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# From Scientific Philosophy to Absolute Positivism: Abel Rey and the Vienna Circle

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**Résumé :** On associe généralement l'expression de philosophie scientifique au positivisme logique, lequel se signale par son recours à la logique mathématique dans l'analyse des problèmes philosophiques. Or il apparaît à plus proche examen que cette expression est employée dès 1848 par Ernest Renan. La tentative d'élaborer une philosophie scientifique fait l'objet d'un long débat. Au tournant du xx<sup>e</sup> siècle, Abel Rey reprend cette question. Or, son livre, *La Théorie de la physique chez les physiciens contemporains*, exercera une influence forte sur le Cercle de Vienne. Le positivisme absolu que propose Rey présente à la fois des analogies frappantes et des différences notables avec le positivisme logique. Si on y trouve le même souci de clarté et de précision, la logique n'est pas au centre de la démarche philosophique. Les diverses sciences, des mathématiques à la psychologie, sont mises à contribution. Il n'y a pas de hiérarchie, mais un encyclopédisme visant à inclure toutes les données fournies par la recherche scientifique. À travers l'étude comparée de la conception d'Abel Rey et de celle du Cercle de Vienne, il s'agit ici d'interroger la possibilité d'une philosophie scientifique.

**Abstract:** The concept of scientific philosophy is generally associated with logical positivism or logical empiricism, which is characterized by its recourse to mathematical logic in tackling philosophical problems. But on closer inspection it appears that this concept was employed as early as 1848 by Ernest Renan. The attempt to elaborate a scientific philosophy gave rise to a lengthy debate. At the turn of the twentieth century, Abel Rey took up the issue again. His book, *La Théorie de la physique chez les physiciens contemporains*, exerted a strong influence on the Vienna Circle. Rey's absolute positivism reveals striking analogies and sharp contrasts with logical positivism. If we find the same requirement for clearness and precision, logic for Rey is not the

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main focus of philosophical method. The various sciences, from mathematics to psychology, are called on. There is no hierarchy but an encyclopedia, whose aim is to encompass all results of scientific research. By way of a comparative study of Abel Rey and the Vienna Circle, I seek to question the possibility of a scientific philosophy.

## 1 Introduction

The concept of scientific philosophy is generally associated with logical positivism or logical empiricism, which is characterized by its recourse to mathematical logic in treating philosophical problems. One of the late works of Hans Reichenbach, published under the title *The Rise of Scientific Philosophy* [Reichenbach 1951], would represent the final outcome: a doctrine applying logic to experimental science, distinguishing the context of justification from the context of discovery, and establishing a collective program of inquiry. Such a philosophy would possess all the attributes of science: accuracy, positivity, and objectivity. As a matter of fact, the project of elaborating a scientific philosophy arises much earlier. It lies at the heart of the work of Abel Rey, who precedes the movement of logical empiricism by a generation. His doctoral thesis had been read enthusiastically by Philipp Frank, Hans Hahn, and Otto Neurath prior to the First World War. Later, Rey, as professor of history and philosophy of science at the Sorbonne, was the one who officially hosted the first International Congress for Scientific Philosophy in Paris in 1935. A more in-depth study of the history of scientific philosophy is thus called for.

Alan Richardson deserves credit for having drawn attention to the need for a thorough historical study of the expression “scientific philosophy”.<sup>1</sup> He has pointed out in this regard several significant references, which largely predate logical empiricism. For example, Richard Avenarius founded a journal in 1877 explicitly devoted to such an orientation: *Vierteljahrschrift für wissenschaftliche Philosophie*. He defended this editorial line for some twenty years, until his early death in 1896. Thereafter, Ernst Mach became associated with the editorship. The empiriocriticism and positivism that were advocated by both thinkers thus came to be connected with scientific philosophy. Unfortunately, Richardson focuses primarily on the German tradition, leaving out large portions of what was a European debate. In consequence, his historical inquiry fails to carry us back to the context of emergence and to seize the underlying factors that fuelled this debate. My aim is not to provide in this paper a complete study of what was a long and complex series of events, but to point out the priority of French philosophy in

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1. [Richardson 1997, 418–451]. See also the more recent but shorter account, [Richardson 2008, 88–96]; Auguste Comte is mentioned but not studied.

this regard and its specific contribution. Rey, who draws on this tradition and transmits it to the Vienna Circle, appears as a pivotal figure.

