1. Introductory remarks: Not a “philosopher of science”

Henri Bergson (1859-1941) was certainly the most influential of all French philosophers in the 20th Century. Till the 1960s approximatively, there was absolutely no doubt about that. I belong probably to the last generation of French students who were presented Bergson as a philosopher as much important as Plato, Descartes or Kant. I can testify that this was obvious for all philosophers, whatever their philosophical orientation. In the past 30 years, however, this situation has dramatically changed. The majority of philosophers under the age of 50 are ignorant of Bergson. Before this conference, I, myself, had not read a single line by Bergson since 1966, when I got my first course in philosophy. As a philosopher of science, and, more especially, as a philosopher of biology, I confess that I have never referred to Bergson in any of my writings, talks or courses. I have never even thought of it. My original culture in philosophy of science was a mixture of neo-positivists authors and of three French philosophers who will be evoked at length in the course of this conference: Bachelard, Canguilhem and Foucault. It is thus a rather strange experience, for a French philosopher of science, to come and speak about Bergson. In a sense, this is a good think. Speaking on Bachelard, Canguilhem of Foucault would be like evaluating my intellectual fathers; Speaking on Bergson allows me to be in the ideal anthropological situation of the foreigner. Thanks to Garry, I spent a good deal of this summer reading my compatriot’s writings. I do not pretend that what I will say is original from the point of view of the current literature in history of philosophy. Actually, I have deliberately neglected most of this literature, and I have chosen to concentrate on a single question: what kind of relationship Bergson’s philosophy had with science?

As shown by my title, I have carefully avoided to suggest that there might be anything like a “philosophy of science” in Bergson’s thinking. Bergson was not a “philosopher of science” and did not want to be one. When he was student in philosophy, his first intention was indeed to devote himself to philosophy of science, in the conventional sense that this expression began to have in the
second half of 19th century (i.e. a critical reflection upon the methodology of science). But he quickly decided that he would not engage himself in such a kind of philosophical activity. This change is nicely described in a letter to William James in 1908. On that year, James gave a series of lectures at Oxford University. Since one of the announced lectures bore upon Bergson, James asked him to provide a curriculum, and to comment on remarkable events in his career. Here is an excerpt of Bergson’s answer:

“Pour ce qui est des événements remarquables, il n’y en a pas eu au cours de ma carrière, du moins rien d’objectivement remarquable. Mais, subjectivement, je ne puis m’empêcher d’attribuer une grande importance au changement survenu dans ma manière de penser pendant les deux années qui suivirent ma sortie de l’École normale, de 1881 à 1883. J’étais resté tout imbu, jusque-là, de théories mécanistiques auxquelles j’avais été conduit de très bonne heure, le philosophe auquel j’adhérais à peu près sans réserve. Mon intention était de me consacrer à ce qu’on appelait alors ‘la philosophie des sciences’ et c’est dans ce but que j’avais entrepris, dès ma sortie de l’École normale, l’examen de quelques notions scientifiques fondamentales. Ce fut l’analyse de la notion de temps, telle qu’elle intervient en mécanique et en physique, qui bouleversa toutes mes idées. Je m’aperçus, à mon grand étonnement, que le temps scientifique ne dure pas, qu’il n’y aurait rien à changer à notre connaissance scientifique des choses si la totalité du réel était déployée tout d’un coup dans l’instantané, et que la science positive consiste essentiellement dans l’élimination de la durée”

This letter is remarkable. In a few words, it just says that Bergson renounced to be a philosopher of science — a critical analyst of scientific knowledge — because science ignored the notion of time, which was the central problem of Bergson’s entire philosophy, from the beginning to the end. However, this letter should not be taken as meaning that knowledge is divided into two branches: on the one hand, positive science” (dealing with space and measurable phenomena) and “philosophy” or “metaphysics” (dealing with time, and related notions in Bergson’s thinking: 
duration, mind, qualitative knowledge, intuition, etc.). Bergson’s philosophy is certainly one of the most radical plea in favor of spiritualism in the entire history of philosophy. But it would be a major mistake to believe that Bergson ignored and contempted positive science. It is exactly the reverse. As shown in one of the texts given in appendix of the present paper, Bergson was so much respectful of positive science that he characterized his own philosophical method with the expression of “positive metaphysics”\(^2\). For Bergson, positive science was both the main source of information for the philosopher, and a model. Bergson’s major books were all devoted to problems and theories that were directly inspired by major areas of scientific investigation, and major modern scientific theories. He himself spent a tremendous time in reading primary sources in psychology, medicine, biology, physics and sociology, and commenting upon them. But positive science was also a model: by “positive metaphysics”, Bergson meant a kind of metaphysics founded upon “facts”, and able to correct and rectify itself indefinitely, with the help of “experience”. Experience was definitely not for him a good criterion for the characterization of the difference between science and philosophy. This explains why he did not see himself as a “philosopher of science”. Bergson was not a philosopher of science because he rejected the very notion of “philosophy of science” as a meta-discourse, either normative, foundational or interpretative. In his book *Creative evolution*, he was perfectly explicit on this subject:

“A première vue, il peut paraître prudent d’abandonner à la science positive la considération des faits. La physique et la chimie s’occuperont de la matière brute, les sciences biologiques et psychologiques étudieront les manifestations de la vie. La tâche du philosophe est alors nettement circonscrite. Il reçoit, des mains du savant, les faits et les lois et, soit qu’il cherche à les dépasser pour en atteindre les causes profondes, soit qu’il croie impossible d’aller plus loin et qu’il le prouve par l’analyse même de la

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connaissance scientifique, dans les deux cas il a pour les faits et les relations, tels que la science les lui transmet, le respect que l'on doit à la chose jugée. A cette connaissance il superposera une critique de la faculté de connaître et aussi, le cas échéant, une métaphysique : quant à la connaissance même, dans sa matérialité, il la tient pour affaire de science et non pas de philosophie.

