞ

PHILOSOPHY IN THE AGE OF APPLIED LOGIC

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FOREWORD

In the last century philosophy has undergone essential transformations. Some spoke of the "death of philosophy". Others argued about the "absorption of philosophy" in logic or in science. In our opinion philosophy is neither dead, nor does it melt "dead" into something else. But, at least in its analytic form, philosophy in the last century has become more rigorous. This rigor was obtained by systematic recourse to the "new logic" (after Frege). More precisely, by appeal to applied logic in various fields, from scientific knowledge to ontology, from research of language to metaphysics, from the problems of rationality to fictional objects, and so on. Hence the title of volume.

This author's belief is that logical and philosophical research of the last century offers us shining examples for the possibilities of applied logic to "rationalize" the irrational, to make logical sense of what may seem illogical at a certain time. These successful examples are all impulses of confidence in the progress of contemporary philosophy, progress based mostly on the force of applied logic.

The author of this volume not only provides synthesis about the approached issues. The author believes that philosophy should not be limited to the formulation of questions, but must offer solutions, especially logical solutions. What original solutions does this book offer? After a clarification of the logical-mathematical structure of scientific experience, of the relationship of

Chapter I

THE LOGICAL–MATHEMATICAL STRUCTURE OF SCIENTIFIC EXPERIENCE: CARNAP'S CONCEPTION

For over a century many thinkers at least within analytic philosophy have attempted to obtain a more rigorous knowledge, even a "mathing of experience". One such project was proposed by Rudolf Carnap in *Der logischeAufbau der Welt* (1928). As Moulines[1] argues, Carnap's *Aufbau* is a "super-program" in which, on the one hand, "the new logic" (developed by Frege, Russell and Whitehead) can be used not only to rebuild the foundations of mathematics, but also for the reconstruction of ontology and the philosophy of knowledge; on the other hand, it's possible to build a mathematical model of experience. Let's admit that this "super-program" is an extremely ambitious project!

Overlooked for a long time, this work has returned to the philosophical spotlight in recent years, because philosophers finally realized that Carnap's project[2] comprises almost all the

[1] Carlos Ulises Moulines, *La (re)construction formelle de l'expérience. Carnap et Nicod*, in Sandra Laugier (ed.), *Carnap et la construction logique du monde*, Vrin, Paris, 2001, p. 44.

[2] With small changes I resume here my text *The Formal Structure of Experience in Carnap's Aufbau*, Balkan Journal of Philosophy, vol. 2, no. 2, Sofia, 2010.

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 phenomenology, Carnap's program in *Aufbau* starts from some premises such as: the need to control experience (= major stake of any scientific knowledge); the orientation towards *form* of the modern concept of scientific knowledge (under Kant's direct influence); the assertion of a concept of knowledge mostly relational or structural (the issue resulted in the orientation towards form of modern knowledge); the need for a methodology engaged in a constructive way and modeled on mathematical thinking; our concern in the constitution of experience (under the E. Mach's influence).

One can't understand Carnap's project in *Aufbau*[3] 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 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 (*Würzelbegriffe*), which are reported to the "data", or immediate

[3] Rudolf Carnap, *Der logische Aufbau der Welt*, Meiner Verlag, Hamburg, 1998.

contents of living[4]. Only through this "reduction" towards "data" can one aim at a uniform science (*Einheitswissenschaft)*. First of all the psychic concepts can be "reduced" to their "data" because they refer to the psychic phenomena of the subject who possesses the knowledge. Starting from the psychic concepts one can make sense of 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*)[5].

It is clear that for Carnap the role of logic is essential in view of a uniform scientific achievement and of the 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 reasons[6] 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 of mathematics; 2) in the form of an analytical instrument, logic could be used not only for mathematics but it also allowed for an extension to all scientific knowledge. In this respect Carnap was convinced in that period and it is even more clear in the present that the theory of knowledge, which isn't in

[4] Rudolf Carnap, *Vechea şi noua logică*, (editions and translation in Romanian by Alexandru Boboc), Paideia, Bucureşti, 2001, p. 32.

[5] *Ibidem*, p. 32.

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

its essence anything but applied logic, can't be deprived of logistics just like physics can't deprive itself of mathematics[7].

1.1. *The New Logic and the Rational Reconstruction of the World*

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*, a work which he admired especially for itsmethod of the rational reconstruction of mathematics. But one must not forget other influences also, such as the *Tractatus* of Wittgenstein, the conventionalism of Poincaré of the philosophy of science or of neo-Kantian 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, a crisis 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 at the same time an important instrument for the radical renewal of epistemology and philosophy in general.

[7] Rudolf Carnap, *Vechea și noua logică*, p. 21.

Of course, Carnap was not the only person excited by the potential of the new logic to renew scientific and philosophical conceptual thinking. In 1914 Russell published *Our Knowledge of the External World*[8], 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 judgment simply an act in which a predicate was assigned to a subject. Frege proposed the analysis of judgment 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 sense, the theory of propositional functions *etcetera*. Carnap will particularly appreciate Frege's contribution to the quantification field for what he calls "the new logic", and some years later (in fact two years after *Aufbau*'s 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 sentences, of 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 significant development of the field of logic, the new domains and the most important of which is considered the logic of relations and the theory of the propositional functions. In the traditional logic one finds a unique form of the propositions (judgments) that is the predicative form. When one says "Socrates is a man" we attach

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

a predicate-concept (man) to a subject-concept (Socrates). 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)"[9].

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 in the past limitingit to predication sentences has led 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 as "the place" of an object. Leibniz – who noticed the importance and possibility of the relation sentences – succeeded in understanding 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 judgment.

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 in *Our Knowledge of the External World*, Russell aimed to achieve the dream of the empiricist epistemologists[10], that of succeeding to explain the

[9] Rudolf Carnap, *Vechea şi noua logică*, p. 22.
[10] W. V. O. Quine, *From Stimulus to Science*, Harvard University Press, Cambridge/Massachusetts, London/England, 1995, p. 10.

construction of the exterior world from the sensitive impressions, this project being resumed with all seriousness[11] 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[12]. 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"[13] presuppose

[11] In his Intelectual 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).
[12] Rudolf Carnap, *Der logische Aufbau der Welt*, § 38.
[13] In the specialized literature, expecially due to Quine's reductionist interpretation (starting with *Two Dogmas of Empiricism*), the term used by Carnap in german for this intervention is *zürükführung* – was equated to that of "reduction", which we consider to be an overstatement and it distorts Carnap's idea. A more appropriate understanting 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*.

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[14].

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, a situation for which the pattern in *Principia Mathematica* no longer offered solutions. In order to characterize empirical entities in a formal way, 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[15].

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

[14] Rudolf Carnap, *Der logische Aufbau der Welt*, § 15.
[15] *Ibidem*, § 15.

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).

1.2. *Carnap and German Scientific Tradition*

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 investigateit in detail. We have to remember though, that beside the influences of Russell and Frege, of Wittgenstein and other logicians, Carnap's conception can't be understood outside the German philosophical tradition, especially that of Kant and the neo-Kantian philosophy, but also the German scientific tradition in the physics domain where the works of Helmholtz, Boltzmann, Hertz and Mach imposed themselves. Even though their influence was not necessarily as direct as C. Moulines emphasizes[16] at a certain moment but was through other names 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, and 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. Along the same lines was Boltzmann's advice to consider the concepts and statements of physics as "mental images", patterns

[16] C. Ulises Moulines, *op. cit.*, p. 44.