What André-Marie Ampère or William Whewell had named philosophy of science in the early nineteenth century came at some point to seem insufficient. The expression was probably modeled on the series: philosophy of history, philosophy of religion, philosophy of law, philosophy of art.<sup>2</sup> But in this case philosophy was directed to the exact sciences; in other words, two disciplines were brought together, which were very different in nature. Was this discourse to be internal to science, to be carried out by the scientist in relation to her or his specialized research? Or was it to be external to science, a comparison of scientific results with earlier philosophical speculations? While the ambiguity persisted, the field acquired more and more autonomy. Over the course of the development of philosophy of science various alternate expressions were proposed: positive philosophy, scientific philosophy, logic of science, etc. By focusing on one of these expressions we touch on constitutive issues: how are we to present, to understand and to pursue the discipline? The scientific philosophy of logical empiricists was criticized and has ceased to be considered a viable account of science. But its critics—post-positivists or falsificationists—have failed in turn to provide a generally accepted alternative. What these critics have been reproached with is tending toward relativism. In other words, they are accused of being at odds with a truly scientific philosophy.

As we shall see, many different ways of rendering philosophy scientific have been proposed in the past two hundred years. By bringing back to mind a neglected strand of this development, I hope to offer some critical insights on philosophy of science.

## 2 A short history of the expression of scientific philosophy

The Bibliothèque nationale de France holds indeed a brochure dating from 1866 in which the expression “scientific philosophy” occurs in the very title: *Quelques mots sur la philosophie scientifique*. On the cover the author is simply designated as “un médecin libre penseur”, but the last page bears the signature Marius Montagnon. The author remains however an obscure figure: there is no other significant mention of him. We learn, on reading his text, that he entered medical school in 1857. If he did so at the usual age, then, by the time he wrote his brochure, he would have been in his late twenties or early thirties. In one passage the author explains the purport of his title:

All freethinkers, all great physiologists seek, as much as possible, to truly account for things, by leaving aside all those fruitless

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2. Such is the account given in [Lalande 1902-1923], under “Philosophie, observations”.

questions of the *absolute*, which only cause quarrels and massacres. So all such elite minds now profess scientific philosophy, that is, *positivism*, which, whatever may be said, is materialistic, and abandons metaphysics to its fate as a barrier to progress. [Montagnon 1866, 1-2]<sup>3</sup>

The author is no system builder; the argument is succinct and cursory. He is rather encouraging leading public figures, such as Adolphe Guérault, to whom the booklet is dedicated, to follow their ideas to their ultimate consequences and to frankly espouse materialism. The latter was editor in chief of the *Opinion Nationale*, a major liberal newspaper. The text carries also a political agenda, alluding to some recent events of the time, such as the first international student congress held in Liège in 1865, at which various reformist or revolutionary ideas were discussed, among others those of Auguste Comte. More could be said about freethinking during the French Second Empire, but, to keep to our topic of inquiry, what the brochure shows is that a debate, which had certainly originated in the intellectual circles of cities, had by then reached the notables of small towns.

Earlier occurrences of scientific philosophy are to be found. Ernest Renan employed the phrase several times in *L'Avenir de la science*, which, although published only in 1890, was written in full in 1848. In one passage Renan states:

Have I made clear the possibility of a scientific philosophy, of a philosophy that would not be a vain and empty speculation, bearing on no real object, of a science that would no longer be dry, fruitless, exclusive, but which by becoming more complete, would become religious and political? [Renan 1890, 329]<sup>4</sup>

The formulation may seem surprising. It should be understood with respect to Renan's aim: to develop the historical sciences. As these bear more closely on humankind, they thereby provide a means of transforming society. It is likely that Renan had in mind Comte, whom he quoted more than once. The latter had finished publishing his ambitious *Cours de philosophie positive* only a few years earlier and went on to launch a positivist association, a movement with both doctrinal and political aims. Comte generally employs the term philosophy with a defining adjective: "mathematical philosophy, astronomical philosophy, physical philosophy, chemical philosophy and biological philosophy" [see Comte 1830-1842, Table of Contents]. Renan had only, it would seem, to follow through to its logical conclusion this presentation to coin the generic term scientific philosophy. Half a century later we find a scholar such

3. All translations mine, unless otherwise indicated.

4. The expression "*philosophie scientifique*" occurs several times in chapters 15 and 16, for example [Renan 1890, 342]. For more on the relation between Renan and Comte, see [Petit 2003].

as Gaston Milhaud writing an article under the title “Sur un point de la philosophie scientifique d’Auguste Comte” [Milhaud 1900, 15–26].<sup>5</sup> Comte himself would have probably objected to this attribution. He was suspicious of extending hypotheses beyond their sphere of application and careful to distinguish the sciences with respect to method and object. This gave rise to what is now termed regional epistemologies; philosophical considerations are to be formulated with respect to specific scientific context. By employing the term scientific philosophy, Renan was obviously elaborating his own line of thought, one devoted to science but also naturalistic in orientation. In addition, he was intent to promote a rigorous philosophy, based on the model of science, which could be seen to lead to a form of positivism better called scientism. This term was to remain thereafter in use alongside philosophy of science. Renan’s book shows that scientific philosophy as a genre had been conceived as early as the 1840s, in a context infused by positivism.