“Mais comment ne pas voir que cette prétendue division du travail revient à tout brouiller et à tout confondre? La métaphysique ou la critique que le philosophe se réserve de faire, il va les recevoir toutes faites de la science positive, déjà contenues dans les descriptions et les analyses dont il a abandonné au savant tout le souci. Pour n'avoir pas voulu intervenir dès le début, dans les questions de fait, il se trouve réduit, dans les questions de principe, à formuler purement et simplement en termes plus précis la métaphysique et la critique inconscientes, partant inconsistentes, que dessine l’attitude même de la science vis-à-vis de la réalité... Nous ne sommes pas ici dans le domaine judiciaire, où la description du fait et le jugement sur le fait sont deux choses distinctes... La forme n’est plus tout à fait isolable de la matière, et celui qui a voulu, par là, mettre la philosophie au-dessus des sciences comme une Cour de Cassation au-dessus des cours d'assises et d'appel, sera amené, de degré en degré, à ne plus faire d’elle qu’une simple cour d’enregistrement, chargée tout au plus de libeller en termes plus précis des sentences qui lui arrivent irrévocablement rendues”


English transl.: "At first sight, it may seem prudent to leave the consideration of facts to positive science, to let physics and chemistry busy themselves with matter, the biological and psychological sciences with life. The task of the philosopher is then clearly defined. He takes facts and laws from the scientists' hand; and whether he tries to go beyond them in order to reach their deeper causes, or whether he thinks it impossible to go further and even proves it by the analysis of scientific knowledge, in both cases he has for the facts and relations, handed over by science, the sort of respect that is due to a final verdict. To this knowledge he adds a critique of the faculty of knowing, and also, if he thinks
This quotation clarifies what Bergson meant by “positive metaphysics”. On the one hand, philosophers should be as rigorous as scientists regarding the empirical adequacy of their theories. On the other hand, there is no absolute frontier between science and philosophy: philosophers should feel free discuss with the scientists about the very content of scientific knowledge. Correlatively, it is not enough for philosophy to be a “critique” of scientific knowledge. Bergson’s attack against Kant and anything that would resemble “epistemology” (a philosophical reflection upon the foundations and limits of scientific knowledge) is obvious.

These observations clarify the second half of my title: “Bergson’s... and the sciences”. Although Bergson often used the word “science” as a generic word for a certain kind of knowledge, he could hardly accept that philosophy or metaphysics stood as something different in nature from “science” in general. Rather than a general “philosophy of science”, philosophers had better examine in detail “the sciences” and confront or cooperate with them. “Confrontation” and “cooperation” are two keywords in Bergson’s terminology when he speaks of the relationship between philosophers and scientists.

proper, a metaphysic; but the matter of knowledge he regards as the affair of science and not of philosophy.

“But how does he fail to see that the real result of this so-called division of labor is to mix up everything and confuse everything? The metaphysic or the critique that the philosopher has reserved for himself he has to receive, ready-made, from positive science, it being already contained in the descriptions and analyses, the whole care of which he left to the scientists. For not having wished to intervene, at the beginning, in questions of fact, he finds himself reduced, in questions of principle, to formulating purely and simply in more precise terms the unconscious and consequently inconsistent, metaphysic and critique which the very attitude of science to reality marks out... Here we are not in the judiciary domain, where the description of fact and the judgment on the fact are two distinct things... Form is no longer entirely isolable from matter, and he who has begun by reserving to philosophy questions of principle, and who has thereby tried to put philosophy above the sciences, as a "court of cassation" is above the courts of assizes and of appeal, will gradually come to make no more of philosophy than a registration court, charged at most with wording more precisely the sentences that are brought to it, pronounced and irrevocable.”
The first half of my title, “Bergson’s spiritualist metaphysics” focuses on the most distinctive feature of his thinking. Bergson was indeed a spiritualist. The entirety of his writings are devoted to demonstrate the existence of the mind, the supremacy of the spiritual over “matter”, by a careful reflection upon various spheres of human knowledge and experience: sensation and perception (psychology), memory (neurology and psychopathology), life (biology), time (physical theory of relativity), but also morals and art. Beyond the variety of objects that Bergson considered, he never stopped repeating and exploring the same basic idea from the first to the last writing. Namely, that time is the key problem that has been neglected by all philosophers and scientists before him. By reflecting upon time, philosophers can establish the reality and importance of “mind” on an appropriate basis. Most commentators concentrate on the system of concepts that Bergson progressively constructed in order to express this idea. This is a legitimate way of analyzing the thinking of a “great philosopher”. What I want to stress here is the relationship of Bergson’s spiritualism with his concern for the empirical knowledge and for the sciences (plural).