Some ten years later one finds the expression that we have been studying in Claude Bernard. In the *Cahier rouge* or *Cahier de notes 1850-1860*, he writes:

In scientific philosophy: the foreseen and the unforeseen are in inverse reason to one another according to the greater or lesser state of advancement of science. [Bernard 1850-1860, 124]<sup>6</sup>

Bernard is calling attention to predictive power as a characteristic feature of science. This is part of a series of remarks, on which the editor Mirko Grmek gives the following comment:

The general considerations, labeled “scientific philosophy” by Bernard himself in his index to the “*Cahier rouge*”, are in fact interspersed in a text that is highly scientific, specialized and sometimes purely technical. The physiological context throws additional light on these remarks of a general nature, connecting the lofty thoughts with real facts and indicating the true place of “scientific philosophy” in Bernard’s meditations.<sup>7</sup>

Reflection on science is here closely linked with research. By such formulations Bernard was perhaps distancing himself from Comte, with whose doctrine’s he was familiar [see for example Bernard 1937, 262]. Although this manuscript was published only later, like the one of Renan cited above, the fact that both authors independently hit on the same formula suggests that scientific philosophy was part of the *Zeitgeist*. An extensive study of

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5. This paper, delivered at the first Congrès international d’histoire comparée held in 1900 in Paris, was thus not restricted to a French audience.

6. The passage quoted is entered in the notebook under the years 1857-1860.

7. See introduction by Grmek, [Bernard 1850-1860, 12]. Bernard in the index he produced referred to several other passages under the heading scientific philosophy, which are given in this edition.

the documents of the time is likely to reveal its appearance in public prior to the 1860s. Let us recall that Bernard, who may have been one of the great physiologists that Montagnon had in mind, went on to publish shortly after his *Introduction à l'étude de la médecine expérimentale* [Bernard 1865]. This work, in which he explored the philosophical problems raised by the life sciences and brought attention to the precise features of experimental method, provided the background for discussions throughout the remainder of the nineteenth century.

It is worth noting that, a year prior to the launching of Avenarius' journal, the *Revue de la France et de l'étranger* carried an article by Léon Dumont signaling the philosophy of Joseph Delbœuf: "M. Delbœuf et la théorie de la sensibilité" in the following terms:

The expression of scientific philosophy has no other meaning than that of a protest against the doctrine of a diversity of methods, and it is best employed concerning sensitivity. For sensitivity is the part of metaphysics in which theories have retained most completely until today a mystical character. Mr Delbœuf rejects with good reason the distinction between two kinds of science, the one founded on a purely inductive method, the other on deduction, the one on truths of fact, the other on a priori necessary principles. All positive sciences, from mathematics to logic and psychology, proceed in a uniform manner. [Dumont 1876, 456]

Delbœuf was formulating an analysis of sensation along lines similar to those simultaneously taken by Avenarius and Mach.

Let us now turn to the reception of Renan's *L'Avenir de la science* following its belated publication in 1890. It was highly influential, and obviously played a role in the revival of the debate over scientific philosophy. The term became increasingly widespread during the next decade or so. Poincaré's first major philosophical work, *Science and hypothesis*, was published in 1902 in a highly successful book series founded by Gustave Le Bon under the title "Bibliothèque de philosophie scientifique".<sup>8</sup> Readers were thereby lead to consider Poincaré's reflections in this light, although the author himself does not readily use the term. Philosophers were keen to follow up on this. We have already seen the case of Milhaud. Léon Brunschvicg provides another example. While holding the chair of history of modern philosophy at the Sorbonne, he wrote extensively on philosophy of science and resorted on occasion to the expression scientific philosophy to designate what he was doing. As in the following passage:

The attention devoted by the *Revue de métaphysique et de morale* to problems of mathematical philosophy has acquainted its readers

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8. Le Bon edited well over two hundred books in this series during his lifetime, including the French translation of Mach, 1908. For more on this topic see [Rollet 2002].

with the distinction of three themes which have successively come up, over the past twenty years, in essays on the general problems in mathematics: the theme of integer, the theme of logical class and the theme of intuition. The first two themes correspond to genuine systems, not merely to scientific philosophy but to metaphysics as well. [Brunschvicg 1911, 145]

Brunschvicg mentions in this regard Charles Renouvier, Gottlob Frege and Bertrand Russell. This expression had become so successful that Émile Boutroux felt the need by 1908 to issue the following warning:

The very expression of scientific philosophy, truly widespread today, carries more than one interpretation, and raises a problem rather than offering a well-defined doctrine. Science alone cannot constitute the *philosophy* of science. [Boutroux 1908, 190–191]<sup>9</sup>

Boutroux had a great interest in science; he was responsible for training several philosophers of science who would represent this specialty, among others Rey. But he did not want to do away with metaphysics altogether. He exhorted his contemporaries to keep in mind the perennial issues: the quest for the unity of things and their significance for humankind. As he emphasizes, reason goes beyond science. It involves action, judgment, and discernment. Scientific practice presupposes a knowing subject, the Cartesian cogito, from which its activity radiates.

We have every reason to believe that Avenarius and Mach two leading advocates of scientific philosophy in German-speaking lands, were aware of the discussions that were taking place in France. Avenarius was born in Paris, the son of a German publisher based there, and he returned on occasion to this city during his many travels. Mach, as an Austrian thinker whose views had met with some resistance in Germany, was eager to come into contact with French philosopher-scientists holding similar views to his, such as Pierre Duhem. Avenarius and Mach both admitted the positivist orientation of their views and recognized Comte as the initiator of this movement. Of course, they were as determined as their French counterparts to renew positivism, taking into account the latest scientific discoveries, notably those provided by experimental psychology, which Comte had discarded from the realm of positive science along with metaphysics.

### 3 Abel Rey's philosophical itinerary

It is time now to explain who was Abel Rey. Born in 1873, he was one of the younger members of the conventionalist movement initiated by

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9. This text was conceived as a sequel to Félix Ravaisson's famous report. The passage quoted is from the concluding section.



Poincaré. His œuvre represents a transition toward a new sensitivity. In particular he was less skeptical than Poincaré with regard to atomic theories of matter. By training, Rey was a philosopher; he studied philosophy at the Sorbonne and wrote his doctoral dissertation under the supervision of Boutroux. He was nevertheless attracted to the sciences, and attended Poincaré's lectures in mathematical physics. He even worked in the physics laboratories of Edmond Bouty and Gabriel Lippmann. In his dissertation, Rey undertook an examination of the philosophical conceptions of contemporary physicists. Following this, he went on to teach philosophy at the University of Dijon, where he set up a laboratory for experimental psychology. But his tenure was soon interrupted by the First World War, during which he was mobilized. After the war, Rey was elected to the chair of philosophy of science at the Sorbonne. In this position he established the Institute for history of science, later the Institute for history and philosophy of science and technology, which is still in existence.<sup>10</sup> The purpose of this Institute was to make possible cooperation between the different *facultés* of the University of Paris, to bring into closer contact the hard sciences and the soft sciences, especially philosophy, history and the social sciences. Among the scientists, the list of founding members is impressive: Émile Borel, Louis de Broglie, Paul Langevin, Jean Perrin, to name but a few. The institute was to develop international cooperation. In the ensuing years it provided refuge for a number of scholars fleeing Italian fascism and German National Socialism.<sup>11</sup> One notes that this institutional endeavor presents similarities with Schlick's seminar, the Ernst Mach Association and the Vienna Circle.

Rey adopted readily the term "scientific philosophy" from the outset of his career. As early as 1903, he published a textbook under the title *Éléments de philosophie scientifique et morale* [Rey 1903], in which he sought to renew the philosophy program for secondary education by greater emphasis on the sciences and their impact on philosophy. He followed this up with a long article, "La philosophie scientifique de M. Duhem" [Rey 1904, 699–744], which elicited a response from the latter, leading to fruitful exchange between the young philosophy teacher and the well-established professor of theoretical physics concerning the nature of scientific theories.

In his dissertation, *La Théorie de la physique chez les physiciens contemporains* [Rey 1907] defended in 1907 Rey carries out a careful and detailed survey: he is closely informed of Poincaré's views and carries out a lengthy debate with Duhem. Rey distinguishes three attitudes with respect to mechanical theories of matter: the hostile attitude of advocates of energetics, a critical attitude illustrated mainly by Poincaré, and a favorable attitude of advocates of electronic theory of matter, which he himself defended. This detailed analysis,

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10. For a precise and instructive study of this Institute, see [Gayon 2016].

11. Among others, Paul Schrecker, Aron Gurwitsch, Paul Kraus, Shlomo Pinès, Aldo Mieli.

which covers half a century of physics, was to provide logical empiricists with a fruitful historical perspective.