For Bergson, matter and mind are not substances. They are “tendencies” or “forces”. These tendencies conflict and collaborate in many areas of human experience, and, beyond, of reality. The problem, then, is not whether the mental is reducible or irreducible to the material, or the reverse. The problem is: what is the respective weight of both tendencies in this or that aspect of reality:

“Le oui et le non sont stériles en philosophie. Ce qui est intéressant, instructif, fécond, c’est dans quelle mesure ? On ne gagne rien à constater que deux concepts tels que ceux d’esprit et de matière, sont extérieurs l’un à l’autre. On pourra faire, au contraire, des découvertes importantes si l’on se place au point où deux concepts se touchent, à leur frontière commune, pour étudier la forme et la nature du contact. Il est vrai que la première opération a toujours séduit les philosophes, parce que c’est un travail dialectique qu’on fait tout de suite sur de pures idées, au lieu que la seconde est une opération pénible qui ne peut s’accomplir que progressivement sur des faits,
sur l’expérience — l’expérience étant précisément le lieu où les concept se touchent et s’interpénètrent.”

This quotation is taken from the 1901 article on “positive metaphysics” that I give in appendix. Later on in the article, Bergson explains what these programmatic precisely mean in relation to his own “spiritualist” philosophy, a term that for once he endorses (though in general he avoids this conventional term)? He explains that his work has deliberately focused on aspects of reality where the “interpenetration” of “matter” and “mind” is obscure: sensation (psychophysics), aphasia and pathology of memory (neurology), biological evolution. This is typical of Bergson’s strategy of advocacy of spiritualism. For him, the mind/body problem (or more widely, the mind/matter problem) had to be examined in areas where these distinctions are obscure: phenomena of high degree of material complexity, which can also be interpreted as “lower manifestations of the mind”. The spiritualist/materialist debate is uninteresting and non-fertile if it focuses on the superior psychological faculties, understanding, reason, creative imagination:

“…j’ai fait descendre l’esprit aussi près que possible de la matière.”

In his successive books, Bergson went “lower” and “lower” in this downward movement: first sensation (Les Données immédiates de la conscience, 1889), then memory (Matter and Memory, 1896), then life (Creative evolution, 1907); the 1922 book on Einstein’s relativity (Duration and simultaneity, 1922), curiously neglected by most commentators, can be seen as the ultimate attempt to understand what “mind” means on the basis of a reflection upon the signification of space and time in definite areas of modern empirical science.

The link between Bergson’s spiritualism and his concern for empirical science is most explicit in the same 1901 article:

“…je dis que le spiritualisme doit se résigner à descendre des hauteurs où il s’est retranché… Nous voulons substituer à l’ancien jeu de écoles, où chacun développait jusqu’au bout une conception abstraite pour venir ensuite l’opposer à la conception contraire, une philosophie large, ouverte à tous, progressive, où les opinions

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5 Ibid., p. 144.
s’éprouveront elles-mêmes, se corrigeront entre elles au contact d’une seule et même expérience”

Thus for Bergson, “the “spiritual’ is never left to pure speculation... For him, reasoning had no import if it did not lead to the facts”. Bergson was a “spiritualist positivist”. This is not an retrospective interpretation, something that I would formulate because it sounds like a nice paradox. It is the plain expression of the historical fact. Around 1900, “spiritualist positivism” was the current name of living tradition among certain French philosophers, such as Jules Lachelier or Émile Boutroux. As Bergson, who was directly influenced by them, they emphasized a conception of the mind founded upon spontaneity, contingency and indeterminism, they also emphasized the importance of time, and they correlative supported that the notion of free causation was as much important as the notion of law, in all areas of natural sciences. Boutroux, for instance, in La Contingence des lois de la nature (PhD, 1874), declared:

“Abandonnant le point de vue externe d’où les choses apparaissent comme des réalités fixes et bornées, pour rentrer au plus profond de nous-mêmes, et saisir, s’il se peut, notre être dans sa source, nous trouvons que la liberté est une puissance infinie. Nous avons le sentiment de cette puissance chaque fois que nous agissons véritablement. Nos actes ne la réalisent pas, ne peuvent la réaliser, et ainsi nous ne sommes pas nous-mêmes cette puissance. Mais elle existe, puisqu’elle est la racine de nos êtres... Par cette doctrine de la liberté divine, la contingence que présente la hiérarchie des formes et des lois générales du monde se trouve expliquée... A leur tour, les êtres inférieurs, dans leur nature et dans leurs progrès, rappellent, à leur manière, les attributs divins.”

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6 Ibid., p. 144.
These sentences are a good illustration of the kind of “indeterminism” and “positivist spiritualism” that flourished in France when Bergson began his philosophical career. Bergson’s would most probably have endorsed all the ideas that are contained in the quotation above (style apart). This helps us understand the cultural Background of Bergson’s philosophy.

In the subsequent sections of this paper, I will first examine the signification of Bergson’s “positive metaphysics” in relation with the general state of scientific knowledge in his time. I will then briefly describe his major “confrontations” with given areas of sciences. Finally, I will characterize Bergson’s general appraisal of “science” – his implicit “philosophy of science”; this can be done by examining his interpretation of notions such as: knowledge, reality, science, causation, law, fact.

2. “Positive metaphysics”

We need to go a little further in our characterization of Bergson’s provocative phrase, “positive metaphysics”. If metaphysics can be “positive”, it means that it can be, not only a “science” (in the loose sense of justified knowledge), but also an empirical science. An empirical science deals with facts, and leaves room for rectification of its theories. Bergson had no problem with this requirement:

“Je vois… dans la métaphysique à venir, une science empirique à sa manière, progressive, astreinte comme les autres sciences positives, à ne donner que pour provisoirement définitifs, les derniers résultats où elle aura été conduite par une étude attentive du réel.”

However, there is a problem here. If metaphysics deals with notions such as “duration”, or “unforeseeable novelty”, will this discipline be able to apply the standard methodology of the natural sciences? Can we conceive of a kind of metaphysics that would measure its objects and make predictions? This seems impossible. Bergson himself rejected this perspective. In fact, when he said that metaphysics could pretend to be an empirical science, the word “science” had not the
signification that he currently attributed to it in the majority of his writings. Innumerable quotations would show that “science” was for him a kind of knowledge defined by the requirement of measuring and predicting the phenomena: “La science a pour principal objet de prévoir et de mesurer: or on ne prévoit les phénomènes qu’à la condition de supposer qu’ils ne durent pas comme nous, et on ne mesure que de l’espace.”\textsuperscript{11} Science, here, means mathematized knowledge, making us able to master the material phenomena. In that sense, science and metaphysics have different objects and methods. This is a common place in Bergson’s philosophy: science is quantitative, metaphysics is qualitative; science relies on spatial schemata, metaphysics does not; science is the work of “intelligence”, and is therefore adaptive, pragmatic, and technically oriented, whereas metaphysics relies on “intuition”, and aims at a gratuitous “understanding” of what is absolute and real. When Bergson develops such ideas, the qualification of metaphysics as “science” is a mere impossibility.

However Bergson was convinced that the Cartesian or mechanistic ideal of science as mathematized knowledge was no longer the only one. For him, the emergence of biology and human sciences in the 19th century forced the scientists and the philosophers to recognize that science could not merely be a huge mathematics, that is a system of symbolic relations between measurable phenomena. The idea of a universal mathematics, a \textit{mathesis universalis}, was definitively behind. Again, the 1901 talk delivered in front of the French Society of Philosophy is highly interesting. On that occasion, he clearly formulated the philosophical import of the emergence and development of biological and human sciences:

“Si les cartésiens... ont rapporté à l’\textit{étendue} tout ce que la nature nous offre de clair et distinct, c’est que les découvertes des astronomes et des physiciens du XVI\textsuperscript{e} et du XVII\textsuperscript{e} siècle, et par dessus tout les découvertes de Descartes, leur avaient révélé la puissance

\textsuperscript{10} Henri Bergson, “Le parallélisme psycho-physique et la métaphysique positive”, loc. cit. n. 2, p. 147.


“The main object of science is to forecast and measure: now we cannot forecast physical phenomena except on condition that we
explicative de l’idée d’étendue... Mais notre expérience à nous, est beaucoup plus vaste. Elle s’est élargie au point que nous avons dû renoncer, depuis bientôt un siècle, à l’espoir d’une mathématique universelle. Des sciences nouvelles se sont constituées sur cette renonciation même, des sciences qui observent et expérimentent sans arrière-pensée d’arriver jamais à une formule mathématique. L’intelligibilité s’étend ainsi peu à peu à de nouvelles notions, suggérées, aussi, par l’expérience.”

For Bergson, biological evolution and physiology, provided empirical evidence in favor of the existence of a certain degree of “indeterminacy”, “contingency”, and “capacity of choice”. Thus, together with an unprecedented development of the psychological and social sciences, biology open the route to a genuine collaboration between metaphysics and the empirical sciences. Here are the last words of the 1901 communication to the French Society of Philosophy:

“Travaillons donc à serrer l’expérience d’aussi près que nous pourrons. Acceptons la science avec sa complexité actuelle... Il faut rompre avec les cadres mathématiques, tenir compte des sciences biologiques, psychologiques, sociologiques, et sur cette large base édifier une métaphysique capable de monter de plus en plus haut par l’effort continu, organisé, de tous les philosophes associés dans le même respect de l'expérience”

Bergson’s claims about the possibility of a “positive metaphysics” were thus closely related to his evaluation the state of the sciences in his own time. Biological sciences were absolutely crucial in that respect. For Bergson, they provided thousands of examples of the existence of something in nature that cannot be correctly understood in the mere language of “matter in motion”. For this, he had a conventional expression, “la signification de la vie” (the meaning of life). By this term, Bergson meant “the insertion of thinking in life” (“l’insertion de la pensée de la vie”). If this concept could be empirically documented, then a “positive metaphysics” was possible:

assumption that they do not endure as we do; and, on the other hand, the only thing we are able to measure is space.”