A doctoral thesis is an academic work that requires some diplomacy. It was only afterwards that Rey could give free rein to his own views. In his subsequent book *La Philosophie moderne*, he gave a more ample and personal presentation of his ideas [Rey 1908]. He set about to study the major problems of philosophy in the light of scientific progress, not only number and matter, but also life, mind, morals and truth. He definitely goes beyond the scope of his thesis, outlining a general philosophical conception. With respect to number, for example, he describes the mathematical logic and the philosophical logicism of Russell and Couturat, a topic absent from his dissertation. He claimed to have reformulated profoundly the doctrine initiated by Auguste Comte in the sense of realism. This resulted in his absolute positivism. The outlook is science-oriented. As he writes:

Current philosophy, if we leave aside fossils, [...] always begins by acquiring a scrupulous knowledge of the results, the methods and hypotheses of science. [Rey 1908, 25]

He rebukes as outdated Rudolf Eucken, professor at the University of Iena, who had published in French journals on philosophy and religion.

I shall now concentrate on an article that appears to me particularly characteristic of his conception, “Vers un positivisme absolu”, published in 1909 [Rey 1909], reproduced in [Brenner 2015]. Rey sets his positivism in historical perspective. According to his account, a separation between philosophy and science was brought about at the beginning of the nineteenth century because of two philosophical trends, French spiritualism and German idealism. Let us note here the similar impact in France of Victor Cousin’s spiritualism. Positivists and materialists then reacted to these trends. They sought to bring philosophy and science back into contact. But according to Rey, neither this early positivism nor materialism was successful. In particular, Comte in his aversion for speculation overshot the mark and rejected certain hypotheses that would prove to be fruitful. Rey also signals the emergence of new scientific fields, in particular sociology and psychology. He points to Theodule Ribot, one of the initiators of experimental psychology in France. Ribot, who was also the first editor of the *Revue philosophique de la France et de l’étranger*, was instrumental in fostering discussions concerning the relation between philosophy and science. This particular case needed to be generalized: the establishment of sciences whose object is the human subject would necessarily give rise to philosophical consequences. Rey does not merely follow in the footsteps of his predecessors. He traces his own path, taking into account the causes of their failure. Rey also calls on a series of philosopher-scientists stretching from Galois to Poincaré and Duhem, but also to Mach and Boltzmann. Revolutionary scientific theories transform our thinking.

Let us note that Rey in his sketch of the recent evolution of knowledge gives importance to the emergence of new sciences, such as psychology

and sociology. It is often remarked that the German term *Wissenschaften* has a broader meaning than its English equivalent “science”, hence the expression *Geisteswissenschaften*. This is however not particular to German. As the above passages of Rey and Renan go to show, there were French thinkers defending such an extension, that is taking literally designations such as *sciences de l’homme*, *sciences humaines* and *sciences sociales*. The opposition is rather between British and Continental usage, or better between a traditionalist and a modernist stance.

Scientific philosophy is a *leitmotiv* of the article, which opens with the question “Can there be a scientific philosophy?” [Rey 1909, 463]. Rey then takes Comte to task for having confused scientific philosophy with scientific popularization [Rey 1909, 468]. The philosopher is to have up to date information. He insists that scientific philosophy should be built from bottom up, a more careful, prudent approach [Rey 1909, 476]. Finally in the “conclusions” to his article he describes his method:

In so far as this positive philosophy does not seek to go beyond what science authorizes it to assert, or to anticipate by hypothesis [...], in so far as this philosophy always contents itself with the solid basis furnished by current science, while pointing out the uncertainties and gaps, this positive philosophy can legitimately be called a scientific philosophy. [Rey 1909, 478]

Rey’s conception is set against that of Comte. Let us not forget that Comte’s disciples were very influent at the beginning of the French Third Republic. The limitations that orthodox positivism had sought to impose had become a hindrance for scientific research by the end of the nineteenth century. By contrast, Rey expounds his position in the following terms:

An absolutely positive philosophy cannot, it seems, be defined otherwise than the system of positive science. [Rey 1909, 469]<sup>12</sup>

By absolute positivism Rey means a conception that is complete, integral, finished, in other words consequent. It should not go beyond science, and a few lines after this quote Rey specifies that its aim is not a systematization.

Rey defends a new positivism. In this sense he belongs to a general trend of the time. Édouard Le Roy as early as 1900 called for a new positivism or neo positivism [Le Roy 1901]; “Positivisme, observations”, in [Lalande 1902-1923]. He was followed by a number of other thinkers. It is worth noting that Milhaud went so far as to speak of “logical positivism” in an article dating back to 1905. He applies this expression to Renouvier with regard to his emancipation from the teachings of Comte:

The strict commitment to the principle of contradiction was thereafter to be the first rule of any thought and any assertion

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12. This is probably a realist’s inversion of [Weber 1903].

concerning reality [...]. This would be the source of a logical positivism [*positivisme logique*] dominating Renouvier's metaphysics. [Milhaud 1905, 669]

To be sure Milhaud does not have in mind the application of mathematical logic to philosophical problems in the manner of the Vienna Circle. He is referring to Renouvier's extensive recourse to the principle of non-contradiction within his Neo-Kantian doctrine. But this goes to show the extent to which the endeavor to reformulate positivism was carried prior to the Vienna Circle.