“Si cette signification de la vie peut être déterminée empiriquement d’une manière de plus en plus exacte et complète, une métaphysique positive, c’est-à-dire incontestée et susceptible d’un progrès rectiligne et indéfini, est possible.”

3. “Confrontation”

I will now briefly characterize and classify the various interactions that Bergson had with definite areas of empirical science. With the exception of a few brilliant, but marginal essays (especially those on laughter and dream), the major books written by Bergson can be presented as a major “confrontation” between a philosopher and a given area of scientific knowledge. The word “confrontation” is the one he used himself with some solemnity at the beginning of his book on Einstein’s theory of Relativity”.

“We wanted to find out to what extent our concept of duration was compatible with Einstein’s views on time. Our admiration for this physicist, our conviction that he was giving us not only a new physics but also certain new ways of thinking, our belief that science and philosophy are unlike disciplines but are meant to complement each other, all this imbued us with the desire and even impressed us with the duty of proceeding to a confrontation” (Duration and Simultaneity, With Reference to Einstein’s Theory, translated by Leon Jacobson, Indianapolis, The Bobbs-Merrill Company, 1965, p. 5. In this translation, I have substituted “implement each other” by “complement each other”).
Compatibility, complementation, confrontation: these words perfectly describe Bergson’s attitude towards given areas of science. Note however the nuances associated to these words: reciprocal complementation is desirable, it is an ideal; compatibility is subject to discussion; confrontation is then the normal relationship between the two disciplines. Confrontation implies a collision between two lines of thought. It is not the kind of word that philosophers of science would ordinarily use in order to describe the kind of relationship that they have with science, or give areas of scientific knowledge or practice. Philosophers of science would typically say that they evaluate or interpret the scientific structure of a given theory, its rational or non-rational foundations, its significance for the understanding of science and the history of science in general. They would hardly characterize their work as a “confrontation” between their understanding of a given subject (for instance the brain, or the phenomena of sensation and memory, or the concepts of simultaneity) and the scientific treatment of these subjects in given areas of investigation. As far as I know, Hempel, Popper, Bachelard, or Kuhn did not devote entire books to showing that, for instance, the foundations of psychophysics are just wrong, that the theory of cerebral localization and psycho-physic parallelism is not proved, that biologists have missed something essential in evolution, and that the current interpretation of Special Relativity in physics is unsound. But this is precisely what Bergson did. He did it, not as a specialist of the domains I have mentioned, although he worked hard on each of them, but because he wanted to “confront” scientific evidence and theories with philosophical theories of his own. To have a “confrontation”, one needs two terms. On Bergson’s side, this term is easy to designate: it is a certain conception of time. This conception of time had many consequence for many issues in philosophy, such as perception, knowledge, matter, reality, freedom, God and morals, for instance. Nevertheless it is this conception of time, for which Bergson coined the word “duration”, which he unceasingly “confronted” to many areas of the scientific knowledge of his time.

Commentators of Bergson commonly say that Bergson wrote four important books:

- *Essai sur les données immédiates de la conscience* [Time and free will. An essay on the immediate data of consciousness], 1889. This was his PhD dissertation. First English translation: 1912.


- *L’Évolution créatrice* [Creative evolution], 1907. First English translation: 1911.
- Les Deux Sources de la morale et de la religion [The two sources of morality and religion],

This appreciation is certainly correct from the point of view of the genesis of Bergson’s philosophical thinking. The “essential Bergson” is indeed contained in these four books. It would be tempting then to evaluate the evolution of Bergson’s philosophy with respect to scientific knowledge. Although these books have a rather complex structure, and go much beyond their specific comments on given areas of scientific knowledge, it is true that each one of them is concerned with a major scientific area: psychology (Essai and Matière et mémoire), neuropathology (Matière et mémoire), biology (L’Évolution créatrice), and social sciences — especially ethnology (Les deux sources). This would even agree with Bergson’s prophetic declaration of 1901, when he said that modern metaphysics should take into account, not only mathematics and physics, but also “biology, psychology and sociology” (see quotation above, contra n. 13).

However, another presentation is possible, if we take seriously the science and philosophy “confrontation” that was so crucial to Bergson. As already said, this confrontation was not a mere bunch of diverse interactions between Bergson’s philosophy in general and science in general. If we are looking for just this, almost everything written by Bergson is relevant. The real “confrontation” bore upon one single problem, the problem of the signification of time. Although all of Bergson’s writings bear some relation with this problem, not all these writings are specifically intended to explore the, and even fewer pretend to have made a significant advance on the issue of “duration” (the concept that Bergson introduced in philosophy in order to account for the nature of time).

First, the last big book (The two sources of morality and religion) is not a book on duration. It does not bring anything new on the subject, and does not pretend to do so. Secondly, the list of four books that we gave above does not mention Duration and simultaneity, first published in 1922. This book is important for us for several reasons. First it is the only book the title of which contains the word “duration”. Secondly, it is a work on the most general physical theory that was available to Bergson, Einstein’ theory or Relativity. Third, Einstein is explicitly mentioned in the subtitle of the book. Nowhere else did Bergson ever mentioned the name of a scientist in the title of a book (or even of a chapter).

Duration and simultaneity had a strange fate. There was a second edition in 1923, with several important appendices. Four other printings were made between 1926 and 1931. In spite of this
success, Bergson renounced to publish on Relativity, and finally forbade the reprinting of his book. He confessed that he was unable to understand the mathematics involved in the theory of General Relativity. General Relativity was not the subject of *Duration and simultaneity*, which discussed only Special Relativity. But Bergson came to realize that some of his criticisms (especially the paradox of “asymmetrical aging”) could be dramatically affected by taking into account General Relativity. The result of this is that *Duration and simultaneity* was never reissued before his death. It was also excluded from the volume of the “Centenary”, which gathered in 1959-1959 the major books and articles. Similarly, the three volumes of minor texts published in 1957 under the title *Dits et écrits* also ignore this book, and related articles on Relativity. *Duration and simultaneity* was finally reissued in 1968, and is currently available now. In spite of this, commentators most often ignore this book and do not quote it. The most reasonable explanation for this is that *Duration and simultaneity* does not bring something really new from the point of view of Bergson’s own elaboration of the notion of duration. Bergson confronts the theory of Special Relativity with his concept of duration as elaborated in previous works. Another possible explanation for the historians of philosophy low interest for the book on Einstein is that it is written in a style quite different from the other books: here, from the first to the last page of a 285 pages book (second extended edition, 1923), Bergson deals with one single scientific theory, with not even a single digression. The book is austere, non-metaphoric, and entirely devoted to a methodological discussion. In other words, were it not for the confrontation with Bergson’s own philosophy of time, *Duration and simultaneity* looks like a traditional book in “philosophy of science”… Commentators of Bergson are generally not “philosophers of science”.

For our purpose, *Duration and simultaneity* is important. It reveals a sort of hidden agenda of research. Consider indeed the first three books in the list above, and add *Duration and simultaneity*. Each of these books can be considered as a decisive step in a program consisting in exploring the content and empirical plausibility of the concept of duration. The 1889 *Essay on the immediate data of consciousness* introduces the concept of duration in the most conspicuous case: the psychological problem of “consciousness”. *Matter and memory* (1896), Bergson’s masterpiece, broadens the subject: duration is still examined and documented on the sole case of human beings, but the concept now applies to “inferior faculties”, which can be unconscious, and are indeed explicitly presented as such by Bergson: inferior manifestations of “mind”, with its properties of
continuity, unforeseeable novelty, free causation, contingency. In *Creative evolution* (1807), Bergson moves to biology in general, with special regard to evolution. Here, the concepts of duration and mind find their broadest signification, life and creation, with discrete but firm allusions to extraterrestrial life, and, ultimately, God. At that point, it seems that Bergson has reached the end of his program: mind and matter, although not “substances”, exist as “forces” or “tendencies” that conflict at all levels of reality. Science does not escape that conflict: physics explores the manifestations of matter and space, biology and psychology are also concerned with mind and time. *Duration and simultaneity* (1922), however, shows that Bergson wanted to go a step beyond. The central thesis of this book is that Einstein’s theory of Relativity of Space and Time is in fact “compatible” with a notion of “universal physical time”. The entire book consists in developing one single argument. Bergson demonstrates, or try to demonstrate that the contraction of distance, the dilatation of time, and the “dislocation” of simultaneity, although fully valid from an empirical point of view, result from a fictitious theoretical situation where each observer (taken as “real”) imagines another “virtual” observer and tries convert his own measurement into the measurements of this “phantasmal” observer. This operation, Bergson’s says, is absolutely legitimate for the construction of laws of nature that are genuinely invariable, whatever the position of the observer in space and time. But for Bergson, this does not demonstrate that time and motion are relative. The conclusion of the book is that Einstein’s relativity does not force us to admit Langevin’s paradox of “asymmetrical aging”. In 1911, this French physician had stated that a space-traveler would be younger upon his return on earth than his stay-at-home brother, which might well be dead by that time. It is this paradox indeed that led Bergson to write on physical Relativity. The paradox of asymmetrical aging was a major problem for a philosopher who asserted that movement in general is real and not relative, and that duration is an internal, immanent and absolute property of living beings. Bergson’s refutation of the paradox of asymmetrical aging would deserve a more detailed analysis. What I want emphasize here is Bergson’s objective: his intention was to show that the new physics of Einstein, if it did not illustrate his notion of duration, was at least compatible with it. Einstein’s theory was true from the point of view of pragmatic and predictive science, but it was neutral with respect to the philosophical question of the existence of an “universal time”.

We now understand better the program of Bergson’s “positive metaphysics”. In psychology, then neurology, then evolutionary biology, and finally in physics, he pretended to have convincingly
“refuted” a number of theories, or interpretations of theories, that were vitiated because they neglected the role and the signification of time: the treatment of conscious states as magnitudes (psychophysics), the engrammatic interpretation of memory in neurology, the “mechanistic” theories of evolution (especially Darwin). The examination of Einstein’s Relativity was also a necessary piece in this philosophical program. Of course, physics, which is the science of matter, could hardly confirm and illustrate positively the philosophy of duration. But it was crucial to Bergson to show that the first theory in the history of physics that wholly assumed a theory of space and time was not incompatible with his philosophical interpretation of time.