One should not be led to believe that this French positivism tended exclusively toward idealism and rationalism. Let me quote once again from Rey's *La Philosophie moderne*:

One could name the philosophical attitude sketched in these short inquiries a rationalist positivism, absolute positivism, or scientism. To avoid any confusion it would perhaps be better to call it "experimentalism": which would express both that it rests entirely on experience—but unlike old empiricism, on a regimented experience, the fruit of scientific experiments—and that it refrains in its absolute realism, and its experimental monism, from going beyond experience. [Rey 1908, 367]

The doctrine of the Vienna Circle was no less an attempt to overcome traditional dualisms such as empiricism and rationalism or idealism and realism.

Abel Rey was interested in coordinating the different sciences, and this would lead him to collaborate with Lucien Febvre on the project of a general encyclopedia. This development in Rey's research, brings him in close proximity once again with the Vienna Circle. When Neurath came to develop his *Encyclopedia of Unified Science*, he did not fail to point out the similarities of the two projects:

It is only step by step that one begins to establish unity among the particular sciences, a beginning that we can consider as the "necessary prologue to the unification of science" [...]. That this process of unification must continue, so to speak, on all levels of scientific formulation, and that, in addition, only collective work makes it possible to achieve this work of synthesis, similar to that which Henri Berr, Abel Rey and others advocate, is exactly what we are trying to show here. [Neurath 1936, 198, Eng. transl., 156]

Both encyclopedias claim to innovate and to reinforce the connections between different scientific disciplines. They derive their inspiration in part from the same source: new positivism and a coordination of the sciences.

## 4 Abel Rey's reception in the Vienna Circle

Although Rey is not mentioned in the *Vienna Circle Manifesto*—only earlier French thinkers such as Comte, Poincaré or Duhem are included—logical positivists were quick to associate him in their activities. He was thus appointed to the Committee for International Congresses for the Unity of Science in 1935, the first one being held in Paris. Furthermore, several founding members of the Circle underscored his early influence on them. Philipp Frank, in the historical introduction to his *Modern Science and its Philosophy*, which he published in 1949 after settling in the United States, wrote à propos Rey's doctoral thesis: "His book was discussed frequently by us in the last years of my stay in Vienna (1908-1912)" [Frank 1949, 3]. Frank is referring here to the informal discussions that Hahn, Neurath and he would carry on in coffee houses shortly after their studies. In 1912, he left Vienna for Prague in order to take up a chair in physics. Several historians of philosophy of science have pointed out the importance of this prehistory, which they call the first Vienna Circle.

This account is corroborated by Neurath, who added to the list of participants Richard von Mises. Although the latter soon left Vienna to pursue a career first at the German University of Strasbourg and eventually at the University of Berlin, he visited Vienna often, keeping up early relationships. He also acted as a mediator between the Berlin Society for Empirical Philosophy and the Vienna Circle. Here is an extract from a retrospective article of Neurath:

I shall try to describe how I myself, as a logical empiricist, developed my attitude towards the sciences and their unity. Many of us, beside myself, have been brought up in a Machian tradition, e.g., Frank, Hahn, von Mises. Because of this, we try to pass from chemistry to biology, from mechanics to sociology without altering the language applied to them. We [...] were also influenced by scientists such as Poincaré, Duhem, Abel Rey, William James, Bertrand Russell. [Neurath 1946, 230]<sup>13</sup>

So, Abel Rey figures on the list in both cases.

Frank had indeed published in 1910 a review of the German translation of Rey's dissertation. He gives a precise description, noting "this is the first book in the German language that offers a thorough synthesis of modern research at the frontier of physics and philosophy" [Frank 1910, 45]. Frank draws the attention of the reader to the development of the research program called energetics. What Rey has to say about the British physicist Macquorn Rankine, alongside Ernst Mach, Wilhem Ostwald and

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13. Published directly in English, this is one of Neurath's last articles. He died on Dec. 22, 1945.

Pierre Duhem, brings to light an aspect that is less well-known in German-speaking countries. Furthermore, according to Frank, Rey helps to draw the philosophical consequences of the work of the research of innovative scientists such as Poincaré or Duhem. In particular he provides a synthesis of the aphoristic remarks of Poincaré. He also shows that Duhem was working toward an axiomatisation of physics.