Of course, the positive content of Bergson’s metaphysics does not go beyond biology. Bergsonian metaphysics finds indeed his most powerful formulation on the occasion of an opposition between the sciences of matter, and the sciences of life (biology and psychology), which reveal the extent of mind in nature. As soon as 1901, that is six years before the publication of Creative Evolution, this is already perfectly clear:

“Je ne puis envisager l’évolution en général et le progrès de la vie dans l’ensemble du monde organisé, la coordination et la subordination des fonctions vitales les unes aux autres chez un même être vivant, les relations que la psychologie et la physiologie combinées semblent devoir établir entre l’activité cérébrale et la pensée chez l’homme, sans arriver à cette conclusion que la vie est un immense effort tenté par la pensée, pour obtenir par la pensée, pour obtenir de la matière quelque chose que la matière ne voudrait pas donner... Il semble que la pensée cherche à profiter de [l’]aptitude mécanique de la matière, à l’utiliser pour des actions, à convertir ainsi en mouvements contingents dans l’espace et en imprévisibles événements dans le temps, tout ce qu’elle porte en elle d’énergie créatrice.”

Bergson’s epistemology and philosophy of science

Bergson did not want to be a "philosopher of science". The kind of division of labor implied by this conventional term did not appeal to him. Science was indeed a major partner for philosophy, an probably the major partner. But it was not enough for philosophy to be just a "critique" of scientific knowledge. Philosophy can and should pretend to participate in the construction of the content of knowledge. This does not mean that Bergson's philosophy is of no relevance for philosophers of science. Science is so much a central object for Bergson that it is not difficult to identify in his thinking a series of theses, which constitute a sort of implicit "philosophy of science". In this last section, I enumerate some of these characteristic theses. Since my objective is just to sketch out a portrait, I will not go far in the analysis of these theses. It will be enough to formulate them.

Knowledge

Knowledge was one of the most central problems for Bergson. A major and constant objective of his thinking was to show that Kant's critique was wrong. Bergson sustained that our knowledge is able to attain something real and absolute. What is real and absolute is what we perceive. All knowledge is based upon conscious perception, no knowledge can go beyond. This is not a limitation. Perception is the firm basis and ultimate horizon of all knowledge. Bergson's constant philosophical model, in that respect, was Berkeley. In Duration and simultaneity, there is a remarkable passage. At a certain point, after a lengthy discussion over the relativistic thesis of the "plurality of times", Bergson states his own view of time: "Qu'est-ce en effet qu'un temps réel, sinon un temps vécu ou qui pourrait l'être"\(^7\) [What, indeed, is a real time, if not a time lived or able to be lived]. Shortly after this sentence, the philosopher explains what he means by "reality": "... la réalité – c'est-à-dire... la chose perçue ou perceptible"\(^8\) ["reality, that is [a] perceived or perceptible thing]. It is not haphazard if this explication of the meaning of "reality" comes in the

"What, indeed, is a real time, if not a time lived or able to be lived?"

\(^8\) Ibid., pp. 107-108.
context of a discussion over the notion of time. For Bergson, time as duration is real because it is immediately experienced: we experience the continuous succession of anything whatsoever. In contrast, space is a schema that our spirit constructs for the purpose of an efficient action on our environment. Space is neither a property of things or an a priori condition of our faculty knowledge. The elucidation of the signification of space and time with respect of “reality” was the most constant and central objective of Bergson’s philosophy.

A second aspect of Bergson’s epistemology is the inseparability of theory of knowledge and theory of life. If the theory of knowledge is a theory of the a priori conditions of knowledge, then it depends narrowly on biological evolution. For instance, space and logic are adaptive devices. Their ultimate signification is that of instrumental schemata that render possible our mastery of the material world. Or, in other words, their ultimate background is not understanding of the world, but acting upon the world. Bergson would have felt at ease with today’s discussions over “evolutionary epistemology” and the “meso-cosmic” constraints that affect our cognitive faculties.

Science

If “science” is taken in the sense of “knowledge of the measurable”, it is relatively easy to situate Bergson relatively to the current debates over the cognitive status of scientific theories. Insofar as it deals with measurable magnitudes, scientific knowledge is for Bergson a “symbolic” knowledge, which translates perceptual data into space symbols. Such a kind of knowledge aims at controlling our natural environment. It belongs to a “logic of action”. Therefore it cannot pretend to tell us what is “real”, but how we can master our material environment. Science, in this respect, is instrumental, conventional, and pragmatic. This thesis is repeated again and again in all Bergson’s books.

Causation and laws of nature

A spectacular illustration of Bergson’s conception of knowledge and science can be found in his interpretation of the notions of causation and law. Laws are a perfect example of a pragmatically oriented knowledge. Science and technique come from the same source. Both are primarily interested in the constant properties of things around of us. These constant properties are that which makes us able to predict and control the behavior of our surrounding world. A maximal
degree of constancy and universality is thus a guarantee of maximal efficiency. We look for laws because we want to control the phenomena.

Bergson was very cautious about not confounding the notion of law and that of causation. He defended that the empiricist interpretation of the category of causation was unlikely. The traditional account of causation consists in saying that this belief comes from habits generated by the observation of external phenomena. In a remarkable talk of 1900, given here as an appendix\textsuperscript{19}, he argues that this conception is erroneous. Here is the argument:

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"La physique nous découvre de mieux en mieux des phénomènes donnés en concomitance, ou en succession avec des phénomènes auxquels ils sont liés invariablement. Mais il est rare que des phénomènes déterminés coexistent, ou succèdent à des phénomènes déterminés dans notre expérience visuelle immédiate, et causalité n'implique pas distinctement succession ni distinctement concomitance pour l'intelligence commune. Mle tort de l'empirisme ne serait-il pas... d'intellectualiser trop la croyance générale à la loi de causalité, de l'envisager dans son rapport à la science, et non dans son rapport à la vie."\textsuperscript{20}
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The true psychological origin of the general belief in causation is in fact in our internal experience of voluntary action:

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"A tort ou à raison, nous voyons dans nos volitions et dans nos mouvements des effets contingents, indéterminés, dans une certaine mesure, par rapport à leur cause. Ce n'est donc pas la notion de causalité déterminante, mais celle de causalité libre, que nous puisons dans l'observation pure et simple de nous-même."\textsuperscript{21}
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This internal and practical experience has nothing to do with our perception of the external world. It is a “continuously active habit”. This habit is itself “coextensive and essential to life”, just

\textsuperscript{20}\textit{Ibid.}, p. 131.
\textsuperscript{21}\textit{Ibid.}, p. 131. Bergson draws this idea from Maine de Biran, whom he quotes in this text.
as “the habit of respiring”. This metaphor is not innocent. The origin of the belief in causation is not just psychological, it is biological. The notion of causation is indeed rooted in the very structure of the nervous system. The nervous system consists fundamentally in sensorimotor mechanisms, which anticipate a contact of our body with the perceived object. The origin of the notions of “cause” and “effect” is just there: the sensory impression is the “cause”, the contact with the object is the “effect” (135). Thus, causation, in the sense of free causation, has its origins in a “practical belief” common to humans and superior animals. “Determining causation” [causalité déterminante] is something more complex. It presupposes the intervention of abstraction. The belief in determining causation results from the projection of our intuitive feeling of necessity upon external objects. This implies some kind of logical necessity. The belief in external causation is thus a rather complex psychological construction. The important point for Bergson is that it is built upon the more primitive experience of free causation. Action, not passive perception is the key word.

Ontology (furniture of the world)

Bergson did not use the word “ontology” in the current sense that we currently gave it in modern philosophy of science (i.e. a reflection upon the entities that constitute the “furniture of the world”). But he definitely had a clear notion of what the natural world is made of. His ontology was an ontology of “forces” or “tendencies”, not an ontology of “substances”. Whence his sympathy for energetism, which was rather popular among many scientists and philosophers of his time. This energetism was in perfect agreement with his interpretation of science and causation, an interpretation which emphasized the notions of adaptation and action rather than that of disinterested knowledge.

Physical and biological sciences: two kinds of “facts”

I have already stressed the huge import of biological sciences in the genesis of Bergon’s philosophy. I would like to conclude this paper by pointing a rather fascinating interpretation that Bergson gave of the duality of biological sciences and physical sciences. In the discussion that followed the 1901 famous talk where Bergson advocated the idea of “positive metaphysics”, a metaphysics founded on facts, he was objected to have misused the words “fact”, “experience”,
and “scientific”. This objection was formulated by Louis Couturat. He was in fact reproached to have confounded “theory” and “fact”. Bergson responded that “facts”, although objective in all cases, do not have the same signification in physics and in biology, with respect to their dual relation to nature and to our representation:

“Je suis tout prêt à accorder que, dans le monde inorganique tout au ois, et partout où le fait a des allures mathématiques, notre loi détermine le fait autant que le fait détermine notre loi... Les corps tombaient avant Galilée, et c'est ce qui a donné à Galilée l'idée de chercher la loi de chute des corps. Mais c'est la loi de la chute des corps qui a permis d'isoler définitivement le phénomène de la chute des corps, et même, plus généralement, de définir le ‘fait physique’ et de l'ériger en entité indépendante. En ce sens le fait physique est en grande partie notre œuvre? Mais à mesure que nous nous élevons de l'inorganique à l'organisé, nous nous trouvons en présence de faits plus objectivement voulus comme comme faits, par la nature elle-même. Un être vivant est un cercle à peu près fermé, et fermé par la nature.”

In other words, facts have more the status of cognitive constructs than in biology. The objectivity of physical facts is proportional of our ability to recognize constant and universal relations (or “laws”). In biology, facts are facts because they express something that is genuinely posed or “wanted” by nature. I cannot read such declarations without thinking of Georges Canguilhem about the “normativity” of the living (the living poses its own norms). Bergson’s reflection over biological facts resembles very much to Canguilhem’s “normativity”. Canguilhem might well have been himself inspired by Bergson’s 1901 intuition. Bergson was indeed suggesting that biological facts, if they have any nomological import, are laws instituted by the living itself. Biological facts, thus, testify for the existence of a certain degree of freedom, a certain degree of spirituality in living being as such. I am not sure whether the word “fact” still has any

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methodological value or not in such a kind of discourse. But I am sure that this was absolute crucial to what Bergson called “positive metaphysics”.