As Frank writes in his historical introduction: “We agreed with Rey’s characterization of Poincaré’s contribution as a ‘new positivism’” [Frank 1949, 9]. He then goes on to quote at length from the second part of the dissertation concerning the philosophical consequences. In Rey’s words:

What was lacking in Comte’s or Mill’s positivism [...] was their [...] failure to have established in a new form a theory of categories. Objective experience is not something which is outside and independent of our minds. Objective experience and mind are functions of each other, imply each other, and exist by virtue of each other [...]. Our experience is a system, a relation of relations. The relation is the given. [Rey 1907, 392]. Quoted by [Frank 1949, 9–10]. Compare with [Hahn, Neurath *et al.* 1929, 30, Eng. transl., 84]

It is worth evoking also the testimony of Richard von Mises, whom Neurath included among the members of the philosophical discussion group that preceded the establishment of the Vienna Circle. In an article written for the centenary of the birth of Mach he voices the following complaint:

The French public generally considers Poincaré the founder of the *philosophie scientifique*, although Mach, in fact, had proposed almost all of Poincaré’s ideas earlier, in a more elaborate and more consistent form. [von Mises 1938, 25, Eng. transl. 266]<sup>14</sup>

Although von Mises’ account differs somewhat from that of Frank in favoring Mach over French thinkers, it points to a shared tradition of scientific philosophy. Now, on the evidence that we have gathered, if Mach formulated his doctrine prior to Poincaré, the genre of scientific philosophy predates the former as well. What this shows is that we have here a rich and varied international tradition.

This early interest in Abel Rey would eventually lead to exchanges after Frank, Hahn and Neurath had helped to set up the Vienna Circle and launched logical empiricism as a philosophical movement. This took some time, owing to the First World War and the subsequent difficulties that it caused. But in 1935, the Vienna Circle co-organized the First International Congress for Scientific Philosophy in Paris, and Abel Rey was on the general supervising committee. This was a truly important event: 170 philosophers and scientists

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14. The expression “philosophie scientifique” is given in French in the German original, which highlights it all the more.

from some twenty countries convened at the Sorbonne. Logical positivists were numerous and many other scientifically inclined thinkers were present. This event initiated several collaborations. Articles dealing with the Vienna Circle program were translated and published in French, notably by Frank, Neurath and Schlick.<sup>15</sup> Yet this promising encounter was to be short-lived.

## 5 The parting of ways: Historical study versus logical analysis

In 1937, two years after the Paris congress on scientific philosophy, Abel Rey penned an article in which he defines his position with respect to logical empiricism. I would like to concentrate now on this paper, which is of particular interest for my argument. “De la pensée primitive à la pensée actuelle” [Rey 1937] constitutes the introduction to the first volume of *l’Encyclopédie française* under the general editorship of Lucien Febvre. This volume of the thematically ordered encyclopedia deals with the mental toolkit, a concept which seems to have been largely inspired by Abel Rey and was to play a role in the French historical school. Section B of Abel Rey’s chapter takes up the issue of logical thought. He goes on to describe the development of modern mathematical logic, mentioning among others Poincaré and Hilbert. In speaking of formal logic, Rey writes:

We are indeed concerned with a set of forms constructed one from another, using only negation, for example in one of the most felicitous systems, that of Russell. [Rey 1937, 1.18-7]

He then turns to the Vienna School. He views favorably the general orientation of logical empiricism. Their program derives from Auguste Comte, and is enhanced by Mach. It represents a neo-positivism. Rey goes so far as to characterize it as an “absolute positivism”, the term he had used for his own philosophy. As he puts it, this attitude amounts to

An absolute ignorance of the real-in-itself, *qua* absolute positivism. Because we cannot know anything of the nature of things,—which would be an intrusion into metaphysics—and because all knowledge is only relation, we understand that these relations can be coordinated tautologically. [Rey 1937, 1.18-8]

He is careful to point out the existence of a variety of logical systems, calling on the work of Luitzen Egbertus Jan Brouwer, Jan Łukasiewicz, Alfred Tarski and others. This means that standard first order logic cannot serve as the sole basis for philosophical analysis. Moreover, Rey insists that logic is a tool; its purpose is first and foremost to help us develop a fruitful discourse on the world. He then formulates some precise objections. First,

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<sup>15</sup>. Concerning the early reception of logical empiricism, see [Stern 1935].

The main point is to discover if experience and framework can be considered as absolutely independent of one another. Do they not naturally interact in a continuous and perhaps indiscernible way? [Rey 1937, 1.18-8]

This anticipates in a sense Quine's rejection of the analytic-synthetic dichotomy. He continues:

The machinery is tempting on account of its simplicity and its rigor—necessary even as a rigorous logical means of expression and, if you like, as an elimination of pseudo-problems. But from the point of view of the elaboration and the psychological act of knowledge, can it be taken as sufficient? [Rey 1937, 1.18-8]

What Rey is clearly suggesting is the importance of development, both as an individual and collective process. He can then proceed to introduce his own directions of research. This is precisely the mental tool-kit that Rey is striving to characterize in his article. To quote from his conclusion:

In this long effort of explication, as revealed by its history, the mental tool-kit has always been relative to a conception of the universe. The converse is probably true as well. But this tool-kit is made precise only to the extent that it has been imposed by the conception to which it corresponds. A logical form never preexists its realization. On the contrary, it comes out of this realization by means of an analysis, which is internal to it. But far from being sterile and artificial, [...] this analysis, by rendering more precise the tool-kit, has always contributed to perfecting the very conception which was formed with it and which it first gave rise to. [Rey 1937, 1.20-11]

Moreover, let us recall that Rey set up a laboratory for experimental psychology at the beginning of his career. He continued to collaborate with psychologists. For example in 1924 he contributed to what became a standard manual in the field, *Traité de psychologie*, under the editorship of Georges Dumas [Rey 1924, vol. 2, 426–476]. Here he devotes a chapter to the phenomenon of invention, both artistic and scientific. After paying tribute to Ribot, Rey takes into account recent research in psychology. He is however intent on bringing out the philosophical implications. We see Rey endeavoring to go beyond formal logic and to capture as much as possible the procedures involved in the logic of discovery and invention. What is interesting to note is that he was favorably inclined towards some of Bergson's ideas, in particular his theory of the schema [see Bergson 1896, chap. 2]. This puts Rey at odds with the Viennese philosophers, who were from the outset impatient with Bergsonian metaphysics, and, following Reichenbach, rejected the context of discovery in favor of the context of justification.



But undoubtedly more significant is *La Science dans l'Antiquité* [Rey 1930]. This multi-volume work on ancient science offers a rich and in-depth study. Rey makes an inventory of the methods of scientific investigation: experimental, mathematical, inductivo-mathematical, deductivo-logical. Reading it today, one is likely to think of Alistair Crombie's styles of thought. Let us extract from the five volumes some remarks that throw light on Rey's intention. He is careful to set his inquiry within a tradition of philosophy of science as it developed in France:

It is only appropriate that I recall here the rule of historical method laid down by Paul Tannery: one should never ascribe to the thinkers of the past the principles of their doctrines nor the doctrines of their principles. Let me add: one should never seek to interpret them as we ourselves would interpret similar theories. [Rey 1930, vol. 3, 41]

In other words, the past should not be submitted merely to a rational reconstruction but should be grounded on genuine historical inquiry. Rey invites us to avoid any anachronism. The same concern is voiced again in reference to Rey's predecessor at the Sorbonne:

Gaston Milhaud had the same aim as me: the history of the relations between philosophy and science. [Rey 1930, vol. 2, 14]

Historical study is then essential for philosophy of science. Rey endeavors to bring out the philosophical value of science, with the example of Poincaré probably in mind:

In agreement with a whole movement of thought that is perceptible among contemporary scientists, and the foremost among them, I am led to believe that science is an evolution of thought no less so than philosophical thought, which is often merely a meditation upon it. Science *is* thought. [Rey 1930, vol. 2, 3; cf. vol. 5, 10]

Rey thus refuses a divorce between science and philosophy. His aim is to develop a scientific humanism.

## 6 Conclusion

What the study of Rey brings to light is a whole line of development from Comte and Renan to Poincaré as well as the interactions between French positivism and its German-Austrian versions. The need to establish a reflection on science arose in a particular discursive configuration that involved not only the upheavals within the exact sciences, but the birth of new sciences as well as the social and political consequences of science. This comes across clearly in Renan's wish "to organize scientifically humanity, such is

then the final word of modern science, such is its audacious but legitimate pretence” [Renan 1890, 106]. Philosophy of science as it has evolved since the nineteenth century offers numerous doctrines and multifarious methods. The logical analysis of scientific language is not the sole technique available. In particular, Rey, while a positivist and an empiricist, adopted a decidedly historical approach; he even had the intuition of historical epistemology, which has come again to the forefront of philosophical debates today. His insights suggest that we give serious consideration to the benefits of historical method for philosophy of science.

Up until World War Two French philosophy and Austrian philosophy followed similar lines of development and there were many points of contact. Philosophy of science, as it is often conceived today, perhaps under pressure to justify its disciplinary status, represents a narrowing of focus, with respect to earlier endeavors. By concentrating exclusively on the logical analysis of theory structure and its various aspects—measurement, mathematical development, experimental control—we have neglected many other legitimate topics, namely the political and ethical implications of science. This descriptive, professional, apolitical attitude is the outcome of a particular situation. The members of the Vienna Circle, logical empiricists, finding refuge mainly in the United States, felt obliged, for obvious reasons, to pass over in silence some of their more radical ideas as well as their political leanings, especially so during the McCarthy period. In contrast, the comparison with Abel Rey brings out more clearly the political agenda, the Enlightenment values that were part and parcel of the Vienna Circle.

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